

**A NCRAC-SEA GRANT PARTNERSHIP FOR REGIONAL AQUACULTURE EXTENSION  
FOCUSED ON MARKETING AND CONSUMER DEMAND**

*Extension: Education/Producer and Consumer Education*

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<b>Industry Advisory Council Liaison:</b>	Marvin Emerson
<b>Extension Liaison</b>	Ronald Kinnunen
<b>Funding Request</b>	\$150,000
<b>Duration:</b>	2 years, 11/01/2018 – 10/30/2020

**Objectives:**

1. Hire a regional aquaculture extension specialist housed at Purdue University and jointly appointed in the North Central Region Sea Grant Programs and serving all 12 states of the North-Central Region.
2. Conduct a regional needs assessment to better understand what consumer- and marketing-oriented aquaculture programming is being done and how to best use extension to address needs and impediments.
3. Work with existing personnel throughout the North Central Region to develop and deliver extension programming to address consumer needs and impediments aimed at all of the states in the North Central Region.
4. Coordinate development of regional aquaculture extension networks by serving as a liaison among the Sea Grant programs, partnering universities, NCRAC stakeholders, and other stakeholders throughout the North Central Region.
5. Use quantitative and qualitative evaluation to assess the effectiveness of the specialist's program and to help plan subsequent years of the program.
6. Partner with stakeholders to develop funding extending beyond the initial two-year period.

**Deliverables**

- **Needs assessment/market research.** This will include a report describing the results of the mixed-methods needs and market assessment, which will be made available to project staff, NCRAC, and interested members of the aquaculture industry.
- **Marketing tools and products** These will potentially include both marketing and extension products aimed at increasing consumer demand by emphasizing the local, healthy, and sustainable aspects of farmed fish and the benefits of buying US-produced seafood. The digital home for the project will be a website, designed and maintained by communication staff at Purdue. Other products will include farmed fish fact sheets, videos, and other extension products, which may be targeted towards magazines, podcasts or other audio media, booths at trade shows or fairs, and other items as needed.
- **Published resources and on-site demonstrations of farmed seafood preparation.** The regional specialist will develop a series of brochures, cookbooks and/or recipe cards (print and electronic), together with on-site demonstrations of seafood preparation. Demonstrations would be developed with an emphasis on farmed seafood, to be delivered at farmers' markets, grocery stores, and other points-of-purchase. Ultimately, the specialists will train extension agents to deliver these demonstrations (via a train-the-trainer approach) to expand the reach of this program.
- **Stakeholder workgroups.** As part of the regular meetings related to this project, the specialist may convene workgroups of relevant stakeholders. The workgroups themselves and any notes, minutes, or other products related to the workgroups might be a valuable deliverable for the project.

**Proposed Budgets**

<b>Institution</b>	<b>Principal Investigator</b>	<b>Objectives</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Total</b>
Purdue University	Tomas O Höök, Ph.D.	1-6	\$75,000	\$75,000	\$150,000
<b>Totals</b>			\$75,000	\$75,000	\$150,000

**Non-funded Collaborators:**

<b>Facility</b>	<b>Collaborators</b>
Illinois-Indiana Sea Grant	Stuart Carlton, Ph.D.; Kwamena Quagraine, Ph.D.
Ohio Sea Grant	Christopher Winslow, Ph.D.
Michigan Sea Grant	James Diana, Ph.D.; Catherine Riseng, Ph.D.
Wisconsin Sea Grant	James Hurley, Ph.D.
Minnesota Sea Grant	John Downing, Ph.D.

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## PROJECT SUMMARY

Aquaculture is an important source of healthy protein for ever-expanding domestic and global populations. However, the US edible seafood trade deficit was over \$14 billion in 2016 (NMFS 2017), the second-largest natural resources trade deficit. Aquaculture production in the North Central Region (NCR) could grow if producers have improved access to knowledge, skills, and technology and consumers demand this healthy, sustainable, locally produced food.

We propose a partnership between the North-Central Regional Aquaculture Center (NCRAC) and Sea Grant to catalyze aquaculture growth in the North-Central Region. The program will be co-funded by NCRAC and Sea Grant, housed at Purdue University, and host a regional aquaculture specialist jointly appointed to the five NCR Sea Grant programs: Illinois-Indiana, Michigan, Minnesota, Ohio, and Wisconsin. The initial focus of the program will be aquaculture marketing and consumers. In the first two years of the project, the program will assess industry extension needs and impediments, deliver responsive, consumer-oriented programming and marketing, serve as a liaison among project partners and regional stakeholders, and seek future funding. The overall goal of the project is increased consumer awareness of and demand for the locally grown, healthy protein that aquaculture provides resulting in a more resilient, profitable aquaculture industry.

## JUSTIFICATION

U.S. aquaculture is a growing industry with the potential to ease demand on overexploited capture fisheries and reduce the significant edible seafood trade deficit by providing consumers with a source of healthy locally grown protein. However, the growth in aquaculture in the US, generally, and the North Central Region (NCR) specifically, has lagged expectations (NCRAC 2017). Indeed, the seafood trade deficit remains considerable in both weight and dollar value (Figure 1) despite increased focus on aquaculture.

Although the success or failure of the aquaculture industry depends on multiple interrelated factors, there is substantial evidence that understanding consumer perceptions of aquaculture, aquaculture producers, and farmed fish is a key to success for the industry. For example, many NCRAC extension publications (e.g., Burden 2012) and presentations (e.g., Kumar and Engle 2018) discuss the critical role of understanding — and marketing to — consumer attitudes in aquaculture business success. Simply put, continued aquaculture growth requires using production and marketing to be responsive to consumers' preferences.

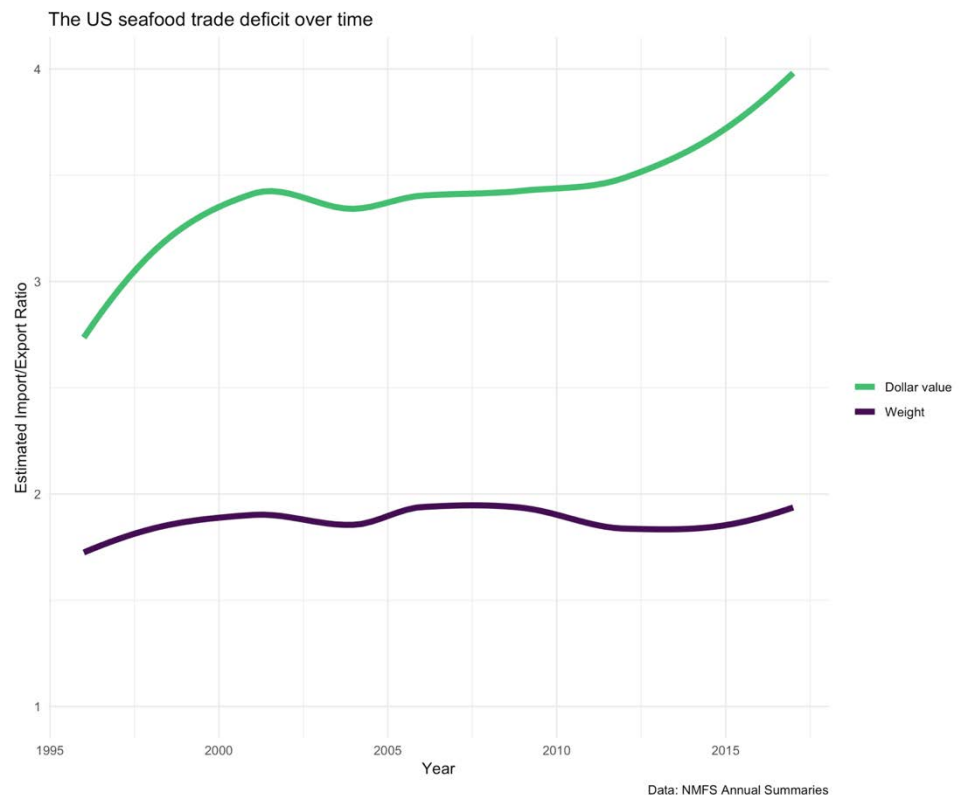


Figure 1. US Seafood Trade Deficit

However, evidence suggests that aquaculture is an *unobtrusive issue* for most people: one with which they have limited direct experience (Eyal et al. 1981). Consumers lack a nuanced understanding of aquaculture as a means of production or farmed fish as a source of protein. As a result, consumer perceptions of aquaculture tends to be through mediated communication such as news media and strongly influenced by their perceptions of terrestrial agricultural and livestock production (Verbeke et al., 2007; Hall and Amberg 2013; Rickard et al. 2017) or by attitudes towards other environmental issues (Froehlich et al., 2017). Consumers may have outdated views of aquaculture production as environmentally detrimental (Conklin 2014). This lack of information and understanding

can lead consumers to inconsistent conclusions about farmed fish. For example, one study found that Spanish consumers preferred farmed fish in a blind taste test but preferred wild-caught fish in a test where fish was labeled as wild-caught or farmed (Claret et al. 2016).

On the other hand, there is a growing interest among consumers to prioritize local foods and products (Figure 2; Feldman and Hamm 2015). Consumers and suppliers may not always think of Midwest-produced fish as a viable option for local food, but we believe that tapping into the local-foods movement will represent a compelling motivation for increasing demands for these products. Indeed, many consumers have a consistent preference for local foods (Schneider and Frances 2005) and several studies (e.g., those reviewed in

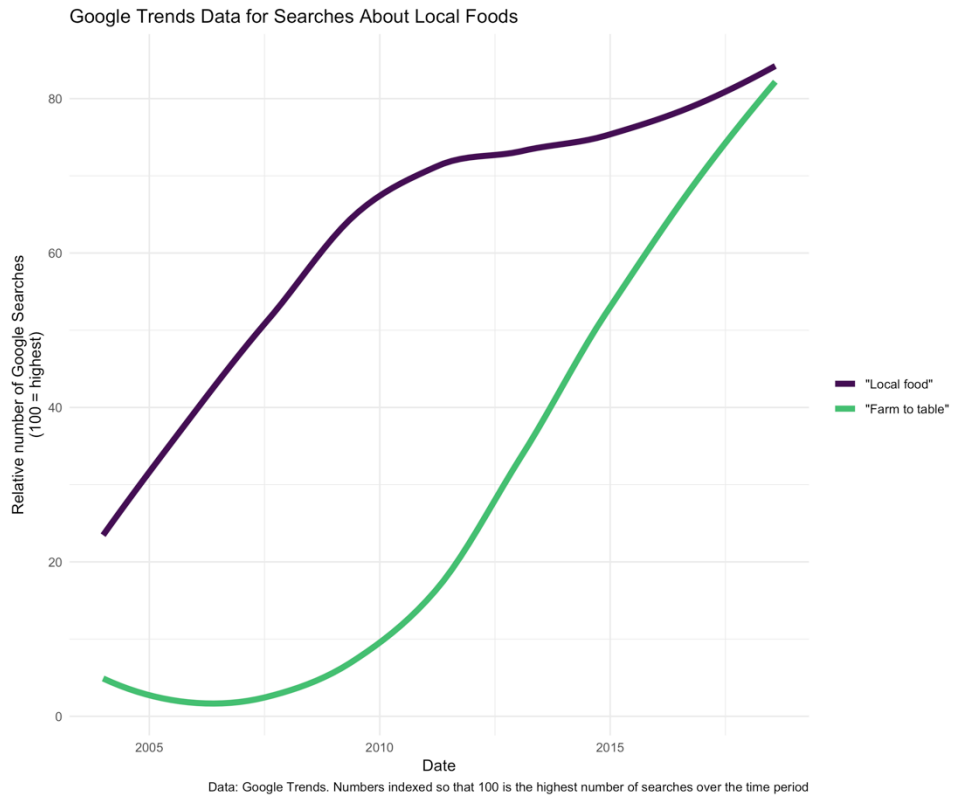


Figure 2. Google search trends for local foods

Onken et al. 2011) have shown that consumers are willing to pay as much — or more — for locally grown food as for organic food. Marketing along these lines may work to significantly inform consumers’ perceptions of aquaculture. In addition, as described above and in Fig. 1, there is a pronounced trade deficit for seafood. Thus, we also anticipate tapping into the desire for Midwest residents to support US products in the global economy.

Consumers’ lack of knowledge presents an opportunity for extension and marketing. Indeed, media are key sources of information on unobtrusive issues (Ader 1995) and media and marketing messages can strongly influence consumers’ perceptions on these sorts of issues (Lee 2004). Our proposed consumer- and marketing-focused regional aquaculture extension program can work to educate consumers about the benefits of farmed fin- and shellfish as a sustainable source of local protein, serve as a liaison between consumers and industry, and supplement existing, production-focused aquaculture extension work. By partnering with the Sea Grant programs in the North Central Region, we can leverage existing facilities, networks, and ongoing extension activity while serving the entire North Central Region. This partnership will work towards the goals outlined in the NCRAC Strategic Plan with a focus on Goals 2 and 3:

- Goal 2: NCRAC will build a strong aquaculture community through partnerships in the North Central states.
- Goal 3: Enhance aquaculture’s stature in the North Central states and NCRAC’s image within the industry and among its key stakeholders, e.g., elected officials (federal, state, and local), public agencies, politically influential agricultural organizations, professional organizations, and other Regional Aquaculture Centers.

In addition, this partnership will help the five Sea Grant programs achieve their goal of supporting sustainable fisheries and aquaculture by supplementing (rather than replacing) existing efforts. The financial support pledged by National Sea Grant (see attached letter) is contingent on NCRAC funding this proposed program. Thus, the Sea Grant commitment would extend capacity and not duplicate existing Sea Grant activities.

## RELATED CURRENT AND PREVIOUS WORK

There is a broad history of extension working on aquaculture seafood marketing, ranging from video products (e.g., Pierce et al. 1995) to manuals (Burden 2012. Riepe 1999a, 1999b), and electronic tools such as MarketMaker. In addition, many Sea Grant programs dedicate significant resources to aquaculture and seafood production and marketing. In the North Central Region, Michigan Sea Grant has hosted a “Seafood Summit”, posted recipes, and published several articles and publications related to seafood preparation and consumption. Wisconsin Sea Grant supports an aquaculture outreach and education position in collaboration with the University of Wisconsin – Stevens Point and has maintains an Eat Wisconsin Fish site at <https://eatwisconsinfish.org>. Illinois-Indiana Sea Grant supports an aquaculture marketing specialist who does important research and extension work to help inform the aquaculture market. Other Sea Grant programs, such as Ohio and Minnesota, have focused on technical support and education for producers. Our proposed project will expand on past and current work by increasing the amount of effort dedicated to aquaculture marketing in the North Central Region, updating outdated materials, increasing the reach of existing programs, building off of past successes, and helping to share lessons learned on a regional basis.

## STATEMENT OF DUPLICATION

Although this is not a research project, we accessed the USDA Current Research Information System (CRIS or REEport), the National Sea Grant Office Funding Page, prior Sea Grant funded projects, and the NOAA Office of Aquaculture Funding Opportunities page. Our proposed work is original work and, in our opinion, does not duplicate any previously funded projects in any of the databases.

## ANTICIPATED BENEFITS

The anticipated benefits are delineated in the logic model (Figure 3) and are as follows:

- Short-term knowledge gains (timeframe: 1–2 years)
  - Consumers will increase knowledge of the health, environmental, and economic benefits of locally produced seafood
  - Consumer awareness of locally produced farmed seafood will increase
  - Consumers will increase knowledge of how to clean and cook seafood
  - Producers will have increased knowledge of consumer preferences and marketing techniques and understanding of relevant food supply chain regulations
  - Program staff, NCRAC, USDA, and Sea Grant will increase their understanding of how to effectively partner on synergistic resource issues
- Medium-term behavior changes (timeframe: 2–5 years)
  - Consumers will increase their consumption of locally produced seafood
  - Seafood producers, distributors, and sellers will adapt their practices based on consumer preferences
  - The aquaculture industry will receive increased investment from existing and potential producers
  - NCRAC, USDA, and Sea Grant will invest in continued partnerships on resource issues.
- Long-term condition changes (timeframe: 5+ years)
  - Consumers will be aware of and demand locally produced aquaculture as a healthy, sustainable source of protein
  - The aquaculture industry in the NCR will be more resilient through increased sales, a better-understood market position, and increased consumer demand
  - Enhanced quality of life for NCR residents thanks to increased production and consumption of locally grown seafood and a vibrant aquaculture industry
  - A culture of collaboration and partnership between NCRAC, USDA, and Sea Grant

## OBJECTIVES

This project will create a more resilient aquaculture industry by increasing consumer demand and producer profitability through an ongoing, regional aquaculture extension program designed and delivered by a regional aquaculture extension specialist. Our specific objectives in the first two years of this project are:

1. Hire a regional aquaculture extension specialist housed at Purdue University and jointly appointed in the North Central Region Sea Grant Programs and serving all 12 states of the North-Central Region.
2. Conduct a regional needs assessment to better understand what consumer- and marketing-oriented aquaculture programming is being done and how to best use extension to address needs and impediments.
3. Work with existing personnel throughout the North Central Region to develop and deliver extension programming to address consumer needs and impediments aimed at all of the states in the North Central Region.
4. Coordinate development of regional aquaculture extension networks by serving as a liaison among the Sea Grant programs, partnering universities, NCRAC stakeholders, and other stakeholders throughout the North Central Region.
5. Use quantitative and qualitative evaluation to assess the effectiveness of the specialist's program and to help plan subsequent years of the program.
6. Partner with stakeholders to develop funding extending beyond the initial two-year period.

## DELIVERABLES

Although the precise products we produce will depend on the results of the needs assessment and the skills and interests of the specialist that we hire, we anticipate the initial deliverables will include:

- **Needs assessment/market research.** This will include a report describing the results of the mixed-methods needs and market assessment, which will be made available to project staff, NCRAC, and interested members of the aquaculture industry.
- **Marketing tools and products** These will potentially include both marketing and extension products aimed at increasing consumer demand by emphasizing the local, healthy, and sustainable aspects of farmed fish and the benefits of buying US-produced seafood. The digital home for the project will be a website, designed and maintained by communication staff at Purdue. Other products will include farmed fish fact sheets, videos, and other extension products, which may be targeted towards magazines, podcasts or other audio media, booths at trade shows or fairs, and other items as needed.
- **Published resources and on-site demonstrations of farmed seafood preparation.** The regional specialist will develop a series of brochures, cookbooks and/or recipe cards (print and electronic), together with on-site demonstrations of farmed fish preparation. Demonstrations would be developed with an emphasis on farmed seafood, to be delivered at farmers' markets, grocery stores, and other points-of-purchase. Ultimately, the specialists will train extension agents to deliver these demonstrations (via a train-the-trainer approach) to expand the reach of this program.
- **Stakeholder workgroups.** As part of the regular meetings related to this project, the specialist may convene workgroups of relevant stakeholders. The workgroups themselves and any notes, minutes, or other products related to the workgroups might be a valuable deliverable for the project.

## PROCEDURES

Our general approach is to start a regional extension program linking the USDA/NCRAC and Sea Grant aquaculture programs. NOAA, generally, and Sea Grant, specifically are increasing their investment in aquaculture, but little of that money has been invested in the Midwest and Great Lakes region. This project represents a strong initial investment in the partnership and aquaculture in the North Central and Great Lakes regions that will supplement, not replace, existing Sea Grant efforts in the region.

The specific approaches to each of the objectives are described below.

### *1. Regional Aquaculture Extension Specialist*

To achieve these objectives, we are proposing to fund a regional aquaculture outreach specialist to be housed in the Department of Forestry and Natural Resources at Purdue University and jointly appointed in the five North Central Region Sea Grant programs: Illinois-Indiana, Michigan, Minnesota, Ohio and Wisconsin and serving all 12 states of

the North-Central Region. For each of the first two years of the program, we will combine the \$75,000 in NCRAC funding with an additional \$35,000 from the National Sea Grant Program (as committed by National Sea Grant Director, Jon Pennock, see attached letter). These funds will enable us to hire a specialist and provide for travel throughout the North Central region (not just the Sea Grant states) to host meetings and workshops, visit stakeholders, and attend aquaculture-related events in the region. In addition, funds will be used to support the variety of print and electronic extension materials anticipated for this program. This will be a significant addition to the number of full-time aquaculture extension personnel working in the region and, to our knowledge, the only full-time aquaculture extension specialist with a regional scope of concern. In addition, this position will represent an important bridge between USDA/NCRAC and Sea Grant, two federally-funded programs committed to growing the aquaculture sector in the Midwest Great Lakes region.

To provide oversight and guidance for the regional aquaculture outreach extension specialists, we will establish two committees. 1) The **administrative oversight committee** will include co-PIs at Purdue University (Höök, Carlton, Quagraine), as well as the NCRAC Director (i.e., Joe Morris). This committee will be responsible for helping the specialist develop work-plans, define day-to-day activities, and conduct annual reviews of performance. The committee will meet in-person or virtually as needed, but at a minimum will meet quarterly. 2) A broader **advisory committee** will help the specialist define broader activities, suggest extension approaches and identify and facilitate partnerships with aquaculture industries, food industry and consumer groups, Extension and Sea Grant collaborators. Membership on the advisory committee will be broad enough to encapsulate the diversity of stakeholders' interests throughout the NCR, but will be limited to 10 people to not become unnecessarily cumbersome. The project's industry (Marvin Emmerson, Crystal Lake Fisheries, Missouri) and extension (Ronald Kinnunen, Michigan State University and Michigan Sea Grant) liaisons will serve on the advisory committee. The other eight members will be determined through consultation with NCRAC staff and Sea Grant Directors with the goal of having broad geographic representation throughout the NCR, while representing industry, extension, Sea Grant and NCRAC perspectives.

Ronald Kinnunen, the extension liaison, will serve as the liaison and on the advisory committee as part of his regular duties with Michigan State University and Michigan Sea Grant. His travel needs will be covered by project funds as described in the budget justification and supplemented, if necessary, with Sea Grant funds.

## 2. *Needs assessment*

While the search and hiring process for the specialist is underway, Dr. Stuart Carlton, Illinois-Indiana Sea Grant's Assistant Director and a natural resources social scientist, and Kwamena Quagraine, Illinois-Indiana Sea Grant's Aquaculture Marketing Specialist, will conduct a rapid needs assessment of the aquaculture industry in the region, following the work of Weeks et al. (2014). We anticipate that this will take approximately one month of personnel time, a significant contribution of personnel to this project at no direct cost to the program. The goal of the needs assessment will be to understand what aquaculture marketing efforts are taking place in the region, identify potential partners for future extension programming, and to shed light on the needs and perceptions of potential or actual aquaculture purchasers in the grocery and restaurant industries. The needs assessment will be initiated before the specialist is hired and completed within the first few weeks of his or her tenure. If necessary, the survey will be followed up with informal interviews to help the specialist further understand the regional aquaculture extension needs, impediments, and opportunities for growth.

The sampling frame of potential survey respondents will be developed in conjunction with NCRAC personnel, aquaculture extension specialists working in the North Central Region, and through the professional networks of the five Sea Grant programs partnering on this proposal as well as the broader National Sea Grant network. In addition to identifying relevant industry and consumer groups to take part in the needs assessment, we will use a snowball sampling technique of key stakeholders to make sure that the most important and informed voices have a chance to weigh in.

## 3. *Responsive extension programming*

The specialist will design and deliver extension programming to address the needs and impediments identified in the needs assessment. The specific aims and methods of programming will depend on the results of the needs assessment, together with input from NCRAC (Industry Advisory Council and Technical Committees of Extension and Research) and Sea Grant networks. We anticipate that the initial focus will be working with stakeholders on the consumer side to promote consumption of regionally-produced aquaculture products as a sustainable, locally grown protein option, with a focus on tapping into the local food movement to promote the benefits of farmed fish. The extension program itself will be multimodal, consisting of a clearinghouse website (developed by Purdue and



Illinois-Indiana Sea Grant personnel at no additional cost to the program), workshops, extension publications, advertisements in print and audio media, and/or online products. We will carefully integrate qualitative and quantitative formative evaluation throughout the process to fine-tune our programming and ensure that we are delivering the right messages to the right audiences. This formative assessment process will also allow us to identify any challenges that we are having and, in concert with the advisory committees, come up with a plan for addressing the challenges.

#### 4. Aquaculture network

One of the regional extension specialists' key functions will be to interact with existing aquaculture professional networks in the region and further develop these relationships over time. The end goal is for the liaison to be a key regional connector on aquaculture issues, helping to link producers, consumers, and scientists to foster a resilient and profitable aquaculture industry in the North Central Region.

The specialist will attend aquaculture association meetings throughout the North Central Region, using these meetings as an opportunity to conduct extension workshops and other programming. Additionally, the specialist will work with stakeholders in the grocery, restaurant and local foods (e.g., farmers markets) industries to identify targeted opportunities for participating in and presenting at relevant meetings in those sectors.

#### 5. Evaluation

Evaluation is a key part of a successful extension program. The overarching goal of the evaluation plan is to follow up on the needs assessment (i.e., how well is the extension program meeting the addressable needs?), to track the development of the program across the region (i.e., how successful is the specialist at creating a genuinely regional aquaculture extension program), and, in the long term, track the growth and resilience of aquaculture within the region. The evaluation metrics, outputs, and outcomes will be based on the logic model presented in Figure 3 and are described in detail in the Outreach and Evaluation section, below.

#### 6. Additional funding

An important aspect of our long-term success will be acquiring funding for future work beyond the initial two-year commitment from NCRAC and the National Sea Grant Office. This may include working within the Sea Grant programs and NCRAC network to obtain additional funding, responding to relevant internal and external calls for proposals, working with industry on a fee-for-service model, and/or securing additional funding from aquaculture-related NGOs. We anticipate that the effort to secure additional funding will be led by the project leadership team, and not the specialist. That is, we want to ensure that the specialist is able to deliver important extension programming during the two-year project and not spend a large portion of their time fund-raising.

## OUTREACH AND EVALUATION PLAN

Outreach is integral to this project: the regional aquaculture specialist funded by this project will conduct ongoing extension throughout the North Central Region. Evaluation will be conducted throughout the project, ranging from a preliminary formative evaluation in the form of the needs assessment ongoing formative assessments throughout the two-year project and basic summative assessments at the end of the two-year cycle, as well. The evaluation plan is as follows:

In the first two years of the project, the evaluation will necessarily focus on outputs and short-term outcomes related to knowledge gain and potentially some behavior changes. We will use the number of workshops given, number of states workshops were given in, the number of attendees at the workshops (including a state-by-state breakdown), the number of meetings held, extension products produced and delivered (including a state-by-state breakdown), the number of new contacts made within the aquaculture industry, and similar measures as our sources of output. We will use pre- and post- workshop/demonstration surveys to evaluate the following predicted knowledge gain outcomes:

- Consumers will increase knowledge of the health, environmental, and economic benefits of locally produced seafood
- Consumer awareness of locally produced farmed seafood will increase
- Consumers will increase knowledge of how to clean and cook seafood
- Producers will have increased knowledge of consumer preferences and marketing techniques
- Program staff, NCRAC, USDA, and Sea Grant will increase their understanding of how to effectively partner on synergistic resource issues

The output-counting and workshop evaluation will help us to assess program growth, identify opportunities for follow-up, and continue to develop an effective and responsive extension program. In addition, by the end of the second year, we will use phone interviews with aquaculture producers, suppliers, and consumers to evaluate our progress on the following anticipated behavior change outcomes:

- Consumers will increase their consumption (and demand) of locally produced seafood
- Seafood producers, distributors, and sellers will adapt their practices based on consumer preferences
- The aquaculture industry will receive increased investment from existing and potential producers
- NCRAC, USDA, and Sea Grant will invest in continued partnerships on resource issues.

LOGIC MODEL

**Situation:** A Midwest aquaculture industry that is increasingly successful from a technical production standpoint but has substantial room for increasing both the share and size of the seafood market

**Goal:** A resilient, sustainable aquaculture industry throughout the North-Central Region that produces a major source of protein for healthy communities

**Objective:** Increase aquaculture demand by improving aquaculture marketing, working to help producers understand regulations, and educating consumers on aquaculture preparation and the health, economic, and environmental benefits of locally grown aquaculture.

Logic Model					
Inputs	Outputs		Outcomes/Impacts		
	Activities	Deliverables	Knowledge Gain	Behavior Change	Conditions
<p><i>People</i></p> <ul style="list-style-type: none"> <li>- Regional Aquaculture Specialist</li> <li>- Project PIs</li> <li>- Advisory board</li> <li>- Sea- and Land-grant extension partners</li> <li>- University support staff</li> </ul> <p><i>Resources</i></p> <ul style="list-style-type: none"> <li>- NCRAC funds</li> <li>- Sea Grant funds</li> <li>- Existing equipment</li> <li>- Partner aquaculture labs, production facilities, and producers</li> <li>- Team staff time</li> </ul> <p><i>Materials</i></p> <ul style="list-style-type: none"> <li>- Factsheets</li> <li>- Websites</li> <li>- Supplies</li> </ul> <p><i>Research</i></p> <ul style="list-style-type: none"> <li>- Previous needs assessments</li> <li>- Theoretical &amp; applied marketing research</li> <li>- Marketing campaign evaluations</li> </ul>	<p><i>Project management</i></p> <ul style="list-style-type: none"> <li>- Supplemental needs assessment/marketing analysis</li> <li>- Develop network</li> </ul> <p><i>Consumer education topics</i></p> <ul style="list-style-type: none"> <li>- Healthiness of local aquaculture</li> <li>- Sustainability of local aquaculture</li> <li>- Aquaculture as a local food</li> <li>- Trade imbalance</li> <li>- Seafood preparation &amp; cooking</li> <li>- Information on producers</li> </ul> <p><i>Industry-focused topics</i></p> <ul style="list-style-type: none"> <li>- Marketing techniques</li> <li>- Consumer research</li> <li>- Production regulation</li> </ul> <p><i>Delivery</i></p> <ul style="list-style-type: none"> <li>- Short printed materials</li> <li>- Advertising (magazine/podcast/social media)</li> <li>- Trade show booths</li> <li>- Websites</li> <li>- "Train the trainer" with local extension</li> </ul>	<p><i>Participants</i></p> <ul style="list-style-type: none"> <li>- Consumers</li> <li>- Aquaculture producers</li> <li>- Distributors</li> <li>- Farmers markets</li> <li>- Restaurants</li> <li>- Project staff</li> <li>- NCRAC</li> <li>- Sea Grant</li> </ul> <p><i>Products</i></p> <ul style="list-style-type: none"> <li>- Needs assessment/market research</li> <li>- Website</li> <li>- "Train the trainer" model for seafood cleaning, preparation</li> <li>- Facilitating further network development between producers, distributors</li> <li>- Marketing tools and products</li> <li>- Stakeholder workgroups</li> </ul>	<ul style="list-style-type: none"> <li>- Consumers will increase knowledge of the health, environmental, and economic benefits of locally produced seafood</li> <li>- Consumer awareness of locally produced farmed seafood will increase</li> <li>- Consumers and Extension educators will increase knowledge of how to clean and cook seafood</li> <li>- Producers will have increased knowledge consumer preferences and marketing techniques</li> <li>- Program staff, NCRAC, USDA, and Sea Grant will increase their understanding of how to effectively partner on synergistic resource issues</li> </ul>	<ul style="list-style-type: none"> <li>- Consumers will increase their consumption of locally produced seafood</li> <li>- Seafood producers, distributors, and sellers will adapt their practices based on consumer preferences</li> <li>- The aquaculture industry will receive increased investment from existing and potential producers</li> <li>- NCRAC, USDA, and Sea Grant will invest in continued partnerships on resource issues.</li> </ul>	<ul style="list-style-type: none"> <li>- Consumers will be aware of and demand locally produced aquaculture as a healthy, sustainable source of protein.</li> <li>- The aquaculture industry in the NCR will be more resilient through increased sales, a better-understood market position, and increased consumer demand</li> <li>- Enhanced quality of life for NCR residents thanks to increased production and consumption of locally grown seafood and a vibrant aquaculture industry</li> <li>- A culture of collaboration and partnership between NCRAC, USDA, and Sea Grant</li> </ul>

Figure 3. Logic model for the Regional Aquaculture Extension Program

## FACILITIES AVAILABLE

The project will be based, and the specialist physically located, within Illinois-Indiana Sea Grant in the Department of Forestry and Natural Resources at Purdue University. This will give them access to office space, administrative and business support, technological equipment and support, and all of the other benefits of being housed in a research-oriented land grant university. In addition, the specialist will have access to numerous aquaculture research and production facilities. As a jointly appointed member of the Great Lakes Sea Grant Network, the specialist will have access to a network of over 100 extension agents, specialists, educators, and communicators working in some of the highest-producing aquaculture states in the North Central Region. The joint appointment will allow the specialist to leverage existing professional networks and more easily develop an aquaculture-focused professional network throughout the North Central Region. The joint appointment will also give the specialist easy access to meeting space and other facilities throughout the region. In particular, in Indiana through Purdue's College of Agriculture and the Department of Forestry and Natural Resources he/she will have access to the Baker Aquaculture Research Center ([ag.purdue.edu/fnr/Pages/labaquaresearch.aspx](http://ag.purdue.edu/fnr/Pages/labaquaresearch.aspx)), the Palmer Research Center for Aquatic Resources ([ag.purdue.edu/fnr/Pages/proppalmer.aspx](http://ag.purdue.edu/fnr/Pages/proppalmer.aspx)) and a series of eight agriculture centers (<https://ag.purdue.edu/arge/pac/Pages/default.aspx>). We anticipate that through our network, we will have access to similar spaces in the other North Central Region states.

## REFERENCES

- Ader, C. 1995. A longitudinal study of agenda setting for the issue of environmental pollution. *Journalism and Mass Communication Quarterly*. 72. 300–311.
- Burden, D. J. 2012. Marketing Aquaculture Products. North Central Regional Aquaculture Center and Iowa State University Extension and Outreach. Available: <https://www.ncrac.org/files/publication/manual.pdf>.
- Claret, A., L. Guerrero, I. Gartzia, M. Garcia-Quiroga and R. Ginés. 2016. Does information affect consumer liking of farmed and wild fish? *Aquaculture* 454: 157–162.
- Conklin, A. R. 2014. Bottlenecked: The growth of aquaculture in Wisconsin. Wisconsin Sea Grant. Available: <http://uwiscseagrant.tumblr.com/post/86412981927/bottlenecked-the-growth-of-aquaculture-in>. (August 2018).
- Eyal, C. H., J. P. Winter, and W. F. DeGeorge. 1981. The concept of time frame in agenda setting. Pages 212–218 in G.C. Wilhoit, editor. *Mass communication yearbook*, volume 2. Sage, Beverly Hills.
- Feldman, C. and U. Hamm. 2015. Consumers' perceptions and preferences for local food: A review. *Food Quality and Preference*. 40: 152–164.
- Froehlich, H.E., R.R. Gentry, M.B. Rust, D. Grimm, and B.S. Halpern. 2017. Public perceptions of aquaculture: evaluating spatiotemporal patterns of sentiment around the world. *PLoS ONE* 12. Available: e0169281. <https://doi.org/10.1371/journal.pone.0169281>. (August 2018).
- Hall, T.E. and S.M. Amberg. 2013. Factors influencing consumption of farmed seafood products in the Pacific northwest. *Appetite*. 66. 1–9.
- Kumar, G. and C. R. Engle. 2018. Strategic Marketing & Adapting to Dynamic Market Demand. Presentation to 2018 North Central Aquaculture Conference. Available: [https://www.ncrac.org/files/presentation/file/engle\\_strategic\\_marketing\\_adapting\\_to\\_changing\\_market\\_demand.pdf](https://www.ncrac.org/files/presentation/file/engle_strategic_marketing_adapting_to_changing_market_demand.pdf). (August 2018).
- Lee, G. 2004. Reconciling 'cognitive priming' vs 'obtrusive contingency' hypotheses: An analytical model of media agenda-setting effects. *International Communication Gazette*. 66. 151–166.
- NCRAC. 2017. Annual Progress Report 2015-16. Current Fishery Statistics No. 2016. Available: [https://www.ncrac.org/files/page/files/2016\\_annual\\_report\\_final\\_002.pdf](https://www.ncrac.org/files/page/files/2016_annual_report_final_002.pdf) (August 2018).

- NMFS. 2017. Fisheries of the United States, 2016 Report. Available: <https://www.fisheries.noaa.gov/resource/document/fisheries-united-states-2016-report>. (August 2018).
- Onken, K.A., J.C. Bernard, and J.D. Pesek. 2011. Comparing willingness to pay for organic, natural, locally grown, and state marketing program promoted foods in the mid-Atlantic region. *Agricultural and Resource Economics Review*. 40. pp.33–47.
- Pierce, R., R. Henderson, and K. Neils. 1995. Aquacultural marketing: a practical guide for fish producers. VHS format. 19 min. NCRAC Video Series #102. NCRAC Publications Office, Iowa State University, Ames.
- Riepe, R. J. 1999a. Marketing Seafood to Restaurants in the North Central Region. Fact Sheet 110. North Central Regional Aquaculture Center, Ames IA.
- Riepe, R. J. 1999b. Supermarkets and Seafood in the North Central Region. Fact Sheet 112. North Central Regional Aquaculture Center, Ames IA.
- Rickard, L.N., Noblet, C.L., Duffy, K., and W.C. Brayden. 2018. Cultivating benefit and risk: aquaculture representation and interpretation in New England. *Society & Natural Resources*. Available DOI: 10.1080/08941920.2018.1480821 (August 2018).
- Schneider, M. L. and C. A. Francis. 2005. Marketing locally produced foods: Consumer and farmer opinions in Washington County, Nebraska. *Renewable Agriculture and Food Systems*. 20. 252–260.
- Weeks, C.T. 2014. North Central Region Aquaculture Needs Survey. Presentation to 2014 North Central Aquaculture Conference. Cited in Patillo, D.A. Base extension project outline 2015. 2015. Funded Project #16 - NCRAC Extension Project. Available: [https://www.ncrac.org/files/project/files/extension\\_proposal\\_2015\\_isu\\_revised.pdf](https://www.ncrac.org/files/project/files/extension_proposal_2015_isu_revised.pdf). (August 2018).
- Verbeke, W., I. Sioen, K. Brunsø, S. De Henuaw, and J. Van Camp. 2007. Consumer perception versus scientific evidence of farmed and wild fish: exploratory insights from Belgium. *Aquaculture International*. 15. 121–136.

PROJECT LEADERS

<b>State</b>	<b>Name, Institution</b>	<b>Specialization (project role)</b>
IN	Tomas Höök, Purdue University	Director, Illinois-Indiana Sea Grant (co-PI)
IN	Stuart Carlton, Purdue University	Asst. Director, Illinois-Indiana Sea Grant (co-PI)
MI	James Diana, University of Michigan	Former Director, Michigan Sea Grant (co-PI)
MN	John Downing, University of Minnesota	Director, Minnesota Sea Grant (co-PI)
WI	James Hurley, University of Wisconsin	Director, Wisconsin Sea Grant (co-PI)
IN	Kwamena Quagraine, Purdue University	Aquaculture Marketing Professor, Illinois-Indiana Sea Grant (co-PI)
MI	Catherine Riseng, University of Michigan	Director, Michigan Sea Grant (co-PI)
OH	Christopher Winslow, Ohio State University	Director, Ohio Sea Grant (co-PI)
MI	Ronald Kinnunen, Michigan State University	Extension Educator, Michigan Sea Grant (extension liaison)
MO	Marvin Emerson, Crystal Lake Fisheries	Crystal Lake Fisheries, (industry liaison)

ORGANIZATION AND ADDRESS Purdue University 155 S. Grant St. West Lafayette, IN 47907-2114			<b>USDA AWARD NO.</b> Year: 1		<b>Objective:</b>	
PROJECT DIRECTOR(S) Tomas Hook			Duration Proposed Months: <u>12</u>  <b>Funds Requested by Proposer</b>	Duration Proposed Months: ____  <b>Funds Approved by CSREES (If different)</b>	Non-Federal Proposed Cost-Sharing/Matching Funds (If required)	Non-federal Cost-Sharing/Matching Funds Approved by CSREES (If Different)
<b>A. Salaries and Wages</b> 1. No. of Senior Personnel			<b>CSREES FUNDED WORK MONTHS</b>			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s) .....						
b. ____ Senior Associates .....						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates . . .						
b. ____ Other Professionals .....			9			\$45,250
c. ____ Paraprofessionals .....						
d. ____ Graduate Students.....						
e. ____ Prebaccalaureate Students.....						
f. ____ Secretarial-Clerical .....						
g. ____ Technical, Shop and Other .....						
<b>Total Salaries and Wages</b> ..... <input type="checkbox"/>						
<b>B. Fringe Benefits (If charged as Direct Costs)</b>						\$15,023
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> ..... <input type="checkbox"/>						\$60,273
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>						
<b>E. Materials and Supplies</b>						\$1,500
<b>F. Travel</b>						\$6,180
<b>G. Publication Costs/Page Charges</b>						
<b>H. Computer (ADPE) Costs</b>						
<b>I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)</b>						
<b>J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)</b>						\$7,047
<b>K. Total Direct Costs (C through I)</b> ..... <input type="checkbox"/>						
<b>L. F&amp;A/Indirect Costs.</b> (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.)						
<b>M. Total Direct and F&amp;A/Indirect Costs (J plus K)</b> ..... <input type="checkbox"/>						\$75,000
<b>N. Other</b> ..... <input type="checkbox"/>						
<b>O. Total Amount of This Request</b> ..... <input type="checkbox"/>						\$75,000
<b>P. Carryover -- (If Applicable)</b> . . . . . <b>Federal Funds: \$</b>			<b>Non-Federal funds: \$</b>		<b>Total \$</b>	
<b>Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)</b> Cash (both Applicant and Third Party) ..... <input type="checkbox"/> Non-Cash Contributions (both Applicant and Third Party) ..... <input type="checkbox"/>					Leave Blank	
<b>NAME AND TITLE (Type or print)</b>			<b>SIGNATURE (required for revised budget only)</b>			<b>DATE</b>
<b>Project Director</b>						8/3/18
<b>Authorized Organizational Representative</b>						8/3/18
<b>Signature (for optional use)</b>						

ORGANIZATION AND ADDRESS Purdue University 155 S. Grant St. West Lafayette, IN 47907-2114			<b>USDA AWARD NO.</b>		Year: 1	Objective:		
PROJECT DIRECTOR(S) Tomas Hook			Duration Proposed Months: <u>12</u>  <b>Funds Requested by Proposer</b>	Duration Proposed Months: ____  <b>Funds Approved by CSREES (If different)</b>	Non-Federal Proposed Cost-Sharing/Matching Funds (If required)	Non-federal Cost-Sharing/Matching Funds Approved by CSREES (If Different)		
<b>A. Salaries and Wages</b> 1. No. of Senior Personnel			<b>CSREES FUNDED WORK MONTHS</b>					
			Calendar	Academic	Summer			
a. ____ (Co)-PD(s) .....								
b. ____ Senior Associates .....								
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates . . . b. ____ Other Professionals .....			9			\$46,381		
c. ____ Paraprofessionals .....								
d. ____ Graduate Students.....								
e. ____ Prebaccalaureate Students.....								
f. ____ Secretarial-Clerical .....								
g. ____ Technical, Shop and Other .....								
<b>Total Salaries and Wages.....</b> <input type="checkbox"/>								
B. Fringe Benefits (If charged as Direct Costs)						\$15,399		
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B).....</b> <input type="checkbox"/>						\$61,780		
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)								
E. Materials and Supplies						\$500		
F. Travel						\$5,402		
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.)						\$7,318		
<b>K. Total Direct Costs (C through I).....</b> <input type="checkbox"/>								
<b>L. F&amp;A/Indirect Costs.</b> (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.)								
<b>M. Total Direct and F&amp;A/Indirect Costs (J plus K).....</b> <input type="checkbox"/>						\$75,000		
N. Other..... <input type="checkbox"/>								
<b>O. Total Amount of This Request.....</b> <input type="checkbox"/>						\$75,000		
<b>Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)</b>						Leave Blank		
Cash (both Applicant and Third Party) .....								
Non-Cash Contributions (both Applicant and Third Party) .....								
<b>NAME AND TITLE</b> (Type or print)			<b>SIGNATURE</b> (required for revised budget only)				<b>DATE</b>	
Project Director							8/3/18	



ORGANIZATION AND ADDRESS Purdue University 155 S. Grant St. West Lafayette, IN 47907-2114				<b>USDA AWARD NO.</b> Year: 1&2 <b>Objective:</b>				
PROJECT DIRECTOR(S) Tomas Hook				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)	
<b>A. Salaries and Wages</b>				<b>CSREES FUNDED WORK MONTHS</b>				
1. No. of Senior Personnel				Calendar	Academic	Summer		
a. ____ (Co)-PD(s) .....								
b. ____ Senior Associates .....								
2. No. of Other Personnel (Non-Faculty)								
a. ____ Research Associates-Postdoctorates . . .								
b. ____ Other Professionals .....				18			\$91,631	
c. ____ Paraprofessionals .....								
d. ____ Graduate Students.....								
e. ____ Prebaccalaureate Students.....								
f. ____ Secretarial-Clerical .....								
g. ____ Technical, Shop and Other .....								
<b>Total Salaries and Wages</b> ..... <input type="checkbox"/>								
B. Fringe Benefits (If charged as Direct Costs)							\$30,422	
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> ..... <input type="checkbox"/>							\$122,053	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)								
E. Materials and Supplies							\$2,000	
F. Travel							\$11,582	
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.)							\$14,365	
<b>K. Total Direct Costs (C through I)</b> ..... <input type="checkbox"/>								
L. <b>F&amp;A/Indirect Costs.</b> (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.)								
<b>M. Total Direct and F&amp;A/Indirect Costs (J plus K)</b> ..... <input type="checkbox"/>							\$150,000	
N. Other..... <input type="checkbox"/>								
<b>O. Total Amount of This Request</b> ..... <input type="checkbox"/>							\$150,000	
<b>P. Carryover -- (If Applicable)</b> .....				Federal Funds: \$	Non-Federal funds: \$	Total \$		
<b>Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)</b>							Leave Blank	
Cash (both Applicant and Third Party) ..... <input type="checkbox"/>								
Non-Cash Contributions (both Applicant and Third Party) ..... <input type="checkbox"/>								
<b>NAME AND TITLE</b> (Type or print)				<b>SIGNATURE</b> (required for revised budget only)				<b>DATE</b>
<b>Project Director</b>								8/3/18
<b>Authorized Organizational Representative</b>								8/3/18
<b>Signature (for optional use)</b>								

BUDGET SUMMARY

**YEAR 1**

Institution Name	Purdue University
Salaries & Wages	\$45,250
Fringe Benefits	\$15,023
Total Salaries, Wages, and Fringe Benefits	\$60,273
Nonexpendable Equipment	\$0
Materials and Supplies	\$1,500
Travel	\$6,180
All Other Direct Cost	\$7047
<b>Totals</b>	\$75,000

Institution Name	Purdue University
Salaries & Wages	\$46,381
Fringe Benefits	\$15,399
Total Salaries, Wages, and Fringe Benefits	\$61,780
Nonexpendable Equipment	\$0
Materials and Supplies	\$500
Travel	\$5,402
All Other Direct Cost	\$7,318
<b>Totals</b>	\$75,000

In addition to the NCRAC budget request described above, we have secured a commitment for \$35,000 per year from the National Sea Grant Office, as outlined in the tables below. These funds will supplement the NCRAC funds as needed to ensure that we have a well-funded, successful regional extension program serving all of the states in the North Central Region.

	Sea Grant Funds – Year 1		
	Objective #	Purdue University (Höök)	Project Total
Salaries, Wages, and Fringe Benefits	1–6	\$20,318	\$20,318
Nonexpendable Equipment			
Materials and Supplies	1–6	\$1,000	\$1,000
Travel	2–5	\$2,000	\$2,000
All Other Direct Costs	1–6	\$2,044	\$2,044
Indirect Costs	1–6	\$9,638	\$9,638
Total		\$35,000	\$35,000

	Sea Grant Funds – Year 2		
	Objective #	Purdue University (Höök)	Project Total
Salaries, Wages, and Fringe Benefits	1–6	\$20,927	\$20,927
Travel	1–6	\$2,500	\$2,500
All Other Direct Costs	1–6	\$1,935	\$1,935
Indirect Costs	1–6	\$9,638	\$9,638
Total		\$35,000	\$35,000

BUDGET JUSTIFICATION FOR PURDUE UNIVERSITY  
(Hook)

*Year 1*

In accordance with 2 CFR 200, Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards, Purdue University tracks and reports its professional personnel on a percent of effort and not on an hourly basis. Salaries are adjusted by standard University inflation rates each fiscal year (July 1): 3% for faculty, 2.5% for professional/technical assistants, and 2% for post docs, graduate/undergraduate students and service staff.

**A. Salaries and Wages**

We request \$45,250 in salary for a TBD Professional Staff. This is based on a 100%FTE for 9 months each year. This person will be responsible for developing and delivering the regional aquaculture extension program as described Objectives 1–6, above. Annual base salary used for calculations is \$60,000 which is effective July 1, 2018.

**B. Fringe Benefits**

We request \$15,023 to cover fringe benefits for the Professional Staff member hired as part of this program. Fringe benefits are budgeted in accordance with university policy as follows: Professional Staff 33.2%

**C. Total Salaries, Wages, and Fringe Benefits**

**\$60,273**

**D. Nonexpendable Equipment – None**

**E. Materials and Supplies**

We request \$1,500 to cover materials needed for workshops, promotional materials, specialized computer software, expendable technology supplies, and similar items needed to conduct a regional extension program

**F. Travel**

We request \$6,180 in travel to cover expenses for six multi-day trips around the region at an estimated cost of roughly \$1,000 per trip, including flight, car rental, hotel, and per diem. This includes travel for project staff and liaisons as necessary. Estimates are made based on past experience.

**G. Publications - None**

**H. Computer Cost – None**

**I. Student Assistances/Support – None**

**J. All Other Direct Cost**

We request \$7,047 to cover website, advertising, and other production costs related to the project. These costs are necessary to help spread the work about farmed fish as a healthy source of locally produced protein, and may include print, broadcast, or social media campaigns with key messages about midwestern farmed fish.

*Year 2*

In accordance with 2 CFR 200, Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards, Purdue University tracks and reports its professional personnel on a percent of effort and not on an hourly basis. Salaries are adjusted by standard University inflation rates each fiscal year (July 1): 3% for faculty, 2.5% for professional/technical assistants, and 2% for post docs, graduate/undergraduate students and service staff.

**A. Salaries and Wages**

We request \$46,381 in salary for a TBD Professional Staff. This is based on a 100%FTE for 9 months each year. This person will be responsible for developing and delivering the regional aquaculture extension program as described Objectives 1–6, above. Annual base salary used for calculations is \$60,000 which is effective July 1, 2018.

**B. Fringe Benefits**

We request \$15,399 to cover fringe benefits for the Professional Staff member hired as part of this program. Fringe benefits are budgeted in accordance with university policy as follows: Professional Staff 33.2%

**C. Total Salaries, Wages, and Fringe Benefits**

**\$61,780**

**D. Nonexpendable Equipment – None**

**E. Materials and Supplies**

We request \$500 to cover materials needed for workshops, promotional materials, specialized computer software, expendable technology supplies, and similar items needed to conduct a regional extension program

**F. Travel**

We request \$5,402 in travel to cover expenses for 5 multi-day trips around the region at an estimated cost of roughly \$1,000 per trip, including flight, car rental, hotel, and per diem. This includes travel for project staff and liaisons as necessary. Estimates are made based on past experience.

**G. Publications - None**

**H. Computer Cost – None**

**I. Student Assistances/Support – None**

**J. All Other Direct Cost**

We request \$7,318 to cover website, advertising, and other production costs related to the project. These costs are necessary to help spread the work about farmed fish as a healthy source of locally produced protein, and may include print, broadcast, or social media campaigns with key messages about midwestern farmed fish.

*Overall*

In accordance with 2 CFR 200, Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards, Purdue University tracks and reports its professional personnel on a percent of effort and not on an hourly basis. Salaries are adjusted by standard University inflation rates each fiscal year (July 1): 3% for faculty, 2.5% for professional/technical assistants, and 2% for post docs, graduate/undergraduate students and service staff.

**A. Salaries and Wages**

We request \$91,631 in salary for a TBD Professional Staff. This is based on a 100%FTE for 9 months each year. This person will be responsible for developing and delivering the regional aquaculture extension program as described Objectives 1–6, above. Annual base salary used for calculations is \$60,000 which is effective July 1, 2018.

**B. Fringe Benefits**

We request \$30,422 to cover fringe benefits for the Professional Staff member hired as part of this program. Fringe benefits are budgeted in accordance with university policy as follows: Professional Staff 33.2%

**C. Total Salaries, Wages, and Fringe Benefits**

**\$122,053**

**D. Nonexpendable Equipment – None**

**E. Materials and Supplies**

We request \$2,000 to cover materials needed for workshops, promotional materials, specialized computer software, expendable technology supplies, and similar items needed to conduct a regional extension program

**F. Travel**

We request \$11,583 in travel to cover expenses for 11 multi-day trips around the region at an estimated cost of roughly \$1,000 per trip, including flight, car rental, hotel, and per diem. This includes travel for project staff and liaisons as necessary. Estimates are made based on past experience.

**G. Publications - None**

**H. Computer Cost – None**

**I. Student Assistances/Support – None**

**J. All Other Direct Cost**

We request \$14,365 to cover website, advertising, and other production costs related to the project. These costs are necessary to help spread the work about farmed fish as a healthy source of locally produced protein, and may include print, broadcast, or social media campaigns with key messages about midwestern farmed fish.

**SCHEDULE FOR COMPLETION OF OBJECTIVES**

The schedule for completion of the objectives is presented in Figure 4, below.

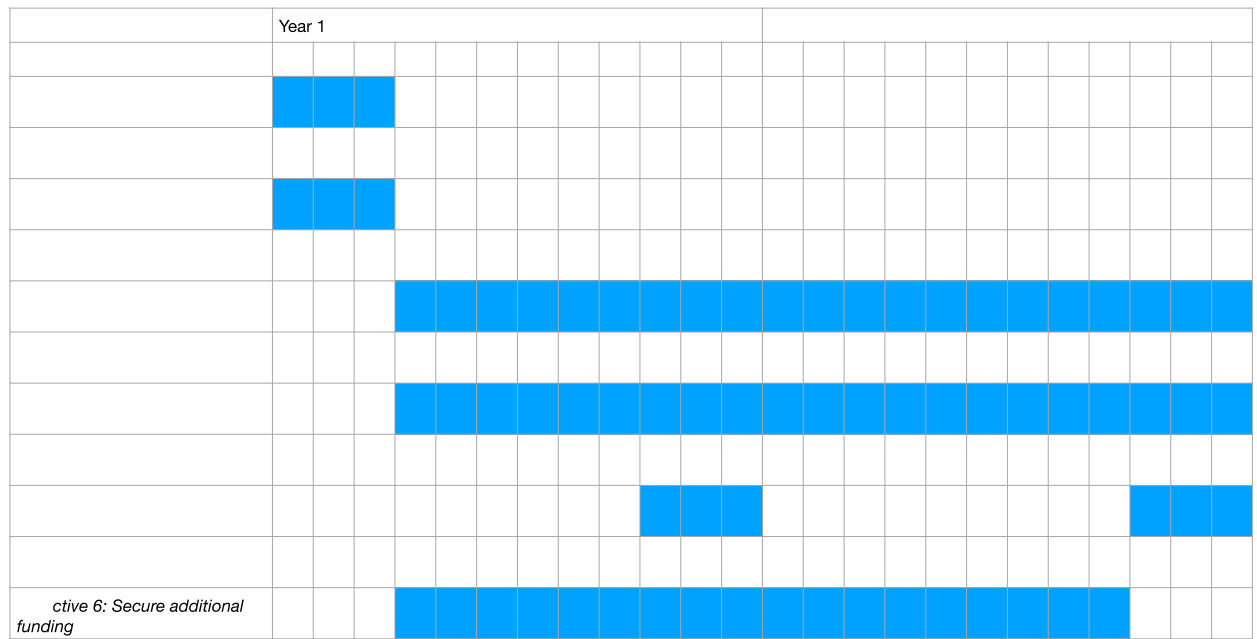


Figure 1. Schedule for completion of the objectives

**LIST OF PRINCIPAL INVESTIGATORS**

- J. Stuart Carlton, Ph.D., Illinois-Indiana Sea Grant
- James S. Diana, Ph.D., Michigan Sea Grant
- John A. Downing, Ph.D., Minnesota Sea Grant
- Tomas O. Höök, Ph.D., Illinois-Indiana Sea Grant
- James P. Hurley, Ph.D., Wisconsin Sea Grant
- Catherine M. Riseng, Ph.D., Michigan Sea Grant
- Kwamena K. Quagraine, Ph.D., Illinois-Indiana Sea Grant
- Christopher J. Winslow, Ph.D., Ohio Sea Grant

## VITA

Tomas O. Höök, Ph.D.  
Illinois-Indiana Sea Grant  
195 Marsteller Street  
West Lafayette, IN 47906

Phone: 765-496-6799  
Fax: 765-494-9461  
Email: thook@purdue.edu

### EDUCATION

B.S. University of Michigan 1996, Biology  
M.S. University of Michigan 2000, Resource Ecology and Management  
Ph.D. University of Michigan 2005, Natural Resources

### POSITIONS

2018-Present Director, Illinois-Indiana Sea Grant Program  
2018-Present Professor, Department of Forestry and Natural Resources, Purdue University  
2010-2018 Associate Director of Research, Illinois-Indiana Sea Grant  
2013–2018 Associate Professor, Department of Forestry and Natural Resources, Purdue University  
2008–2013 Assistant Professor, Department of Forestry and Natural Resources, Purdue University  
2005–2008 Research Investigator, Cooperative Institute for Limnology and Ecosystems  
Research, University of Michigan  
2015 Visiting Researcher, Department of Limnology, Uppsala University, Sweden  
2005 Visiting Researcher, Department of Systems Ecology, Stockholm University, Sweden

### SELECTED PUBLICATIONS

Foley, C.J., Z.S. Feiner, T.D. Malinich and T.O. Höök. 2018. A meta-analysis of the effects of exposure to microplastics on fish and aquatic invertebrates. *Science of the Total Environment*. 631–632. 550–559.  
Feiner, Z.S., R.K. Swihart, D.P. Coulter, and T.O. Höök. In press. Fatty acids in an iteroparous fish: variable complexity, identity, and phenotypic correlates. *Canadian Journal of Zoology*.  
Feiner, Z.S., T.D. Malinich, and T.O. Höök. In press. Interacting effects of identity, size, and winter severity determine temporal consistency of offspring phenotype. *Canadian Journal of Fisheries and Aquatic Sciences*.  
Almeida, L.Z., S.C. Guffey, M.S. Sepulveda, and T.O. Höök. 2017. Behavioral and physiological responses of yellow perch (*Perca flavescens*) to moderate hypoxia. *Comparative Biochemistry and Physiology*. 209. 47–55.  
Coulter, D.P., G.J. Bowen, and T.O. Höök. 2017. Influence of diet and ambient water on hydrogen and oxygen stable isotope ratios in fish tissue: patterns within and among tissues and relationships with growth rates. *Hydrobiologia*. 799. 111–121.  
Hrycik, A.R., L.Z. Almeida, and T.O. Höök. 2017. Sub-lethal effects on fish provide insight into a biologically-relevant threshold of hypoxia. *Oikos*. 126. 307–317.  
Foley, C.J, M.L. Henebry, H.A. Bootsma, S.J. Czesny, Sergiusz, J. Janssen, D.J. Jude, J. Rinchar, and T.O. Höök. 2017. Spatial, seasonal and ontogenetic patterns of integration of an invasive fish into a nearshore freshwater food web. *Food Webs*. 10. 26–38.  
Almeida, L.Z., S.C. Guffey, T.A. Krieg, and T.O. Höök. 2017. Predators reject Yellow Perch egg skeins. *Transactions of the American Fisheries Society*. 146. 173–180.



## VITA

J. Stuart Carlton, Ph.D.  
Illinois-Indiana Sea Grant  
195 Marsteller Street  
West Lafayette, IN 47906

Phone: 765-494-3726  
Fax: 765-494-9461  
Email: carltons@purdue.edu

### EDUCATION

B.A. Tulane University, 2001, English  
M.S. University of Georgia, 2004, Fisheries Biology  
Ph.D. University of Florida, 2012, Interdisciplinary Ecology

### POSITIONS

2018–Present Assistant Director, Illinois-Indiana Sea Grant College Program  
2014–2018 Healthy Coastal Ecosystems Specialist, Texas Sea Grant College Program  
2013–2014 Postdoctoral Research Assistant, Natural Resources Social Science Lab, Purdue University

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

International Association for Society and Natural Resources  
Sea Grant Association

### SELECTED PUBLICATIONS

- Prokopy, L.S., J.S. Carlton, T. Haigh, M.C. Lemos, A.S. Mase, M. Widhalm. 2017. Useful to Usable: Developing usable climate science for agriculture. *Climate Risk Management*. 15. 1–17.
- Church, S. P., T. Haigh, M. Widhalm, S. Garcia de Jalon, N. Babin, J.S. Carlton, M. Dunn, K. Fagan, C.L. Knutson, and L. S. Prokopy. 2017. Agricultural trade publications and the 2012 Midwestern U.S. Drought: A missed opportunity for climate risk communication. *Climate Risk Management* 15: 45–60.
- Carlton, J. S., T. Haigh, C.L. Knutson, M. Lemos, A.S. Mase, D. Todey, L. Prokopy. 2016. The effects of the 2013 drought on climate change beliefs, risk perceptions, and adaptation attitudes. *Climatic Change*. 135. 211–226.
- Carlton, J.S., A. Ropicki, and B. Balboa. 2016. The Halfmoon Reef restoration: A socioeconomic evaluation. Technical Report submitted to the Nature Conservancy.
- Cook, J., N. Oreskes, P. Doran, W. Anderegg, B. Verheggen, E. Maibach, J. S. Carlton, S. Lewandowsky, Skuce, A., Green, S., Nuccitelli, D., Jacobs, P., Richardson, M., Winkler, B., Painting, R., and K. Rice. 2016. Consensus on consensus: a synthesis of consensus estimates on human-caused global warming. *Environmental Research Letters*. 11. 048002.
- Carlton, J. S. and S. K. Jacobson. 2016. Using expert and non-expert models of climate change to enhance communication. *Environmental Communication*. 10. 1–24.
- Carlton, J. S., R. Perry-Hill, M. Huber, and L. S. Prokopy. 2015. The scientific consensus about climate change extends beyond climate scientists. *Environmental Research Letters*. 10. 094025.
- Haigh, T., E. Takle, J.A. Andresen, M.J. Widhalm, J.S. Carlton, and J. Angel. 2015. Mapping the decision points and climate information use of agricultural producers across the U.S. Corn Belt. *Climate Risk Management*. 7. 20–30.
- Hartel, C. (undergraduate mentee), J. S. Carlton, and L. S. Prokopy. 2015. The influence of wildlife value orientations on conservation attitudes toward a noncharismatic reptile. *Human Dimensions of Wildlife*. 20. 553–562.
- Prokopy, L.S., J.S. Carlton, J.G. Arbuckle, T. Haigh, M.C. Lemos, A.S. Mase, J. Andreson, N. Babin, M. Dunn, J. Angel, C. Hart, and R. Power. 2015. Extension's Role in Disseminating Information about Climate Change to Agricultural Stakeholders. *Climatic Change*. 130. 261–272.

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### EDUCATION

B.S. California State University, Long Beach, 1974, Marine Biology  
M.A. California State University, Long Beach, 1975, Biology  
Ph.D. University of Alberta, 1979, Zoology

### POSITIONS

2009–Present	Director, Michigan Sea Grant
1999–2007	Associate Dean, School of Natural Resources and Environment
1996–Present	Professor of Fisheries and Aquaculture, SNRE
1984–1996	Associate Professor and Associate Research Scientist, Great Lakes Research Division
1979–1984	Assistant Professor and Assistant Research Scientist

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society  
International Association for Great Lakes Research  
World Aquaculture Society

### SELECTED PUBLICATIONS

Ahmed, N., and J.S. Diana. 2015. Threatening “white gold”: Impacts of climate change on shrimp farming in coastal Bangladesh. *Ocean & Coastal Management*. 114. 42–52.

Ahmed, N., and J.S. Diana. 2015. Coastal to inland: Expansion of prawn farming for adaptation to climate change in Bangladesh. *Aquaculture Reports*. 2.67–76.

Cao, L., J.S. Diana, and G.A. Keoleian. 2013. Role of life cycle assessment in sustainable aquaculture. *Reviews in Aquaculture*. 4. 1–11.

Diana, J.S., H.S. Egna, T. Chopin, M.S. Peterson, L. Cao, R. Pomeroy, M. Verdegem, W.T. Slack, M.G. Bondad-Reantaso, and F. Cabello. 2013. Responsible aquaculture in 2050: Valuing local conditions and human innovations will be key to success. *BioScience*. 63. 255–262.

Diana, J.S. 2012. Is lower intensity aquaculture a valuable means of producing food? An evaluation of its effects on near-shore and inland waters. *Reviews in Aquaculture*. 4. 234–245.

Diana, J.S. 2012. Some principles of pond fertilization for Nile tilapia using organic and inorganic inputs. Pages 163–177 in C.C. Mischke, editor. *Pond Fertilization: Impacts of Nutrient Input on Aquaculture Production*. John Wiley and Sons, Inc., New York.

Cao L., J.S. Diana, G.A. Keoleian, and Q. Lai. 2011. Life cycle assessment of Chinese shrimp farming systems targeted for export and domestic sales. *Environmental Science & Technology*. 45. 6531–6538.

Diana, J.S. 2009. Aquaculture production and biodiversity conservation. *BioScience*. 59. 27–38.

Diana, J.S., C.K. Lin, and Y. Yi. 1996. Timing of supplemental feeding for tilapia production. *Journal of the World Aquaculture Society*. 27. 410–419.

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### EDUCATION

B.S. Hamline University, 1973, Biology  
M.S. North Dakota State University, 1975, Zoology  
Ph.D. McGill University, 1979, Biology

### POSITIONS

2015–Present Director, Sea Grant College Program  
2015–Present Professor, Large Lakes Observatory and Department of Biology, University of Minnesota, Duluth  
2007–Present Chair, Environmental Science Graduate Program, Iowa State University  
2010–2015 Adjunct Professor, Science, Itasca Community College  
1995–2016 Professor, Ecology, Evolution, and Organismal Biology. Agricultural & Biosystems Engineering.  
Natural Res Ecol. & Management. Botany. Animal Ecology, Iowa State University  
1994–1996 Research Associate, University of Minnesota, Ecology, Evolution & Behavior  
1981–1995 Director, Biological Science: Laurentian Biological Station, Université de Montréal  
1993–1995 Professor, Université de Montréal  
1988–1993 Associate Professor, Université de Montréal  
1987–1988 Assistant Professor, Université de Montréal  
1982–1987 Research Fellow, Université de Montréal  
1981–1982 Postdoctoral Fellow, Université de Montréal  
1981–1995 McGill University, Adjunct Professor  
1980–1981 McGill University, Postdoctoral Fellow  
1979–1980 McGill University, Lecturer

### SELECTED PUBLICATIONS

Downing, J.A. and R.G. Striegl. 2018. The size, age, renewal, and discharge of groundwater carbon. *Inland Waters*. 8. 122-127. DOI: 10.1080/20442041.2017.1412918  
Filstrup, C.T. and J.A. Downing. 2017. Relationship of chlorophyll to phosphorus and nitrogen in nutrient-rich lakes. *Inland Waters*. 7. 385–400. DOI: 10.1080/20442041.2017.1375176  
Downing, J.A.. 2016. Low ratios of silica to dissolved nitrogen supplied to rivers arise from agriculture not reservoirs. *Ecology Letters*. 19. 1414–1418. DOI: 10.1111/ele.12689  
Kalf, J. and J.A. Downing. 2016. Limnology: inland waters ecosystems. *Bibliogenica*, edition 2.0 (e-book).  
Downing, J.A.. 2014. Limnology and oceanography: two estranged twins reuniting by global change. *Inland Waters*. 4. 215-232. DOI: 10.5268/IW-4.2.753  
Downing, J.A.. 2014. Productivity of freshwater ecosystems and climate change. Chapter 127 *in* Freedman, W., editor. 2014. *Handbook of Global Environmental Change*. Springer, New York.  
Downing, J.A., J.J. Cole, C.M. Duarte, J.J. Middelburg, J.M. Melack, Y.T. Prairie, P. Kortelainen, W.H. McDowell, R.G. Striegl, and L.J. Tranvik. 2012. Global abundance and size distribution of streams and rivers. *Inland Waters*. 2' 229–236. DOI: 10.5268/IW-2.4.502.

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### EDUCATION

B.S. Nasson College, Springvale, Maine, 1981, Chemistry and Environmental Science  
M.S. University of Wisconsin-Madison, 1984, Water Chemistry  
Ph.D. University of Wisconsin-Madison, 1988, Water Chemistry

### POSITIONS

2015–Present Chair, UW-Madison Environmental Chemistry and Technology Graduate Program  
2012–Present Director, University of Wisconsin Aquatic Sciences Center (UW Sea Grant and UW Water Resources Institutes)  
2011–Present Associate Professor, Civil and Environmental Engineering, University of Wisconsin-Madison  
2011–2012 Director, Environmental Health Division, Wisconsin State Laboratory of Hygiene  
2011 Visiting Professor, Civil and Environmental Engineering, University of Wisconsin-Madison  
2007–2011 Senior Scientist, University of Wisconsin-Madison  
2002–2011 Assistant Director for Research and Outreach, University of Wisconsin Aquatic Sciences Center  
2007–2008 Associate Research Director, NOAA National Sea Grant College Program (IPA position)

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Association of Public & Land-Grant Universities' Board on Oceans, Atmosphere, & Climate, 2015–Present.  
Reserve Advisory Board, Lake Superior National Estuarine Research Reserve, 2011–Present  
Science Advisory Board, Wisconsin Initiative on Climate Change Impacts, 2014–Present.  
Sea Grant Association, 2015–2018.  
Subcommittee on Science, International Joint Commission, Great Lakes Water Quality Agreement-Annex 10, 2013–Present.  
University-National Oceanographic Laboratory System, 2013–Present.  
Wisconsin Groundwater Coordinating Council, 2012–Present.  
Wisconsin Coastal Management Council, 2003-2010. 2012–Present.

### SELECTED PUBLICATIONS

Yin, R., Z. Guo, L. Hu, W. Liu, J.P. Hurley, R.F. Lepak, T. Lin, X. Feng and X. Li. 2018. Mercury Inputs to Chinese Marginal Seas–Impact of Industrialization and Development of China. Submitted to *Journal of Geophysical Research–Oceans*. DOI: 10.1029/2017JC013691  
Lepak, R.F., S.E. Janssen, R. Yin, D.P. Krabbenhoft, J.M. Ogorek, J.F. DeWild, M.T. Tate and J.P. Hurley. 2018. Factors Affecting Mercury Stable Isotopic Distribution in Piscivorous Fish of the Great Lakes. *Environmental Science and Technology*. 52. 2768–2776. DOI: 10.1021/acs.est.7b06120.  
Rothenberg, S.E., R. Yin, J.P. Hurley, D.P. Krabbenhoft, Y. Ismawati, C. Hong and A. Donohue. 2017. Stable Mercury Isotopes in Polished Rice (*Oryza sativa L.*) and Hair from Rice Consumers. *Environmental Science and Technology*. 51. 6480-6488. DOI:10.1021/acs.est.7b01039.  
Lepak, R.F., R. Yin, R., D.P. Krabbenhoft, J.M. Ogorek, J.F. DeWild, T.M. Holsen, and J.P. Hurley. 2015. Use of Stable Isotope Signatures to Determine Mercury Sources in the Great Lakes. *Environmental Science and Technology Letters*. 2. 335–341. DOI:10.1021/acs.estlett.5b00277.  
Lepak, R.F., D.P. Krabbenhoft, J.M. Ogorek, M.T. Tate, H.A. Bootsma and J.P. Hurley. 2015. Influence of *Cladophora*-*Quagga* Mussel Assemblages on Nearshore Methylmercury Dynamics in Lake Michigan. *Environmental Science and Technology*. 49. 7606–7613. DOI:10.1021/es506253v.

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### EDUCATION

B.S. University of Science and Technology, Ghana, 1982, Agriculture  
M.S. University of Alberta, Edmonton, 1995, Agricultural Economics  
Ph.D. University of Alberta, Edmonton, 2000, Agricultural Economics

### POSITIONS

2015–Present Clinical Engagement Associate Professor, Purdue University  
2013–2015 Clinical Engagement Assistant Professor, Purdue University  
2005–2013 Aquaculture Marketing Director, Purdue University  
2005–Present Aquaculture Marketing Extension Specialist, Illinois-Indiana Sea Grant College Program  
2001–2005 Assistant Professor, Aquaculture Marketing, University of Arkansas at Pine Bluff  
2000–2001 Post-Doctoral Fellow, Department of Agricultural Economics, Washington State University

### SELECTED PUBLICATIONS

Engle, C.R., K.K. Quagraine, and M.M. Dey. 2017. Seafood and Aquaculture Marketing Handbook, 2nd edition. Wiley-Blackwell Publishing, West Sussex, UK.

Quagraine, K.K. Consumer Willingness to Pay for a Saline Fish Species Grown in the US Midwest: The Case of Striped Bass, *Morone saxatilis*. Journal of the World Aquaculture Society. 2017. DOI: 10.1111/jwas.12464.

Amankwah, A., K.K. Quagraine, and P.V. Preckel. 2016. Demand for improved fish feed in the presence of a subsidy: a double hurdle application in Kenya. Agricultural Economics. 47. 633–643.

Darko, F.A., K.K. Quagraine, and S. Chenyambuga. 2016. Consumer preferences for farmed tilapia in Tanzania: A choice experiment analysis. Journal of Applied Aquaculture. 28. 131–143.

Anane-Taabeah, G., K.K. Quagraine, and S. Amisah. 2015. Assessment of Farmed Tilapia Value Chain in Ghana. Aquaculture International. 1–17. DOI:10.1007/s10499-015-9960-1.

Quagraine, K.K. 2015. Profitability of Indoor Production of Pacific White Shrimp (*Litopenaeus vannamei*): A Case Study of the Indiana Industry. Purdue University Extension Publication# EC-797-W / Illinois-Indiana Sea Grant Publication #15-005. Available: [https://www.edustore.purdue.edu/item.asp?Item\\_Number=EC-797-W](https://www.edustore.purdue.edu/item.asp?Item_Number=EC-797-W).

Quagraine, K.K. 2015. Profitability of Hybrid Striped Bass Cage Aquaculture in the Midwest. Purdue University Extension Publication# EC-798-W / Illinois-Indiana Sea Grant Publication #15-004. Available: [https://www.edustore.purdue.edu/item.asp?Item\\_Number=EC-798-W](https://www.edustore.purdue.edu/item.asp?Item_Number=EC-798-W).

Broughton, M.C. and K.K. Quagraine. 2013. Economic Importance of the Aquaculture Industry in Indiana. Purdue University Extension Publication# EC-770-W / Illinois-Indiana Sea Grant Publication #13-70. Available: [https://mdc.itap.purdue.edu/item.asp?Item\\_Number=EC-770-W#.Uz2rpVfJaKU](https://mdc.itap.purdue.edu/item.asp?Item_Number=EC-770-W#.Uz2rpVfJaKU).

Engle, C.R. and K.K. Quagraine. 2006. Aquaculture Marketing Handbook. 1st Edition, Blackwell Publishing Ltd., Ames, Iowa.

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M.S. University of Michigan, 1988, Biology, Aquatic Ecology  
Ph.D. University of Michigan, 2001, Natural Resources, Aquatic Resources

### POSITIONS

2018–Present Interim Director, Michigan Sea Grant (2018–Present)  
2013–Present Research Program Manager, Michigan Sea Grant  
2009–Present Associate Research Scientist, University of Michigan  
2009–Present Research Associate II, University of Michigan

### SELECTED PUBLICATIONS

- Riseng, C., K. Wehrly, L. Wang, E. Rutherford, J. McKenna, L. Johnson, L. Mason, C. Castiglione, T. Hollenhorst, B. Sparks-Jackson. 2018. Ecological classification and mapping of the Laurentian Great Lakes. *Canadian Journal of Fisheries and Aquatic Science*. Available: <http://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2017-0242#.Wj0VzPmnE2x>
- Kramer, A., G. Annis, M. Wittmann, W. Chadderton, E. Rutherford, D. Lodge, L. Mason, D. Beletsky, C. Riseng, J. Drake. 2017. Suitability of Laurentian Great Lakes for invasive species based on global species distribution models and local habitat. *Ecosphere*. 8. e01883. DOI: 10.1002/ecs2.1883.
- Fetzer, W., B.M. Roth, D.M. Infante, D.F. Clapp, R.M. Claramunt, D.G. Fielder, D.K. Forsyth, J. X He, T.J. Newcomb, C.M. Riseng, K.E. Wehrly, and T.G. Zorn. 2016. Spatial and temporal dynamics of nearshore fish communities in Lake Michigan and Lake Huron. *Journal of Great Lakes Research*. 43. 319-334.
- Wittmann, M.E., G. Annis, A.M. Kramer, L. Mason, C.M. Riseng, E.S. Rutherford, W.L. Chadderton, D. Beletsky, J.M. Drake, and D.M. Lodge. 2016. Refining species distribution model outputs using landscape scale habitat data: Forecasting Grass Carp and *Hydrilla verticillata* establishment in the Great Lakes Region. *Journal of Great Lakes Research*. 43. 298-307.
- Wang, L., C.M. Riseng, L.A. Mason, K.E. Wehrly, E.S. Rutherford, J.E. McKenna, Jr, C. Castiglione, L.B. Johnson, D.M. Infante, S. Sowa, M. Robertson, J. Schaeffer, M. Khoury, J. Gaiot, T. Hollenhorst, C. Brooks, and M. Coscarelli. 2015. A Spatial Classification and Database for Management, Research, and Policy Making: the Great Lakes Aquatic Habitat Framework. *Journal of Great Lakes Research*. 41. 584-596. DOI: 10.1016/j.jglr.2015.03.017.
- Esselman, P., R.J. Stevenson, F. Lupi, C.M. Riseng, and M.J. Wiley. 2015. Landscape prediction and mapping of game fish biomass, an ecosystem service of Michigan rivers. *North American Journal of Fisheries Management*. 35. 302-320.
- Bunnell, D.B., R.P. Barbiero, S.A. Ludsin, C.P. Madenjian, G.J. Warren, D.M. Dolan, T.O. Brenden, R. Briland, O.T. Gorman, J.X. He, T.H. Johengen, B.F. Lantry, T.F. Nalepa, S.C. Riley, C.M. Riseng, T.J. Treska, I. Tsehaye, D.M. Warner, M.G. Walsh, and B.C. Weidel. 2013. Changing ecosystem dynamics in the Laurentian Great Lakes. Bottom-up and top-down regulation. *Bioscience*. 64. 26-39.

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### EDUCATION

B.S. Ohio University, 1997, Environmental Biology  
M.S. Bowling Green State University, 2002, Aquatic Biology/Limnology  
Ph.D. Bowling Green State University, 2010, Aquatic Biology/Limnology

### POSITIONS

2017–Present Director, Ohio Sea Grant and OSU Stone Laboratory  
2015–2017 Interim Director, Ohio Sea Grant and OSU Stone Laboratory  
2014–2015 Associate Director, Ohio Sea Grant and OSU Stone Laboratory  
2011 Instructor, Bowling Green State University  
2007–2012 Instructor, Ohio State Stone Laboratory  
2009–2011 Assistant Professor, Kutztown University of Pennsylvania  
2002–2009 Full-time Instructor, Bowling Green State University

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Advisory Board of the Cleveland Water Alliance (2016–Present)  
Advisory Board of Western Lake Erie Basin Conservation Effects Assessment Project (2014–2016)  
Advisory Council for the Ohio Water Trust (2016–Present)  
Agency Partner for Ohio Lake Erie Commission (2015–Present)  
Annex II Lake Erie Partnership Working Group, Great Lakes Water Quality Agreement (GLWQA) (2016–Present)  
Annex IV (Nutrient Annex), GLWQA, Objectives and Targets Task Team (2016–Present)  
International Joint Commission's Research Coordinating Committee of Science Advisory Board (2014–Present)  
Co-Director of Lake Erie Millennium Network (2016–Present)  
Chair of NOAA's Great Lakes Coastal Storms Grant Program review committee (2014–2016)  
Ohio Chapter of American Fisheries Society (2015)  
Old Woman Creek National Estuarine Research Reserve (2016–Present)

### SELECTED PUBLICATIONS

Steinhart, G.B., S. Bode, J. Thieme, and C.J. Winslow. 2017. Fish passage through three types of structures in diked coastal Lake Erie wetlands. *North American Journal of Fisheries Management*. 34. 497-509