

RAES 2013-2016

Project Title: Regional Aquaculture Extension Specialist (RAES) [Termination Report]

Key Word: Extension

Total Funds Committed: \$205,165 (\$103,347+\$101,820)

Initial Project Schedule: September 1, 2013 to August 31, 2016

Current Project Year: September 1, 2015 to August 31, 2016

Participant(s): Christopher Weeks, Michigan State University, Michigan

Extension Liaison: K. Quagraine, Purdue University, Indiana

Industry Liaison: William Lynch, Mill Creek Perch Farms, Marysville, Ohio

Reason for Termination: Project objectives completed and funds have been terminated.

Project Objectives

1. Continue RAES support to the NCR aquaculture community through ongoing activities in areas of services, leadership, assessing and addressing industry needs, and information transfer
2. Develop and implement strategies to address and promote aquaculture sustainability in the NCR.
3. Develop and strengthen partnerships from within the NCR and outside the region among regulatory agencies, industry, academia, and other relevant entities to foster open, meaningful dialog on critical issues and build support for the NCR aquaculture industry.
4. Coordinate efforts for seeking non-NCRAC support for NCR aquaculture development.

Project Summary

According to the USDA aquaculture censuses, aquaculture in the North Central Region (NCR) experienced a 19% drop in registered farms, and a 4% increase in production value between 2005 and 2013. Over this same period, aquaculture extension FTEs in the region dropped from approximately ten down to five. A 2014 NCRAC needs survey (Weeks, Lynch, and Morris unpublished data) found that the majority of survey participants perceived regulations, feed costs and lack of available funding to be top impediments to industry expansion. There are growing concerns within the industry of rising regulatory constraints including the Lacey Act, incidental possession of aquatic invasive species, effluent discharge requirements, and problems obtaining permits for expansion of traditional, outdoor, open water systems. Current public perception and policy appears to favor development of indoor recirculating aquaculture systems (RAS). A review conducted by the RAES showed close to 80% failure rate of RAS startups in the US, and 90% failure in the NCR. The RAES continues to assess these patterns, and develop partnerships and strategies to address barriers holding back regional aquaculture expansion.

Technical Summary and Analysis

Objective 1. Continue RAES support to the NCR aquaculture community through ongoing activities in areas of services, leadership, assessing and addressing industry needs, and information transfer. Aquaculture Needs Survey The RAES, along with the Chair of the Industry Advisory Council (IAC; Bill Lynch), and NCRAC Director (Joe Morris) conducted a NCR Aquaculture Needs survey in 2014 administered in Survey Monkey™ using the NCRAC email contact list as an initial population pool. Listed were 703 individuals from industry,

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academic institution and government agency backgrounds who have expressed interest in aquaculture.

Twenty-five individuals were randomly selected from each state for survey participation. North Dakota was the only exception with 19 contacts listed. Invitations were also extended to all NCRAC members (50) and aquaculture state association officers (52) in the NCR, whose email addresses investigators were able to obtain.

Respondents perceived regulations, feed costs and lack of funding and loans were rated as the top three impediments facing regional aquaculture growth by all groups collectively. There were apparent differences; however, in how impediments were perceived across career groups (Figure 1). When asked if NCRAC was to focus on three species or groups with best potential to substantially increase NCR aquaculture in the next five years, the collective group responded with walleye/ saugeye as number one (44%), followed by yellow perch (43%), and a tie between largemouth bass and trout/salmonids (29%) to finish the top four. However, there were rather wide differences in respondent perceptions towards species priorities when broken down by state (Table 1). Additional activities undertaken by the RAES from 2013-2016 under objective one include: • 2014 and 2016 updates to the NCRAC Regulation website “State Importation and Transportation Requirements for Cultured Aquatic Animals”. • Steering committee action and conference facilitation for: 2014 NCR Aquaculture Conference (Toledo, OH), 2015 Michigan Seafood Summit (East Lansing, MI), 2015 Dialogue on Open Water Aquaculture (St. Ignace, MI), 2016 NCR Aquaculture Conference (Milwaukee, WI), 2016 Michigan Seafood Summit (Traverse City, MI), 2016 Great Lakes Regional Seafood Workshop (Milwaukee, WI). • Twenty presentations at conferences and association meetings. • Extension support through phone, email, list serves, eXtension Ask-an-Expert, site visits and direct personal contact at numerous venues across the region.

Public education related to open water aquaculture at various speaking and comment forums. • Industry representation at public meetings likely to impact aquaculture and baitfish industry sectors (e.g., Great Lakes Panel for ANS), identifying contacts for industry consultation, and leading case by case discussions on regulatory issues for NCR producers.

Objective 2. Develop and implement strategies to address and promote aquaculture sustainability in the NCR. In a paper published by Journal of Extension, the RAES summarizes results from a series of open forum discussions on sustainable aquaculture development in the NCR (Weeks2013). Specifically, that paper discusses the concept of sustainable aquaculture, how it is perceived regionally, and presents a model that allows for increased focus towards three principle components of sustainability: environmental conservation, social benefits, and economic viability.

The RAES obtained outside (non-NCRAC) funding and was principal investigator on a project that produced a strategic plan for a thriving and sustainable aquaculture industry in Michigan (Colyn et al. 2014). In a Sea Grant published report stemming from that project, the authors stated that Michigan has high potential to increase sustainable aquaculture through indoor, flow through, and net pen systems in the Great Lakes. The release of that report generated a flurry of media, discussion and legislation activity due in large part to a strong opposition base against open water aquaculture in the Great Lakes. An important lesson learned from these

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events was that social carrying capacity is a critical component to aquaculture expansion in the US. Most of the opposing views seem to concede that aquaculture, especially seafood production, is important, but that aquaculture can be done indoors in urban settings. In response, the RAES completed an ad hoc review examining success rates of recirculating aquaculture systems in the US and presented results at four regional meetings. Successes were defined as facilities operating more than five years. Overall the success rate was estimated to be approximately 20% in the US, and 11% in the NCR, with nearly all production going to live fish premium markets. Indoor RAS have higher capital costs, greater carbon footprint, and require premium market prices compared to traditional systems.

The RAES continues to further discussion aimed at finding ways to overcome these obstacles. An additional focus area is aquatic invasive species (AIS). Currently the RAES, with fellow NCRAC researchers from Michigan Sea Grant and University of Minnesota, are examining the feasibility of a verification program designed to reduce risk of AIS movement in aquaculture and baitfish practices (Weeks et al. 2016a; Weeks et al. 2016b). This project also is supported by non-NCRAC funding and is expected to be completed by the end of this year.

Objective 3. Develop and strengthen partnerships from within the NCR and outside the region among regulatory agencies, industry, academia, and other relevant entities to foster open, meaningful dialog on critical issues and build support for the NCR aquaculture industry. The RAES provided voice regarding industry interests at various private and public forums and has standing appointments to the Committee for the Right to Farm Generally Accepted Agriculture and Management Practices, Michigan Commission of Agriculture; Great Lakes Panel on Aquatic Nuisance Species; National Aquaculture Association ANS Committee, Aquaculture in Michigan (AIM), and NSF International Global Food Division Advisory Council.

In 2014 the RAES was voted into the NCRAC Board as an ex-officio member, working closely with NCRAC Director and others on issues such as improving NCRAC's project selection protocols and updating the NCRAC Strategic Plan. The RAES also helped to build and strengthen partnerships with a number of other organizations including, Michigan Sea Grant, Indiana and Michigan Soybean Associations, Soy Aquaculture Alliance, Coalition for U.S. Seafood Production, National Institute for Sustainable Aquaculture, initiative for Ohio Seafood co-op, and private agricultural business startup groups such as Originz, and Engle-Stone Aquatic \$ LLC. In addition, the RAES continued to work with nonprofit groups including Aquaculture Research Corporation on Great Lakes open water aquaculture, and the Nature Conservancy on aquatic invasive species issues.

Objective 4. Coordinate efforts for seeking non-NCRAC support for NCR aquaculture development. From 2013-2016, the RAES obtained as \$80,000 of outside funding as a principal investigator, and an additional \$460,000 as a co-investigator for projects to support NCR aquaculture. Additionally, the RAES has supplied a number of support letters for other regional projects and is a project collaborator on the recently awarded Aquaculture Boot Camp 2 project awarded to The Ohio State University and other partners by USDA.

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Principal Accomplishments

The RAES program has continued to provide important contributions towards aquaculture development over a time frame when aquaculture extension effort in the region was drastically reduced. Potential for aquaculture to expand centers on sustainability and social carrying capacity. The RAES has built a reputation that continually strives to message this as an important principle, and that sustainable development must address the environment, society, and economics at the same time. Regulations, permitting, and funding continue to be problematic for current and potential producers. The RAES, through the NCRAC regulation website, presentations, liaison services, list serves and workshops, has helped bring clarity, awareness, and knowledge of regulations across the NCR. For example, the NCRAC regulation website received 393 page views with 234 hits to specific state regulation web pages in September of 2016. Over the past two years the RAES has helped coordinate direct outreach activity to 600 attendees at conferences, meetings and summits. Additional outputs include personal verbal communications (over 50 per month), NCR Fish Culture List serve postings (100 postings to 159 subscribers on the annually), email inquiries (several per week), and over 20 presentations since 2013.

The RAES along with two other NCRAC members secured funding through the 2015-2016 State of Michigan Comprehensive Aquatic Invasive Species State Management Plan to examine the potential of establishing an AIS prevention verification program. That project is nearing completion and receiving interest in both industry and regulatory agencies. An initial report on AIS management in Great Lakes aquaculture and baitfish sectors, and a feasibility assessment have been completed. A case study is now underway. Access to funding remains a challenge and is due in large part to the amount of risk associated with high costs and failure rates associated with RAS. Additional risk and burden is associated with regulatory costs and pressure arising from various groups opposing expansion of traditional, open water systems.

The RAES has continued to provide sound science-based information to stakeholders and legislators, and seek partnerships and opportunities to improve viability of all aquaculture systems through a platform that centers on sustainability. The Michigan Aquaculture Strategic Plan has been an instrument of change and discussion for aquaculture across the region. It has also been a good exercise on social carrying capacity in aquaculture development attempts. The state of Michigan has reportedly doubled its commercial fish production over since the release of the plan. The RAES has been working to build new partnerships and strengthen existing ones. Investigator Weeks is frequently asked for industry viewpoint in national and international program meetings such as the Great Lakes Panel on aquatic nuisance species and the NSF International Global Food Division Advisory Council. The RAES is currently co-investigator on two additional NCRAC projects with Dr. Carol Engle, Engle-Stone Aquatic \$ LLC, designed to build leadership skills to aquaculture association members in the NCR. The RAES is also co-investigator on a \$456,000 grant for education and outreach for sustainable aquaculture in Michigan.

Impacts

Impacts are difficult to measure because of current trends in US aquaculture as a whole. Overall fish production is down, mainly due to dramatic reductions in US catfish production from southern US states. With that said, there are some indications that production is stable or increasing in the NCR. The state of Michigan went from one to three facilities operating under NPDES permits that raise rainbow trout for the food market. According to a recent farm Bureau article, one of those facilities is currently producing up to one million pounds per year. Aquaponics systems are rising up across the NCR, mainly at hobby scale level, but there are also reports of facilities achieving positive cash flow, mainly in areas with close access to white table cloth restaurants. RAS economics remain questionable; however, there are a number of tilapia facilities operating in Ohio and Indiana, a large scale barramundi startup operation in Iowa, and a number of new small marine shrimp production facilities across the NCR. It is noted that the RAES has no direct ties to some of these facilities, but the regional extension network as a whole continues to provide support and information in effort with the overarching goal of helping them become successful.

Recommended Follow-Up Activities

Additional recourses and effort are necessary to address how aquaculture and bait harvest practices are accepted by society at local and regional scale (social carrying capacity). Specifically, more work is needed to educate all stakeholders on aquaculture sustainability comprehensively across aspects of human health, economics, food and water demands, nutrient utilization, and resource management potential. In addition, we must continue to strive, through research and extension, ways to reduce aquaculture associated risk, expand markets, and provide training and tools to help entrepreneurs develop, and operate, economically viable RAS and aquaponics business models.

Publications, Manuscripts, Workshops, and Conferences

See the Appendix for a cumulative output for all NCRAC-funded Extension activities.

Technical Update

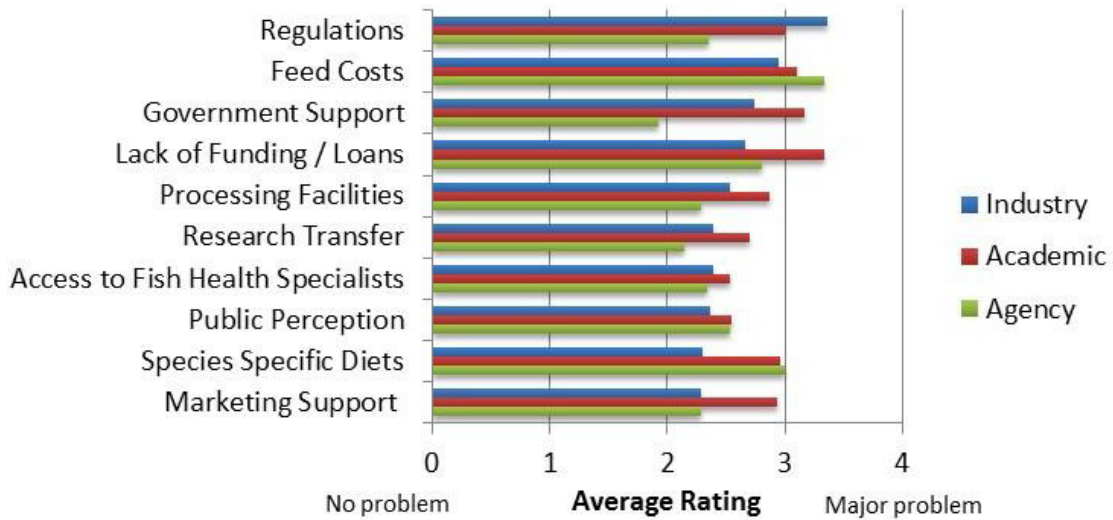


Figure 1. Average Impediment Ratings to Aquaculture Development in the North Central Region by Industry, Academic and State and Federal Agency Groups.

Table 1. The top three species with greatest potential for commercial aquaculture as perceived collectively by state in the North Central Region.

State	#1 Species	#2 Species	#3 Species
IL	Tilapia	Largemouth Bass	Hybrid Striped Bass
IN	Largemouth Bass	Yellow Perch	Shrimp (Marine)
IA	Shrimp (Marine)	Yellow Perch	Walleye / Saugeye
KS	Catfish	Sunfish / Bluegill	Largemouth Bass
MI	Trout / Salmonids	Walleye / Saugeye	Yellow Perch
MN	Baitfish	Yellow Perch	Walleye / Saugeye
MO	Sunfish / Bluegill	Largemouth Bass	Crappie
NE	Walleye / Saugeye	Yellow Perch	Trout / Salmonids
OH	Largemouth Bass	Yellow Perch	Walleye / Saugeye
SD	Baitfish	Yellow Perch	Marine / New
WI	Walleye / Saugeye	Trout / Salmonids	Yellow Perch