
FINAL REPORT

Project Title	Impact assessment of NRAC funding on aquaculture in the Northeast
Reporting Period	9/1/16-8/31/18
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Key Word	northeast, aquaculture, evaluation, research, economic, impact
Funding Level	Total funds allocated for this project to date. <i>Year One: FY 2017, \$74,270</i>
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Project Objectives	<p>List each objective</p> <p>Objective 1: Review the effectiveness of NRAC-funded projects (using targeted interviews and in-depth data collection and analysis) to assess their impacts to aquaculture permitting, siting, production, disease management, and harvesting programs across cultured species and production systems (inland, coastal, closed, integrated, etc.).</p>

	<p>Objective 2: Summarize and describe lessons learned and outcomes (including, where possible an estimate of the return on investment) from projects funded through the NRAC RFR and Workgroup processes.</p> <p>Objective 3: Evaluate the effectiveness of project approaches to promote solutions for aquaculture source problems.</p> <p>Objective 4: Produce science-based knowledge that can be utilized to set new funding priorities, which will yield more effective aquaculture research, education, and extension programs funded by NRAC.</p> <p>Objective 5: Provide examples where the NRAC funding mechanisms have worked synergistically or where they have failed to develop synergies.</p> <p>Objective 6: Deliver results of the synthesis to NRAC, the science community, and relevant stakeholder groups (e.g., industry, municipal, state and federal agencies, commodity organizations).</p>
<p>Anticipated Benefits</p>	<p>State briefly how the project will benefit the aquaculture industry – directly or indirectly.</p> <p>The overall objective of this work group is to assess the scientific, socio-economic, and policy impacts of accomplishments made through NRAC’s portfolio of recently (2005-2014) funded 32 aquaculture projects, including extension workgroup projects. Incorporated in this synthesis will be how these projects have or have not helped move the aquaculture industry close to solutions for the diversity of problems it faces within the region. From the resultant information, suggestions for achieving higher impacts will be identified that NRAC should consider in future funding initiatives to benefit the Northeast aquaculture industry better.</p>
<p>Project Progress</p>	<p>Summarize concisely for each objective the progress toward accomplishment to date. This has an 8,000 character limit.</p> <p>The majority of this project was completed under the first award, including Objectives 1-3 and most of Objectives 4-5. Briefly:</p> <p>Objectives 1-3: The UNH Survey Center and the Carsey School of Public Policy’s Evaluation Program evaluated the relevancy, usefulness, and impact of NRAC-funded research and work group projects to aquaculture industry stakeholders by querying diverse groups and analyzing their responses. Amongst questions asked were:</p>

- 1) What are the critical scientific and management findings of the NRAC portfolio (since fiscal year 2005)?
- 2) What is the overall impact to the industry and local and regional economies with respect to return on investment?
- 3) How effective have integrated (research, education, and extension) projects been at moving stakeholders (e.g., industry) closer to solutions for diversified issues in inland and coastal systems, including diversification of the industry?
- 4) What synergies developed among projects that resulted in improved leveraging of resources and accelerated movement toward solutions?
- 5) What issues should NRAC address as science-industry priorities in the future and what is the best means to address those issues through research, education, and extension efforts?

Working with the PC and Aquaculture Advisors, a focus group was held to formulate survey contents at the beginning of Year 1 to ensure that the evaluation addressed all the relevant stakeholders, themes, and aspects of the NRAC program throughout the evaluation. A series of meetings were held with the UNH research team to develop questionnaires that provided data needed to address research questions, including estimates for return on investment of NRAC research programs. From these meetings, the sampling frame for each population of interest (NRAC grantees, their industry collaborators, and industry stakeholders) was finalized. Draft questionnaires were developed based on input from the Project Team, including the Aquaculture Advisors, and the surveys were tested by the Aquaculture Advisors to ensure clarity of questions, ease of understanding, ease of completion, and comprehensiveness of the questionnaire for achieving research goals. Whenever possible, identical questions were used across survey populations to understand how different groups view the utility of NRAC grants.

Three surveys were designed, conducted, and completed. The first survey targeted Project Coordinators (n=32; response rate=100%) for each of the NRAC-funded aquaculture projects under review. The second survey targeted named collaborators and stakeholders identified in individual project proposals and documents or specifically named by PIs (completed by 141 people; response rate=52%). This group included both funded and non-funded participants which included extension, industry, and other researchers. A third survey targeted a broader array of aquaculture industry stakeholders to provide a more unbiased (by NRAC experience) view of the research needs and priorities of the aquaculture industry as well as the practical utility and scalability

of NRAC research projects. This group was constructed using state supplied lists of licensed, private aquaculture growers or propagators (completed by 273 businesses; response rate=28%).

Prior to receiving the survey, respondents were notified via emails sent by both the PC and the NRAC Director, on behalf of the Project Team, to expect a second email from the Project Team with a link to the survey and encourage them to complete the survey when it arrived. Each respondent received an initial email describing the project, an email directing them to a web site to complete the questionnaire, and up to three follow-up emails as needed. Those who were unable or did not respond to web surveys were contacted by telephone to remind them of the project and to direct them to the web site to complete the survey or the survey was completed over the phone.

All three surveys were analyzed across data sources for similar themes, differences, categories, and content, by all participating stakeholders and by different groups of stakeholders. Data from across all these sources were analyzed to assess the relevance, usefulness, and impact of NRAC-funded research to the aquaculture industry. In addition, a content analysis of original project proposals, progress reports, and, when available, final and impact reports written and submitted by project PCs to NRAC were reviewed for all 32 research projects to determine expected and realized project impacts and tabulate output metrics. For five projects still active at the time of this assessment, project impacts were not able to be determined, however some output metrics could be quantified based on submitted progress reports.

An input-output model of each state in the NRAC region economy was created to estimate the economic impacts that resulted from the completed NRAC projects within each state where an NRAC project occurred and at the regional level.

Objectives 4-5:

During this reporting period, all data were analyzed to produce science-based knowledge about the effectiveness of the 32 NRAC-funded projects, determine what economic impacts they've had on the regional economy, and illustrate examples where the NRAC funding mechanisms have worked synergistically and where they could be improved. A report of all study findings was completed and a summary Fact Sheet created. These were submitted to NRAC Sept. 2017.

Objective 6:

The results of this synthesis (assessment report and fact sheet) were delivered to the NRAC Director who shared them with the NRAC BOD, TIAC, and USDA/NIFA personnel. In addition,

	all collaborators which included representatives from each NRAC state received copies of the documents. Outreach efforts also included presentations at national aquaculture and fisheries meetings (see below for details).
Accomplishments:	
Outreach Overview	<p>Describe in general how your results have been extended to the intended users. OR, if they haven't yet, explain when & how this will occur.</p> <p>The assessment report and fact sheet were submitted to the NRAC Director who then shared them with the NRAC BOD and TIAC, and USDA/NIFA personnel. Copies of these documents also were sent to all project collaborators who represent (or represented) extension or industry in each of the 12 states in the NRAC region. Outreach activities included presentations to aquaculture stakeholders (scientific, policy, research audiences).</p>
Targeted Audiences	<p>Provide information on the target audience for efforts designed to cause a change in knowledge, actions, or conditions.</p> <ul style="list-style-type: none"> • Policy makers will have a better idea of how past NRAC research projects have affected the economic livelihood of people involved in the aquaculture industry and the resulting ripple effects through the economy. With economic impact results, policy makers can direct policy and key areas for future research better. • The NRAC leadership will know which research priority areas will be of key funding importance to increase aquaculture growth in the northeast. • Researchers will be informed of these key issues which most limit aquaculture growth so that they can work towards solutions with the industry. • The Northeast aquaculture industry will be made more aware of the role NRAC has had in applied aquaculture research. • Other RACs will be able to use this assessment template to conduct their own impact studies.
Outputs:	<p>Outputs are tangible, measurable products (website, events, workshops, products [AV, curricula, models, software, technology, methods, websites, patents, etc.], trainees, etc.). Do NOT include publications as they're listed separately.</p> <ul style="list-style-type: none"> • In Year 1, a meeting was held at UNH that included the UNH team and the Aquaculture Advisors to develop and review survey methods and design. • Three types of on-line surveys were designed to target researchers, their collaborators, and the Northeast

	<p>aquaculture industry to determine the effectiveness of NRAC-funded projects.</p> <ul style="list-style-type: none"> • In Year 2, a meeting was held in conjunction with the Aquaculture Advisors in conjunction with NACE to review progress on the project to date. • Results from each question in each of the three surveys were generated in reports.
Outcomes/Impacts:	<p>Describe how findings, results, techniques, or other products that were developed or extended from the project generated or contributed to an outcome/impact. Outcomes/impacts are defined as changes in Knowledge, Action, or Condition.</p> <ul style="list-style-type: none"> • There has been a change in knowledge of those stakeholders reached about how and what NRAC funding contributes to the Northeast aquaculture industry. • RAC funding increased by \$1 million in the Omnibus Bill for FY19. Some data from our assessment report was shared prior to this decision. It is possible that our results may have been partially responsible for this increase in funding.
Impacts Summary	<p>Provide short statements (2-3 sentences) about each of the following: (pre-established fields for Researchers to complete short statement answers)</p> <ol style="list-style-type: none"> 1. Relevance: Issue – what was the problem? NRAC has invested over \$5 million in aquaculture research since 2005, however its effect is unknown. To determine the outcome of NRAC funding on the northeast aquaculture sector, there is a need for an impact assessment. 2. Response: What was done? We determined the impact \$4.1 million invested by NRAC during 2005-2014 has had on the Northeast aquaculture industry. A complete synthesis was provided in an assessment report. 3. Results: How did your work make a difference (change in knowledge, actions, or conditions) to the target audiences? For those who have read the report or fact sheet, there has been a change in knowledge about how and what NRAC funding contributes to the Northeast aquaculture industry, mainly that at the very least, for every \$1 dollar spent by NRAC, there has been an economic impact of 5.3 times (but likely much higher) the initial investment due to increases in GDP of NRAC states, job growth, tax revenues. Additional funding secured as a result of NRAC projects increases the economic impact significantly. In addition, the Northeast aquaculture industry rated NRAC-

	<p>funded projects as being very important to critically important to the future of the industry.</p> <p>4. Recap: One- sentence summary This assessment project has shown that money invested by NRAC in aquaculture projects has benefited the Northeast aquaculture industry and has had a high economic impact to states who participated in the projects.</p>			
Publications	<ul style="list-style-type: none"> • An assessment report synthesizing all data was written: Fairchild, E.A., Cullen, K., Grimm, C., Keirns, T., and Smith, A. 2017. Evaluation of Northeast Regional Aquaculture Center (NRAC) Funding. Report submitted to NRAC 8/10/17. 107 pp. • A 2-page summary fact sheet was published highlighting the important findings of the assessment: Fairchild, E.A., Cullen, K., Grimm, C., Keirns, T., and Smith, A. 2017. NRAC funding grows the Northeast aquaculture industry. NRAC Publication No. 219-2017. • Cullen, K. L., E. A. Fairchild, A. Smith, T. Keirns, and C. Grimm. (in prep) Economic evaluation of funding by the USDA/NIFA Northeast Regional Aquaculture Center: a 10-year review. Agricultural and Resource Economics Review. 			
Presentations	<ul style="list-style-type: none"> • Fairchild, E.A., Cullen, K., Grimm, C., Keirns, T., and Smith, A. 2018. Investing federal funds grows the aquaculture industry: lessons learned in the Northeast from USDA/NIFA/NRAC aquaculture grants. “Aquaculture to Inform and Support Fisheries” Session, Annual Meeting of the American Fisheries Society, August 19-23, 2018, Atlantic City, NJ. (invited talk) • Fairchild, E.A., Cullen, K., Grimm, C., Keirns, T., and Smith, A. 2018. Impact of NRAC aquaculture funding in the US northeast. Aquaculture America 2018. The annual meeting of the World Aquaculture Society, February 19-22, 2018, Las Vegas, NV. 			
Partnerships	List any partners that you worked with on your project. Provide the following information for each Partner:			
	Partner	Specific Type Type	Level Level	Nature of Partnership