Assessing the Effectiveness of NCRAC Funded Research in Aquaculture Within the North Central Region

Chairperson: Jonathan van Senten, Virginia Seafood AREC, Virginia Tech
Co-Investigators Carole Engle, Adjunct, Virginia Seafood AREC, Virginia Tech
Robert Rode, Purdue University
Kwamena Quagrainie, Purdue University
Matthew Smith, The Ohio State University

Industry Advisory Council Liaison: Jeni Blackburn, Fresh Harvest Farm Aquaponics

Extension Liaison: Matthew Smith, The Ohio State University

Funding Request: $74,722

Duration: 1 year (July 1, 2020 – June 30, 2021)

Objectives

1. Review the effectiveness of NCRAC-funded projects.
   a. Conduct a comprehensive literature and document review of all NCRAC-funded projects since 1994.
   b. Identify anticipated project outcomes, impacts, and benefits from proposals.
   c. Identify reported outputs and outcomes from final reports and compare with that proposed.
2. Identify outcomes generated on aquaculture farms in the region; summarize and describe lessons learned
   a. Web-based (Qualtrics) survey of all NCRAC aquaculture producers to identify which project outputs, outcomes, and impacts were of benefit to them.
3. Evaluate the effectiveness of project approaches to promote solutions for aquaculture source problems; provide examples where the NCRAC funding mechanisms have worked synergistically or where they have failed to develop synergies.
4. Deliver results of the synthesis to NCRAC, the science community, and relevant stakeholder groups.

Deliverables

1. Webinar will be held for aquaculture producer stakeholders in the North Central Region to share results.
2. At least 3 presentations: Aquaculture America, annual NCRAC, and one state association meeting other than the NCRAC meeting.
3. At least one fact sheet and an accompanying infographic summarizing overall project results.
4. A synthesis report that summarizes key results.
5. Final project report in NCRAC reporting format.

Proposed Budgets

Institution	Principal Investigators	Objectives	Year 1	Total
Virginia Tech	Jonathan van Senten, Carole Engle	1,2,3,4	$72,222	$72,222
Purdue University	Kwamena Quagrainie, Robert Rode	1,2,3,4	$2,500	$2,500

Non-funded Collaborators

Facility	Collaborator(s)
The Ohio State University	Matthew Smith

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Project Summary

NCRAC has funded numerous projects that have supported Extension services in the region and addressed a wide range of topics including fish health, aquaponics, economics, pond management and more. NCRAC funded Extension projects have included workshops and training programs, publications, manuals, and fact sheets. Similarly, NCRAC funded research projects have produced a variety of outputs including reports, publications, presentations, and more. We propose to conduct a thorough review of all completed NCRAC funded research and Extension projects from 1994 to 2019, to identify the outcomes, impacts and deliverables generated by each project for producers within the region. This will begin with a focused analysis of project proposals and final reports to identify the specific anticipated outcomes and impacts, the achieved outcomes and impacts, and the deliverables of each completed project. That information will be summarized and used to develop a survey which will be distributed to all NCRAC producers; in order to assess which of these project outputs, impacts, and deliverables were of benefit and to which segment of the industry. Producer responses will be evaluated to identify which projects had successful approaches to promote solutions and develop synergies that resulted in benefits to industry. The findings of these activities will be summarized in a report detailing (1) the expected outcomes, impacts, and deliverables of each NCRAC funded research and Extension project between 1994 and 2019, (2) the reported outcomes, impacts, and deliverables from each NCRAC funded project between 1994 and 2019, and (3) those projects that produced outcomes, impacts, and deliverables that were of benefit to industry. In addition to this report, a fact sheet and an infographic that summarize key findings will be developed. The research and extension team assembled have previous experience with impact assessment and program evaluation and have extensive experience with the aquaculture industry in the NCRAC region.

Justification

From its inception, NCRAC has funded in excess of 112 research and Extension projects. Each of these projects was performed with the intent of generating some form of beneficial impact on the aquaculture industry within the region. This project proposes to assess the effectiveness of NCRAC funded projects and to summarize those findings in to readily accessible deliverables for relevant NCRAC stakeholders. Not only will that information provide an account of past effectiveness, but along with which project approaches were more effective and why, may be utilized to develop strategies to maximize beneficial impacts of future NCRAC funded research and Extension.

Related Current and Previous Work

Much has been written on how to evaluate the impacts of research and extension projects, with the work of Norton and Davis (1981) and later by Alston et al. (1995) presenting a clear overview of underlying principles and methods. Fairchild et al. (2017) conducted an evaluation of funding of the Northeastern Regional Aquaculture Center (NRAC), and the report provides suggestions for metrics of funded projects that could contribute to this study. The report also summarized the major impacts and achievements of NRAC-funded research, identified the factors limiting the impacts of NRAC projects, and summarized the most impactful research projects and the most impactful extension projects funded by NRAC.

Statement of Duplication of Research

The USDA Current Research Information System (CRIS or REEport) was accessed to review related or relevant research projects and it was found that the proposed work is original research and does not duplicate any previously funded projects in the CRIS. The National Sea Grant Office Funding page and NOAA Office of Aquaculture Funding Opportunities Page were also consulted. **The following NOAA databases of previously funded projects were also accessed to ensure that the proposed work does not duplicate previous research: 1**) National Sea Grant Office Funding Page (http://www.seagrant.noaa.gov/funding/rfp.html); 2) website of state Sea Grant Program (http://www.seagrant.noaa.gov/other/programsdirectors.html); and 3) NOAA Office of Aquaculture Funding Opportunities Page (http://www.nmfs.noaa.gov/aquaculture/funding/funding.html).

Anticipated Benefits

The anticipated benefits of this work are knowledge gained on which NCRAC funded research and Extension projects had the greatest benefit to industry and why, which project approaches were more effective and why, and which NCRAC funded projects produced synergies and why. This information will be helpful to the planning and development of future NCRAC funded research and Extension projects and to the research and Extension community in the development of programs to maximize their impacts. This project will gauge the effectiveness of NCRAC-funded research and programs, and more importantly assess how to improve them for the future to

maximize the benefit to industry. Furthermore, the information produced by this study would allow for a more targeted approach to the quantification of NCRAC-funded research and Extension through an economic impact assessment in the future. Having information on which projects resulted in the greatest benefits to the region would allow for in-depth investigation of the quantitative effects of those activities and outcomes on industry within the NCRAC region.

Objectives

1. Review of effectiveness of NCRAC-funded projects.
   a. Conduct a comprehensive literature and document review of all NCRAC-funded projects since 1994.
   b. Identify anticipated project outcomes, impacts, and benefits from proposals.
   c. Identify reported outputs and outcomes from final reports and compare with that proposed.
2. Identify outcomes generated on aquaculture farms in the region; summarize and describe lessons learned
   a. Web-based (Qualtrics) survey of all NCRAC aquaculture producers to identify which project outputs, outcomes, and impacts were of benefit to them.
3. Evaluate the effectiveness of project approaches to promote solutions for aquaculture source problems; provide examples where the NCRAC funding mechanisms have worked synergistically or where they have failed to develop synergies.
4. Deliver results of the synthesis to NCRAC, the science community, and relevant stakeholder groups.

Deliverables

1. Webinar will be held for aquaculture producer stakeholders in the North Central Region to share results.
2. At least 3 presentations: Aquaculture America, annual NCRAC, and one state association meeting other than the NCRAC meeting.
3. At least one fact sheet and an accompanying infographic summarizing overall project results.
4. A synthesis report that summarizes key results.
5. Final project report in NCRAC reporting format.

Procedures

Objective 1. Review of effectiveness of NCRAC-funded projects.

Sub-objective 1a. Conduct a comprehensive literature and document review of all NCRAC-funded projects since 1994.

Sub-objective 1b. Identify anticipated project outcomes, impacts, and benefits from proposals.

Sub-objective 1c. Identify reported outputs and outcomes from final reports and compare with that proposed.

Objective #1 will be accomplished through a comprehensive review of existing literature and of documents related to all projects funded by NCRAC since 1994. The first step will be to conduct a review of existing literature related to project evaluation metrics. NCRAC Director, Dr. Joe Morris, will be consulted throughout the literature review and document search process. An initial set of metrics likeliest to be most relevant to NCRAC-funded projects will be developed from the review of existing literature. The initial list will be discussed in a virtual workshop during which project team members will finalize the metrics to be used in the project. We anticipate including the following types of metrics to be obtained from funded proposals: 1) short descriptor of type of problem addressed; 2) category of the problem (i.e., fish health, extension, nutrition, aquaculture production, etc.); 2) species targeted (possibly sub-divided into primary and secondary if applicable); 3) objectives; 4) approaches planned; 5) outputs and deliverables planned; 6) anticipated outcomes; 7) anticipated benefits; 8) project budgets; and 9) non-funded collaborators. From final project reports, the following metrics are anticipated to be recorded: 1) any change in species targeted; 2) any change in approaches used; 3) outputs and deliverables produced (including a list of all journal articles, extension materials and activities); 4) outcomes reported; 5) impacts reported; 6) benefits reported; and 7) synergies identified.

A spreadsheet will be developed for entry of all metrics for each funded project. Summary descriptions of anticipated outcomes and benefits from funded proposals will be developed to complete Sub-objective 1b and a similar summary of outputs and outcomes as reported in final reports will be developed to complete Sub-objective 1c. Review of published scientific and extension materials will also be used to identify key results from NCRAC-funded projects.

The spreadsheet will further be used to compare outcomes anticipated to those reported as achieved in the final reports. Criteria for evaluation of effectiveness will be developed by the project team. We anticipate using a qualitative set of criteria such as: a) outcomes achieved as anticipated; b) outcomes less than anticipated; c) no outcomes achieved; d) outcomes greater than those anticipated; and e) outcomes substantially greater than anticipated. The dataset will then be sorted into the above evaluation criteria from which cross-tabulated tables will be developed to search for evidence of the following: 1) which problem categories (i.e., fish health, extension, nutrition, aquaculture production, etc.) were associated with greater outcomes; 2) which approaches may have resulted in greater outcomes; and 3) which species groups were targeted by those projects with greater outcomes reported.

Objective 2. Identify outcomes generated on aquaculture farms in the region; summarize and describe lessons learned.

Sub-objective 2a. Web-based (Qualtrics) survey of all NCRAC aquaculture producers to identify which project outputs, outcomes, and impacts were of benefit to them.

Results of the document review of NCRAC-funded projects will be used as key input into the survey to be conducted to accomplish Objective #2. From Objective 1, we will have a good idea of what the key results were from the projects, which species groups were targeted, and what the reported outcomes were. However, to understand the effectiveness of those projects in terms of providing solutions to problems faced by aquaculture producers in the region, we need to know which outcomes were adopted by producers. In addition, we need to know which species groups have benefitted to the greatest extent and in which states those benefits occurred.

A survey will be designed with input from the project team. Questions will be developed to solicit information on farm-level adoption of the key outcomes identified in project final reports from the work completed in Objective 1. While the focus of the survey will be on adoption of project results, other questions related to awareness of various types of deliverables and information produced from NCRAC projects and of perceptions of what types of approaches are most effective will also be asked. The survey will employ multiple methods of distribution, with primary distribution online using Qualtrics, but a hard copy version will also be developed for administration to producers based on the recommendations of extension personnel; such as those in the Plain community, who do not use the internet. Follow up telephone calls with producers will be performed as necessary, in order to promote participation and responses.

Objective 3. Evaluate the effectiveness of project approaches to promote solutions for aquaculture source problems; provide examples where the NCRAC funding mechanisms have worked synergistically or where they have failed to develop synergies.

Survey results will be sorted by species group and by category of the problem addressed (i.e., fish health, extension, nutrition, aquaculture production, etc.). Survey results are expected to reveal which species groups benefitted to the greatest extent from NCRAC-funded projects and which types of problems were addressed most effectively. Data from the survey will further be used to identify which approaches appeared to be most effective in achieving positive outcomes and impacts on aquaculture farms.

Objective 4. Deliver results of the synthesis to NCRAC, the science community, and relevant stakeholder groups.

Project results will be summarized and prepared for dissemination to a wide variety of groups in several formats. A webinar will be held to present results to aquaculture producer stakeholders in the North Central Region to provide an opportunity for additional thought and discussion. Presentations will be made at professional scientific meetings, such as Aquaculture America and at state and regional meetings (such as the annual NCRAC, Ohio Aquaculture Association, Wisconsin Aquaculture Association meetings, among others).

At least one fact sheet and an accompanying infographic summarizing overall project results will be developed. If project results reveal robust outcomes on several species groups or specific states in the region, additional fact sheets will be developed as appropriate. A synthesis report will be prepared that summarizes the specific NCRAC-funded research projects covered by this project, the implementation of these research results on farms, and the qualitative

effects of the research at the producer level. There will also be a complete final report prepared that summarizes all results in the NCRAC reporting format.

Outreach and Evaluation Plan

Proposal team members will develop a fact sheet to summarize project findings for relevant stakeholders. In addition to this fact sheet an infographic will be developed to summarize key project findings in an easy to share visual format that can be disseminated through social media and other platforms. These outputs will be prepared so that they can be hosted online through NCRAC (linked to participating institutions) and made accessible to relevant stakeholders. Copies of the report and infographic will also be printed, so that they can be disseminated at NCRAC meetings or NCRAC sponsored events. Proposal team members will present project findings at regional and national meetings of aquaculture producers and relevant stakeholders following the completion of this project.

Logic Model

Title: Assessing the Effectiveness of NCRAC Funded Research in Aquaculture Within the North Central Region

Situation: Assess the effectiveness, impacts, and synergies of NCRAC funded research and Extension projects.

Goal: Synthesize the outcomes, impact, and deliverables of NCRAC funded research and identify which of those projects has resulted in beneficial solutions for industry within the North Central Region.

Objective: Outputs			Outcomes – Impact		
Inputs	Activities	Deliverables	Knowledge gain	Behavior change	Conditions that will change
Post-doctoral Research Associate time Project P.I. and Co-P.I. time NCRAC project proposals NCRAC project final reports Computer equipment Qualtrics (survey) Aquaculture producer time SCITE Graphics design and science communication	Review of NCRAC proposal and final report documents Summary of NCRAC project outcomes, impacts, and deliverables Development of survey to NCRAC producers Implementation of survey to assess which project outcomes, impacts, and deliverables were of benefit Summary of survey results Evaluation of effective NCRAC research and Extension approaches and synergies	Summary of outcomes, impacts, and deliverables for all NCRAC funded research and Extension projects from 1994 – 2019 Report of project findings, identifying which NCRAC project outcomes, impacts, and deliverables were of benefit to producers Final project report in NCRAC required format Fact sheet Infographic	Which NCRAC funded research and Extension projects had the greatest benefit to industry and why Which project approaches were more effective and why Which NCRAC funded projects produced synergies and why	Improve focus of future projects towards methods and approaches that have delivered beneficial outcomes, impacts, and deliverables for producers Increased rates of adoption by aquaculture producers from more effective research and extension projects Greater overall impacts on aquaculture in the North Central Region	NCRAC project results will be adopted more readily and more widely by aquaculture producers in the region. NCRAC projects and funding will lead to greater benefits and impacts to aquaculture producers in the region. Aquaculture will grow in the North Central Region.

Facilities

No special facilities are required for the completion of this project. Pre-proposal team members have adequate office space and computing equipment to complete the objectives as described.

References

Alston, J.M., G.W. Norton, and P.G. Pardey. 1995. Science under scarcity: Principles and practice for agricultural research evaluation and priority setting. Cornell University Press for the International Service for National Agricultural Research (ISNAR), Ithaca, NY.

Cole, A., A. Langston, and C. Davis. 2016. Maine Aquaculture Impact Report, Aquaculture Research Institute, University of Maine, Orono, Maine.

Daniel Bryan Deisenroth , Craig A. Bond & John B. Loomis. 2012. The economic contribution of the private, recreation-based aquaculture industry in the western United States, Aquaculture Economics & Management, 16:1, 1-21, DOI: 10.1080/13657305. 2012.649048.

Engle, C. R. 2018. The economic impact of aquaculture in Pennsylvania. Final report to PennAg Industries, Harrisburg, Pennsylvania.

Fairchild, E.A., K. Cullen, C. Grimm, T. Keirns, and A. Smith. 2017. Evaluation of Northeast Regional Aquaculture Center (NRAC) funding. Northeastern Regional Aquaculture Center, University of Maryland, College Park, Maryland.

Northern Economics. 2013. The economic impact of shellfish aquaculture in Washington, Oregon, and California. Prepared for the Pacific Shellfish Institute, Olympia, Washington.

Norton, G.W. and J.S. Davis. 1981. Evaluating returns to agricultural research: a review. American Journal of Agricultural Economics 63(4):685-699.

van Senten J., C. Engle, M. Parker, and D. Webster. 2020. Analysis of the economic benefits of the Maryland shellfish aquaculture industry. Final report. Chesapeake Bay Foundation.

Project Leaders

State	Name/Institution	Area of Specialization
Virginia	Jonathan van Senten, Virginia Tech	Aquaculture economics
Virginia	Carole Engle, Virginia Tech	Aquaculture economics
Indiana	Kwamena Quagrainie, Purdue	Aquaculture economics
Indiana	Robert Rode, Purdue	Aquaculture research & extension
Ohio	Matthew Smith, The Ohio State	Aquaculture research & extension

ORGANIZATION AND ADDRESS **Virginia Tech** **300 Turner Street NW** **Blacksburg, Virginia, 24601** PROJECT DIRECTOR(S) **Jonathan van Senten** **Carole Engle**				**USDA AWARD NO.** Year 1 : Objective 1,2,3,4 Duration Proposed Months:12 **Funds Requested by Proposer**	Duration Proposed Months: ____ **Funds Approved by CSREES** (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel a. ___ (Co)-PD(s)	**CSREES FUNDED WORK MONTHS** Calendar	Academic	Summer				
b. ___ Senior Associates							
2. No. of Other Personnel (Non-Faculty) a. _1_ Research Associates-Postdoctorates . . .	10			$41,097			
b. ___ Other Professionals							
c. ___ Paraprofessionals							
d. ___ Graduate Students							
e. ___ Prebaccalaureate Students							
f. ___ Secretarial-Clerical							
g. ___ Technical, Shop and Other							
Total Salaries and Wages							
B. Fringe Benefits (If charged as Direct Costs)				$15,925			
C. Total Salaries, Wages, and Fringe Benefits (A plus B)				$57,022			
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies				$2,500			
F. Travel				$3,000			
G. Publication Costs/Page Charges							
H. Computer (ADPE) Costs							
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)							
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)				$9,700			
K. Total Direct Costs (C through I)				$72,222			
L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)							
M. Total Direct and F&A/Indirect Costs (J plus K)				$72,222			
N. Other							
O. Total Amount of This Request				$72,222			
P. Carryover -- (If Applicable) . . . . . **Federal Funds: $**			**Non-Federal funds: $**		**Total $**		
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O) Cash (both Applicant and Third Party) Non-Cash Contributions (both Applicant and Third Party)						Leave Blank	

NAME AND TITLE (Type or print)	**SIGNATURE** (required for revised budget only)	**DATE**
Project Director Jonathan van Senten		3/30/2020
Authorized Organizational Representative		
Signature (for optional use)		

Budget Justification Virginia Tech

(van Senten & Engle)

Objectives : #1,2,3,4

A. Salaries, Wages and Fringe Benefits - $57,022

No salary support is requested for P.I. van Senten. Salary support is requested to hire a TBN Post-doctoral Research Associate for a period of 10 months salary ($41,097) with associated fringe benefits ($15,925). Virginia Tech fringe benefits rate for classified staff is 34.25%. The TBN Post-doctoral Research Associate will assist with project activities outlined under Objectives 1, 2, 3, and 4. The total request for salary and fringe benefits support is $57,022.

B. Nonexpendable Equipment - $0

No support is requested for non-expendable equipment.

C. Materials and Supplies - $2,500

Funding is requested to purchase a computer to be used by the TBN Post-doctoral Research Associate to complete project objectives ($2,000).In addition, funding in the amount of $500 is requested to support supplies and postage for mailing of surveys to producers for data collection under sub-objective 2b. Total request $2,500.

D. Travel - $3,000

Funding is requested to support domestic travel to allow project collaborators and personnel to meet in person to discuss the effectiveness of project approaches to promote solutions for aquaculture source problems and where NCRAC solutions have worked synergistically or where they have failed to develop synergies.

E. Subcontract - $7,200

Funding is requested to support 24 hours of time for Dr. Carole Engle of Engle-Stone Aquatic$ LLC to serve as an advisor on this project and to assist with oversight of project objectives and activities. Dr. Carole Engle will be actively engaged in the project and provide advice and guidance related to the analysis of the effectiveness of projects funded by NCRAC. Dr. Engle will collaborate with the project team in the design and implementation of document review, the survey of aquaculture producers, and the overall assessment of projects and approaches that have been more effective. Dr. Engle will also assist with the development of deliverables as described in this proposal.

F. All Other Direct Costs - $2,500

Funding is requested to support the development of project outputs, namely infographics contracted through SCITE ($1,500). In addition, funding is requested to print project outputs and distribute outputs to relevant stakeholders ($1000). Total request $2,500.

Total Request : $72,222

UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved 0524-0039
Expires 03/31/2004

ORGANIZATION AND ADDRESS Purdue University 155 South Grant Street West Lafayette, Indiana 47907 PROJECT DIRECTOR(S) Kwamena Quagrainie Robert Rode				**USDA AWARD NO.** Year 1 : Objective _1,2,3,4 Duration Proposed Months:12 **Funds Requested by Proposer**	Duration Proposed Months: ____ **Funds Approved by CSREES** (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages	**CSREES FUNDED WORK MONTHS**						
1. No. of Senior Personnel							
a. ___ (Co)-PD(s)	Calendar	Academic	Summer				
b. ___ Senior Associates							
2. No. of Other Personnel (Non-Faculty)							
a. _1_ Research Associates-Postdoctorates . . .							
b. ___ Other Professionals							
c. ___ Paraprofessionals							
d. ___ Graduate Students							
e. ___ Prebaccalaureate Students							
f. ___ Secretarial-Clerical							
g. ___ Technical, Shop and Other							
Total Salaries and Wages							
B. Fringe Benefits (If charged as Direct Costs)							
C. Total Salaries, Wages, and Fringe Benefits (A plus B)							
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies							
F. Travel				2,500			
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.)							
K. Total Direct Costs (C through I)				$2,500			
L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)							
M. Total Direct and F&A/Indirect Costs (J plus K)				$2,500			
N. Other							
O. Total Amount of This Request				$2,500			
P. Carryover -- (If Applicable) . . . . . **Federal Funds: $**				**Non-Federal funds: $**		**Total $**	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						Leave Blank	
Cash (both Applicant and Third Party)							
Non-Cash Contributions (both Applicant and Third Party)							

NAME AND TITLE (Type or print)	**SIGNATURE** (required for revised budget only)	**DATE**
Project Director Kwamena Quagrainie		3/30/2020
Authorized Organizational Representative		
Signature (for optional use)		

Budget Justification Purdue

(Quagrainie & Rode)

Objectives : #1,2,3,4

A. Salaries, Wages and Fringe Benefits - $0

No salary support is requested for Co P.I.s Quagrainie and Rode.

B. Nonexpendable Equipment - $0

No support is requested for non-expendable equipment.

C. Materials and Supplies - $0

No funding is requested for materials and supplies.

D. Travel - $2,500

person to discuss the effectiveness of project approaches to promote solutions for aquaculture source problems and where NCRAC solutions have worked synergistically or where they have failed to develop synergies. Total funding requested is $2500.

E. All Other Direct Costs - $0

Total Request : $2,500

Non-funded Collaborator

Budget Justification the Ohio State University

(Smith)

Objectives : #1,2,3,4

A. Salaries, Wages and Fringe Benefits - $0

No salary support is requested for Co P.I. Smith.

B. Nonexpendable Equipment - $0

No support is requested for non-expendable equipment.

C. Materials and Supplies - $0

No funding is requested for materials and supplies.

D. Travel - $0

No funding is requested for travel.

E. All Other Direct Costs - $0

Total Request : $0

Proposed Summary Budget for Year 1

For All Participating Institutions

	NCRAC Funds				
	Obj	VT (van Senten & Engle)	Purdue (Rode & Quagrainie)	Ohio State (Smith)	Project Total
Salaries, Wages, and Frings Benefits	1,2,3,4	$57,022			**$57,022**
Nonexpendable Equipment					
Materials and Supplies	2	$2,500			**$2,500**
Travel	3	$3,000	$2,500		**$5,500**
All Other Direct Costs	4	$9,700			**$9,700**
Total	1,2,3,4	**$72,222**	**$2,500**	**$0**	**$74,722**

Schedule for Completion of Objectives

Activities	1st month	2nd month	3rd month	4th month	5th month	6th month	7th month	8th month	9th month	10th month	11th month	12th month
Obj. 1 Review of effectiveness of NCRAC-funded projects.												
Obj. 2 Identify outcomes generated on aquaculture farms in the region; summarize and describe lessons learned.												
Obj 3. Evaluate the effectiveness of project approaches to promote solutions for aquaculture source problems												
Obj 4. Deliver results of the synthesis to NCRAC, the science community, and relevant stakeholder groups.												

VITA

Jonathan van Senten, PhD
Assistant Professor Extension Specialist, Virginia Seafood AREC, Department of Agricultural and Applied Economics, Virginia Tech, 102 S King St. Hampton, VA 23669. Tel. 757-727-4861 (Office) / 954-297-7940 (Cell); Email: jvansenten@vt.edu

Education

Ph.D.	*2016*	Aquaculture/Fisheries, University of Arkansas at Pine Bluff
P.S.M.	*2012*	Marine Affairs & Policy: Aquaculture, University of Miami RSMAS
B.S.	*2010*	Marine Biology, Minor: Chemistry, Barry University

Professional Experience

2018 - Present	Assistant Professor, Virginia Seafood AREC, Department of Agricultural and Applied Economics, Virginia Polytechnic Institute and State University. Hampton, VA.
2016 -2018	Postdoctoral Associate, Virginia Seafood AREC, Virginia Polytechnic Institute and State University. Hampton, VA.
2013 - 2016	Graduate Research Assistant, Aquaculture/Fisheries Center, University of Arkansas at Pine Bluff. Pine Bluff, Arkansas.

Selected Publications (of 22)

Engle, C.R., van Senten, J., Fornshell, G. 2019. Regulatory costs on U.S. salmonid farms. Journal of the World Aquaculture Society. https://doi.org/10.1111/jwas.12604

van Senten, J., Engle, C.R., Hartman, K., Johnson, K., Gustafson, L. 2018. A uniform health code for aquaculture farms: an economic analysis of potential farm-level costs and benefits. Preventive Veterinary Medicine. DOI: 10.1016/j.prevetmed.2018.05.007

van Senten, J., Dey, M., Engle, C.R. 2018. Effects of regulations on technical efficiency of U.S. baitfish and sportfish producers. Aquaculture Economics & Management 22:3, 284-305. DOI: 10.1080/13657305.2018.1454539.

Schwarz, M., van Senten, J., Jahncke M., Lazur, A. Overview of Good Aquaculture Practices. Virginia Cooperative Extension. 600-054. December 20, 2018.

Selected Presentations (of 56)

van Senten, J., Engle, C.R. Costs and effects of the regulatory environment on U.S. trout aquaculture. Colorado Aquaculture Association Meeting. Nathrop, Colorado. (*February 1, 2019)*

van Senten, J., Engle, C.R. Regulatory effects on the value of shellfish aquaculture. 45th East Coast Commercial Fisherman's & Aquaculture Trade Exposition. *(January 19, 2018)*

van Senten, J, Engle, C.R., The effects of the regulatory environment on U.S. aquaculture producers. USDA ERS. Washington, D.C. *(April 19, 2018)*

Engle, C.R., van Senten, J. Why are U.S. aquaculture producers so concerned about regulations? Interagency Working Group on Aquaculture. Washington D.C. *(April 19, 2018)*

VITA

Carole Engle
Engle-Stone Aquatic$, LLC, 320 Faith Lane, Strasburg, VA 22557, Phone: 870-489-4259, E-mail: cengle8523@gmail.com

EDUCATION

B.S.	1975	Friends World College
M.S.	1978	Auburn University
Ph.D.	1981	Auburn University

EMPLOYMENT

2015-present	Adjunct Faculty, Virginia Seafood AREC, Virginia Tech Univ.
2015-present	Member/Manager, Engle-Stone Aquatic$ LLC
1996-2015 (retired)	Chairperson/Director, Aquaculture and Fisheries, UAPB
1994-2015	Professor, Aquaculture/Fisheries Center, Assoc. Prof. 1988-1994, UAPB
1986-88	Assistant Professor, Economics, Auburn University at Montgomery

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS
World Aquaculture Society, past Director; USAS, past-President, current member
Intern. Assoc. Aquaculture Economics & Management, past-President, current Board member
Catfish Farmers of Arkansas, Board member; Catfish Farmers of America, member
Arkansas Bait and Ornamental Fish Growers Association, member
US Trout Farmers Association, member; National Aquaculture Association, member

SELECTED PUBLICATIONS **(5 books, 127 journal articles, 16 editorials, 15 magazine columns, 48 book chapters/monographs, 19 proceedings, 125 extension/trade)**

Engle, C.R. 2018. The economic impact of aquaculture in Pennsylvania. Reported submitted to the Pennsylvania Department of Agriculture, Harrisburg, Pennsylvania.

Engle, C.R. 2019. Aquaculture Businesses: A Practical Guide to Economics and Marketing. 5M Publishing. Release date: February, 2020.

Engle, C.R. 2010. Aquaculture Economics and Financing: Management and Analysis. Blackwell Scientific, Ames, Iowa.

Engle, C.R., K. Quagrainie, and Madan Dey. 2017. The Aquaculture Marketing Handbook. 2nd Edition. Blackwell Scientific, Ames, Iowa.

Engle, C.R., J. van Senten, and G. Fornshell. 2019. Regulatory costs on U.S. salmonid farms. Journal of the World Aquaculture Society 50(3):522-549. doi.org/10.1111/jwas.12604.

Kumar, G., C. Engle, and C.Tucker. 2018. Factors driving aquaculture technology adoption. Journal of the World Aquaculture Society 49(3):447-476.

Kaliba, A.R. and C. R. Engle. 2005. Economic impact of the catfish yield verification trials. Journal of Applied Aquaculture 17(4):25-46.

Kaliba, A.R., C.R. Engle, S. Pomerleau, J. Hinshaw, and D. Sloan. 2004. The economic impact of the trout, *Oncorhynchus mykiss*, industry on Transylvania County, North Carolina. Journal of Applied Aquaculture 15(1/2):61-83.

Kaliba, A. and C.R. Engle. 2004. The economic impact of the catfish, *Ictalurus punctatus*, industry on Chicot County, Arkansas. Journal of Applied Aquaculture 15(1/2):29-60.

Grants Funded (84 different externally funded grant awards. Total grant funding received: $9.25 million).

Vita

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Education

The Ohio State University
Doctor of Philosophy, projected graduation 2022
Department of Agricultural Communication, Education, and Leadership | Columbus, Ohio

University of Arkansas at Pine Bluff
Master of Science in Aquaculture & Fisheries, 2015
Department of Aquaculture & Fisheries | Pine Bluff, Arkansas

Auburn University
Bachelor of Science in Fisheries Management, 2012
Department of Fisheries & Allied Aquacultures | Auburn, Alabama

Positions

2019 – Current	Program Director, Aquaculture Extension, The Ohio State University
2016 – 2019	Extension Aquaculture Specialist, The Ohio State University
2015 – 2016	Extension Fish Health Associate, University of Arkansas at Pine Bluff, Lonoke Fish Disease Diagnostics Laboratory
2013 – 2015	Graduate Researcher, University of Arkansas at Pine Bluff

Scientific and Professional Organizations

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

Selected Publications

Smith MA and Stone NM. 2018. Split Ponds Effectively Overwinter Golden Shiners. Journal of the World Aquaculture Society. 48 (5):760-769.

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

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

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

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

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

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

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

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

VITA

Robert Rode

Purdue University
Aquaculture Research Lab
Lab Manager and Aquaculture Specialist
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West Lafayette, IN 47907

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EDUCATION

University of Maine at Orono, B.S. 1981 | Wildlife Management

Auburn University, M.S. 1991 | Aquaculture

POSITIONS

Lab Manager/Aquaculture Specialist, Purdue University 2006-Present.

Production Biologist, GreatBay Aquaculture, 2002-2005.

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

World Aquaculture Society and US Chapter

Indiana Aquaculture Association

Research Involvement

- Near Commercial-Scale Production Studies

  -Bluegill diets in ponds

  -Cage culture of Hybrid striped bass and Largemouth bass

- Larval marine shrimp production

Extension Involvement

- State Specialist working with a diversified Aquaculture Industry
  - Recreational pond stockers, foodfish, aquaponics and marine shrimp producers
- Demonstration Projects in Ponds, RAS and Aquaponics

Kwamena K. Quagrainie
Department of Agricultural Economics / Illinois-Indiana Sea Grant
Purdue University, 403 West State Street, West Lafayette, IN 47907
Tel: 765-494-4200 | kquagrai@purdue.edu

1. Education

Ph.D., Agricultural Economics, University of Alberta, Canada

2. Professional Experience

2005 – Present: Director / Assistant Professor / Associate Professor/ Professor, Aquaculture Economics & Marketing / Extension Specialist Purdue University / Illinois-Indiana Sea Grant

3. Selected Research / Scholarly Publications

a. Books

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

ii. Cai, J., K.K. Quagrainie, and N. Hishamunda. 2017. Social and Economic Performance of Tilapia Farming in Africa. FAO Fisheries and Aquaculture Circular N0. 1132, FIAA/C1132. Rome, Italy.

iii. Quagrainie, K.K. The Market for Aquaculture Products: Market Efficiency and Global Competitiveness. Edited by K.K. Quagrainie. Routledge, Abingdon, Oxon, England. 2013

b. Journal Articles

i. Akuffo, A.S., and K.K. Quagrainie. Assessment of Household Food Security in Fish Farming Communities in Ghana. Sustainability. 11(10); 2807, 2019. https://doi.org/10.3390/su11102807

ii. Amankwah, A., and K.K. Quagrainie. Aquaculture Feed Technology Adoption and Smallholder Household Welfare in Ghana. Journal of the World Aquaculture Society. 50 (4):827-841, 2019. https://doi.org/10.1111/jwas.12544

iii. Quagrainie, 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. 50(1); 163-171, 2019. https://doi.org/10.1111/jwas.12464

iv. Quagrainie, K.K., and J. Chu. Determinants of Catch Sales in Ghanaian Artisanal Fisheries. Sustainability. 11(2); 298, 2019. https://doi.org/10.3390/su11020298

v. Quagrainie, K.K., R.M.V. Flores, Hye-Ji Kim, and V. McClain. Economic Analysis of Aquaponics and Hydroponics Production in the U.S. Midwest, Journal of Applied Aquaculture. 30(1); 1-14, 2018. https://doi.org/10.1080/10454438.2017.1414009

vi. Amankwah, A., K.K. Quagrainie, and P.V. Preckel. Demand for Improved Fish Feed in the Presence of a Subsidy: A Double Hurdle Application in Kenya. Agricultural Economics. 47(6); 633-643, 2016. https://doi.org/10.1111/agec.12261

vii. Darko, F.A., K.K. Quagrainie, and S. Chenyambuga. Consumer Preferences for Farmed Tilapia in Tanzania: A Choice Experiment Analysis. Journal of Applied Aquaculture. 28(3); 131-143, 2016. https://doi.org/10.1080/10454438.2016.1169965

viii. Quagrainie, K.K. 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, May 2015. https://www.edustore.purdue.edu/item.asp?Item_Number=EC-797-W

ix. Quagrainie, K.K. Profitability of Hybrid Striped Bass Cage Aquaculture in the Midwest. Purdue University Extension Publication# EC-798-W / Illinois-Indiana Sea Grant Publication #15-004, June 2015. https://www.edustore.purdue.edu/item.asp?Item_Number=EC-798-W

x. Broughton, M.C., and Quagrainie, K.K. Economic Importance of the Aquaculture Industry in Indiana. Purdue University Extension Publication# EC-770-W / Illinois-Indiana Sea Grant Publication #13-70, June 2013. https://mdc.itap.purdue.edu/item.asp?Item_Number=EC-770-W#.Uz2rpVfJaKU