

Sustainable American Aquaculture

Overview

The Sustainable American Aquaculture program from the Foundation for Food and Agriculture Research (FFAR) is intended to advance innovative research in sustainable fish and shellfish production. Aquaculture has the potential to provide millions of Americans with nutritious foods while contributing to the economic health of communities across the country. Scientific research in this area has typically been funded at low levels compared to other agricultural commodities, however as the industry grows, research will play a critical role in understanding the biology and marketability of a variety of fish and shellfish species and in developing environmentally-friendly practices that sustain production.

The Sustainable American Aquaculture program will bring together major stakeholders from the public and private sectors to support the aquaculture industry.

Background

About one billion people worldwide rely on fish and shellfish as their primary source of animal protein, and these foods contain all the essential amino acids and are rich in vitamins A, B₁₂ and D, minerals such as calcium and iodine, the long-chain omega-3 fatty acids crucial for brain health (FAO, 2016; Hibbeln et al., 2007; Thilsted, 2016). It is clear that fish products play an important role in food security and improving human nutritional outcomes (FAO, 2016; Thilsted, 2016). However, the demand for fish continues to outstrip supply: it is projected that by 2030 the world will need to produce an *additional* 30 million metric tons of fish (FAO, 2016; OECD/FAO, 2015). Producing fish and shellfish sustainably to meet projected demand presents a challenge that will require appropriately-managed aquaculture in addition to wild-capture fishing (FAO, 2011; FAO, 2016; Lowther and Liddel, 2015; OECD/FAO, 2015). The exciting potential of fish and shellfish farming is evident in the variety of species and cultivation systems used globally, and scientific advancement in this area plays an important role in supporting sustainable protein production for a growing population.

Aquaculture is the fastest-growing food-producing sector worldwide (United Nations Food and Agriculture Organization), however the US ranks 15th in production at ~\$1.3 billion annually (Lowther and Liddel, 2015). In fact, approximately half of the seafood consumed in the US is produced by aquaculture, conducted primarily in Asia (Kite-Powell, 2013; Lowther and Liddel, 2015). Domestically, aquaculture is conducted in states ranging from Mississippi and Arkansas to Washington and Maine (USDA-NASS, 2013). Research supported by FFAR will contribute to important economic opportunities for farmers in these states and others.

Key Dates

June 7, 2017: Funding Opportunity Announcement

Pre-proposal receipt open date and time: July 10, 2017

Pre-proposal due date and time: August 9, 2017 at 4:59:59 pm ET

Invited applications notification date: August 30, 2017

Invited applications due date and time: October 11, 2017 at 4:59:59 pm ET

Award Announcement Date: December, 2017

Anticipated Funded Projects start date: January, 2018

Objective

The objective of this RFA is to stimulate innovative research in farmed production of fish and shellfish, providing economic opportunities to US farmers and increasing the supply of domestically-produced, nutritious foods to meet growing consumer demand. There is a major need to understand the biological and technological barriers, and economic/market potential a diverse range of aquatic species. In addition, research focused on understanding and minimizing potential environmental impacts of aquaculture production will be key to public acceptance of farmed fish and shellfish products, an important consideration for long-term industry success.

Program Priorities

Applicants to the Sustainable American Aquaculture Program must address at least one of the following program priorities, and that connection must be explicit in the application along with metrics to measure success of the research program:

The overarching goal of this RFA is to **support innovative research necessary for further development of sustainable aquaculture in the United States.**

FFAR is committed to supporting research on the following topics:

- 1. Genetics of less-commonly studied shellfish species (e.g. mussels, clams, scallops) for improved performance parameters.** Farmed shellfish such as mussels have high feed conversion efficiency, reproduce quickly and can be grown and harvested with minimal environmental impact. Shellfish may also provide important ecosystem services such water filtration and increased biodiversity around cultivation beds. Investigating shellfish genetics and breeding for improved performance has the potential to yield substantial gains in the production of sustainable and nutritious protein sources. New species and those in production will be considered.

Research topics covered:

- a. Genomics, quantitative genetics, phenomics
- b. Gene-editing and biotechnology

- 2. Hatchery research including broodstock development and best early life-cycle production practices.** Establishing a reliable and sufficient supply of high-quality eggs and larvae is critical for successful aquaculture production. Many biological and environmental factors such as nutrition, photoperiod, water conditions and timing of sexual maturation influence egg quality and time of spawning. Similarly, survival of larvae is impacted by environmental conditions, complex feeding protocols, stocking densities and other factors. Better understanding of early life-cycle stages will be important for ensuring a robust supply of animals for commercial stocking.

Research topics covered:

- a. Broodstock nutrition and management for optimal egg production and viability
- b. Male reproductive performance

- c. Improved egg production and hatching rate of fertilized eggs, including spawning, fertilization and incubation procedures
 - d. Early life-cycle stages: feeding protocols, increasing the survival of larvae/fry to fingerling/juvenile stages
- 3. Market-based analyses for new species and/or production systems.** One of the barriers to production of new species is comprehensive assessment of the potential costs and market demand, yields, substitutability and other factors that influence commercial feasibility and decision-making. FFAR intends to fund socio-economic and market-based research for new species and production systems, and will use best efforts to support topics not currently supported by other federal agencies.

Research topics covered:

- a. Business risk and economic feasibility
- b. Market potential
- c. Research on other factors that impact development and commercialization

Research topics not covered by this initiative:

1. Molecular mechanisms of pathogen transmission, pathogenicity, disease resistance, breeding for disease resistance or evaluation of therapeutics (e.g. pre- and pro-biotics, feed additives or drugs).
2. Food-safety related research, traceability and seafood fraud
3. Oyster genetics and breeding

Eligibility

- The Foundation for Food and Agriculture Research welcomes applications from all U.S. institutions of Higher Education, non-profit and for-profit organizations, government-affiliated researchers and other organizations. Partnerships that include farmer/producers or industry will strengthen the application.
- Only one application per Principal Investigator
- This funding opportunity is for new activities only and should not be duplicative of other efforts. The proposed project can build upon existing research and activities, and applicants must clearly articulate what new elements this funding will support.

Award Information

- Anticipated Project duration: Up to 60 months
- Total Amount for this opportunity: Up to \$5 million
- Minimum Request per Award: \$150,000 from FFAR, with at least an equivalent amount of non-federal funds that meets matching criteria (see below for details)
- Maximum Request per Award: \$1,000,000 from FFAR, with at least an equivalent amount of non-federal funds that meets matching criteria (see below for details).

Project budget must be reasonable and commensurate with the scope of the proposed work.

- Indirect Costs on Awards: FFAR allows indirect costs up to 10 percent of the total award funds, including match. Please note this **is not** an indirect cost rate applied to total modified direct costs but instead an overall allotment from the award to be used for indirect costs by the institution. For example, for a grant totaling \$100,000 (FFAR and institutional match) up to \$10,000 can be used for indirect costs and the remaining \$90,000 can be applied toward programmatic expenses. FFAR, an independent 501(c)(3) nonprofit, is not a federal agency and therefore a negotiated federal indirect cost percentage will not apply.
- Estimated Number of Awards: To be determined. Total number of projects to be funded under this opportunity depends on the quality and budgets of successful applications. FFAR reserves the right to negotiate all or none of the applications received for funding consideration under this opportunity.
- Anticipated Award Date: December, 2017

Pre-proposal Application Components

1. Pre-proposal Title Page

- Project Title (Up to 20 Words)
- Total Estimated Project Budget
- (includes fund requesting from FFAR and Matching funds – Cash and In-kind)
- Project Duration (in calendar months)
- Geographic Location(s) of Proposed Project (Congressional District)
- Geographic Areas to be served by Proposed Work

2. Pre-proposal

- Principal Investigator Information
- Key personnel
- Objectives and Relevance (Up to 250 words)
- Overview of Proposed Project (up to 500 words)
- Expected Outcomes and Potential Impacts (up to 500 words)

3. Funding Partners for Matching Funds Requirement (up to 250 words)

- List committed or potential funding partners to provide matching funds
- Describe any prior contact you have had/relationship you have developed with them about this project
- Outline the matching funds contribution from each funding partner

4. Organization Assurances

Full Application Components

Required Attachments:

1. Cover Page, containing:
 - Project Title
 - Principal Investigator
 - Proposed Budget
2. Budget Justification (**up to 8000 character limit**)
3. Key Personnel (please use template provided)
4. Project Personnel involved in other projects being submitted to FFAR (please use template provided)
5. Project Summary (**up to 3000 character limit**)
6. Project Description
 - a. **Introduction**
 - i. A description of how the project is relevant to the challenge of (A) Genomics and breeding of less-commonly studied shellfish species (e.g. mussels, clams, scallops) for improved performance parameters, (B) hatchery research including broodstock development and larval rearing or (C) Market-based analyses for new species and/or production regions. **In the description, please state why FFAR is uniquely positioned to support this project, in contrast to other agencies such as USDA or NOAA. (up to 3000 character limit)**
 - ii. A summary of the knowledge that has laid the groundwork for this project, including any relevant preliminary work or data that has informed the development of the project. The summary should include references in the CBE citation style. **(up to 3000 character limit)**
 - iii. A description of the potential impact the project may have in advancing the aquaculture industry. **(up to 3000 character limit)**
 - b. **Approach**
 - i. A statement of goals and supporting objectives for the proposed project. **(up to 3000 character limit)**

A detailed account of the procedures or methodology you will use to achieve the goals and supporting objectives. The account must have enough resolution for a panel of experts to judge the merit of the project. All application information is treated as confidential. **(up to 8000 character limit)**

The account should include:

 1. Proposed project activities described sequentially.
 2. Techniques to be used, including their feasibility and rationale.
 3. If applicable, stakeholder involvement in the development of the approach.
 4. A description of anticipated risks, including potential environmental impacts, and how you will mitigate them.
 5. How data will be analyzed or interpreted.
 6. Expected results and information, and how it can be used by the food and agriculture community to spur further research or directly impact aquaculture production.

7. Plan to communicate results or amplify outcomes to stakeholder audiences. For projects focusing on the Education and Outreach focus area, this should describe how you will share lessons learned beyond your project.

c. Timeline

A project timetable in tabular form. At minimum, it should show target deadlines for annual goals and objectives. Annual progress reports will be evaluated based on the timelines set in this document. If applicable, include periods beyond the grant funding to demonstrate impact and longevity of the work.

7. Data Management Plan (**up to 5000 character limit**)
8. References Cited (upload; no word limit). Reference information is required. If there are no references cited, a statement to that effect should be included in this section of the application. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. If the document is available electronically, the website address also should be identified. Applicants must be especially careful to follow accepted scholarly practices in providing citations for source materials relied upon when preparing any section of the application. While there is no established page limitation for the references, this section must include bibliographic citations only and must not be used to provide parenthetical information outside of the Project Description.
9. Graphics, Figures, Equations, and Tables (up to 5 single-side pages). The textbox for the Project Description does not support equations, tables, graphics, and figures. Applicants may upload a PDF document with graphics, figures, tables, or a list of equations to support the research program plan. This section should not be used to circumvent the page limit for the Project Description Section.
10. Organizational Assurances
 - a. Research involving human subjects
 - b. Research involving vertebrate animals
 - c. Research involving Recombinant DNA
 - d. Research Involving National Security implications
 - e. Research involving hazardous materials
 - f. Research involving human fetal tissue
 - g. Research involving NEPA review
11. Facilities, Equipment, and Other Resources (**up to 3000 character limit**)

This section of the proposal is used to assess the adequacy of the resources available to perform the proposed project. Include an aggregated description of the internal and external resources (both physical and personnel) that the organization and its collaborators will provide to the project, should it be funded. The description should be narrative in nature and must not include any quantifiable financial information. Reviewers will evaluate the information during the proposal review process. FFAR expects that the resources identified in the Facilities, Equipment, and Other Resources section will be provided, or made available, should the proposal be funded.

12. Budget Form. Please use template provided.
13. Current and Pending Support Form: complete for everyone listed as PI or Key personnel on the project. Please use template provided.
14. Matching Funder Form*
15. Certification of Matching Funds*
16. Biosketches for the PI and other key personnel. Please use the template provided in proposalCENTRAL and combine all biosketches and/or curriculum vitae into a single PDF document before uploading as an attachment.
17. Letters of Support - Applicants may provide letters of institutional, collaborator, or stakeholder support for the proposed project. Please combine all letters of support into a single PDF document before uploading as an attachment.

***Requirement To Demonstrate Matching Funds**

The match share requirement is a one-to-one FFAR-to-awardee ratio. Therefore, for every dollar FFAR awards, the grantee or a third-party institution must contribute a newly dedicated, non-federal dollar towards the project costs. For example, if a proposal requests two hundred thousand dollars (\$200,000) of FFAR funds, the applicant or a third-party must be able to come up with an additional two hundred thousand dollars (\$200,000) to match the request, for a grand total project budget of four hundred thousand dollars (\$400,000).

The applicant agrees to identify and certify matching funds annually prior to disbursement of that year's award funds. At least fifty (50%) of the required matching funds must be a cash match, while the remainder can be in-kind match. The match share is intended to supplement, not supplant existing funding for the principal investigator (PI). The applicant will abide by FFAR's [Matching Guidelines](#) to meet FFAR's matching requirements. To constitute a valid match, all matching funds on a FFAR grant must be expended during the grant period.

Application Submission Guidelines

Applications must be submitted through FFAR's online application receipt system (<https://proposalcentral.altum.com/>). Only applications submitted through this portal will be considered eligible for evaluation. If you are a new user, register for an account by clicking the orange "Create One Now" button. You will receive a confirmation email to sign-in to your account. Once you log in, search through the list of institutions to see if there is an institutional profile for your organization. If there is no institutional profile, ask your Grants & Contracts Department or Office of Sponsored Programs to register your organization. Once the organization's profile is registered and saved, the PI can select their institution and complete his/her personal profile. To access FFAR's open funding opportunities, click the "Grant Opportunities" button on the top right corner of your screen, then on the top left corner of the screen, pull down the "Filter by Grant Maker" button and scroll down to select FFAR. Select the opportunity you would like to apply for by clicking the "Apply Now" button. The Principal Investigator may give access to others who will carry out part of, or participate in the proposed project, in Section Three of the online application. To invite individuals to participate in a application, they must already have an account in the system. By submitting an application, the applicant acknowledges and accepts the terms and conditions of the RFA.

Application Review Process

All submitted applications will go through an internal review process to ensure that the proposed project is relevant to the RFA and suitable to FFAR's mission. Submitted applications will undergo further review using a two-stage peer review process: (1) External Peer Review, and (2) FFAR Advisory Council review. In the first stage, applications will be peer-reviewed by independent, external scientific experts using the review criteria posted in RFA. In the second stage, applications judged to be most meritorious by the peer reviewers will be evaluated and recommended for funding by the FFAR Advisory Council based on comparisons with applications from the same cycle and FFAR's program priorities. All reviewers are required to read and acknowledge acceptance of FFAR's [Conflict of Interest Policy](#) and [Non-Disclosure Agreement](#). We make reasonable efforts to ensure that applications are not assigned to reviewers with a real or apparent conflict with the applicant or project personnel. Reviewers with conflict of interests are recused from evaluating or participating in the discussions of applications. Each stage of the review is conducted confidentially, and as such, FFAR is responsible for protecting the confidentiality of the contents of the applications.

Applications recommended for funding by the Advisory Council will go to the Scientific Program Director and FFAR's Executive Director to consider program priorities set by the Board of Directors, portfolio balance across programs, and available funding.

Application Review Criteria

Applications are evaluated based on scored primary review criteria and unscored secondary review criteria. The bullets under each criterion may serve as a guideline to applicants when writing their applications, and as a guideline to reviewers on what to consider when judging applications. The bullets are illustrative and not intended to be comprehensive. Reviewers will evaluate and score each primary criterion and subsequently assign a global score that reflects an overall assessment of the application. The overall assessment will not be an average score of the individual criterions; rather, it will reflect the reviewers' overall impression of the application. Evaluation of the scientific merit of each application is within the sole discretion of the peer reviewers and they may raise additional factors to consider that are not covered in the bullets for each criterion.

Primary Review Criteria

Primary criteria will evaluate the scientific merit and potential impact of the proposed project. Concerns with any of these criteria potentially indicate a major flaw in the significance and/or design of the proposed work. Examples of primary review criteria are, Significance and Impact, Research Plan, Scientific Merit, Innovation or Novelty, Qualification of project personnel, and Outcomes.

Scientific innovation (25%).

- *Has the applicant demonstrated that this research has not been done elsewhere, or that this research accelerates a current research challenge or addresses the agricultural challenge in a new or innovated manner?*

- *Does the project describe innovative scientific methods and approaches?*
- *What research gaps will be addressed by this project?*
- *How likely is the proposed project to break new ground to address an old or a new problem?*
- ***Why is FFAR uniquely positioned to support this project, in contrast to other agencies such as USDA or NOAA?***

Potential impact and expected outcomes (25%).

- *What are the expected outcomes of this project? How well did the applicant describe those outcomes?*
- *Is the proposal relevant to the RFA and does it address an important problem or need in U.S. aquaculture systems?*
- *Will the proposed outcomes have a significant impact on U.S. aquaculture systems? Which group(s) will be impacted?*
- *Does the applicant describe a viable plan for implementing results that involves farmers, producers or companies?*
- *Does the project contribute to improving or understanding sustainable aquaculture practices?*
- *If the project fails or does not yield the expected outcome, what are the potential benefits or lessons learned?*

Adequacy of the research description and scientific feasibility (15%).

- *Are the aims/objectives of the proposed project clearly presented?*
- *What methods will be used to achieve those aims and objectives and do they appear feasible?*
- *Are the plans outlined by the applicant to monitor and evaluate the project clearly outlined?*
- *What risks could inhibit the success of the project and how well did the applicant describe their plan to avoid/overcome them?*

- *Is the budget commensurate with the proposed work?*

The PI has the proper background, skills and experience, and research environment (10%).

- *Who will conduct the work and are their qualifications sufficient to carry out the proposed research?*
- *Are there partnerships, especially with farmer/producers or industry, that strengthen the capacity to carry out the goals or implementation of the project?*
- *Is the research environment (facilities, equipment and institutional/corporate support) adequate and appropriate to conduct the research?*

Dissemination and implementation of results (15%).

- *How will the grantee manage and disseminate data generated by this project?*
- *In the case of projects producing proprietary information/technology, how effectively did the applicant describe the funding of the production of proprietary information and/or judicious use of public funding?*
- *Are plans for dissemination of the project's results and outcomes, including barriers encountered and successes achieved, clearly described?*
- *Did the applicant describe, where applicable, how they would implement and incorporate results or products into existing food production systems?*

Timeline (10%). (Note: Only projects up to 60 months duration will be considered).

- *What are the milestones associated with the project and are they outlined?*
- *Does the timeline provided by the applicant seem feasible for accomplishing the work outlined?*
- *Is the budget appropriate and reasonable for the scope and services of the proposed work?*

Secondary Review Criteria

Secondary reviews contribute to the global score assigned to the application. Concerns with these criteria potentially question the feasibility of the proposed research. Examples of secondary review criteria are, Budget, Duration of the project, Research Environment, Scalability and Dissemination, Protections for Human and Animal Subjects, and Previous Project Performance.

Award Notice Administration

Selection Notice

Following application review, the principal investigator and the authorized organization representative listed on the project will be officially notified by email whether (1) the application has been selected for funding pending contract negotiations, or (2) the application has not been selected for funding. If an application is selected for funding, the Foundation for Food and Agriculture Research reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to, matching funds, or other budget information. Potential grantees are free to accept or reject the Grant Agreement as offered.

Award Notice

FFAR notifies applicants of whether they are selected for funding through email. The notice does not constitute an award or obligate funding from FFAR until there is a fully executed Grant Agreement.

Grant Period(s)

Upon receipt of the Grant Agreement, the potential grantee should note the Effective Date and the Expiration Date. Grantees may only use FFAR funds on project expenditures on or after the Effective Date of the Grant. Charging expenditures to the grant prior to the effective date is strictly prohibited. Likewise, grantees may not use FFAR funds after the Expiration Date except to satisfy obligations to pay allowable project costs committed on or before that date. The expiration date is the last day of a month.

Once the Grant Agreement is fully executed, the Effective Date cannot be changed. The Expiration Date may be changed with a written approval of a no-cost extension request by FFAR. If a no-cost-extension request is approved, FFAR will issue an amendment to the Grant Agreement.

If the grantee requires additional time beyond the Grant Period and the established Expiration Date to assure adequate completion of the original scope of work within the funds already made available, the grantee may request a one-time no-cost extension of up to 6 months. The request must be submitted to FFAR at least thirty (30) days prior to the Expiration Date of the grant. The request must explain the need for the extension and include an estimate of the unobligated funds remaining and a plan for their use. This one-time extension will not be approved merely for using the unexpended funds.

Post-award Management

Reporting Requirements

After a grant is conferred, the grantee shall provide an annual financial report to FFAR showing grant expenditures to date. The grantee shall also provide an annual progress report to FFAR showing activities being carried out under the grant, including but not limited to project accomplishments to date and grant expenditures. Within 30 days of completion of all grant activities, the grantee shall provide a final progress report. The final progress report should address the original objectives of the project as identified in the application, describe any

changes in objectives, describe the final project accomplishments, and include a final project accounting of all grant funds.

If awarded, grantees will be expected to:

Meet all applicable State and Federal regulations required to conduct the project. Applicants may be asked separately to describe how they will assess, prevent and respond to potential adverse environmental impacts including increased eutrophication, changes in benthic ecosystems, fish escapement, entanglement of wildlife and the spread of pests or pathogens.

Scientific Integrity

FFAR's ability to pursue its mission to build unique partnerships to support innovative science addressing today's food and agriculture challenges depends on the integrity of the science on which it relies. A fundamental purpose of FFAR is to facilitate the advancement of knowledge and the application of the science to address challenges relevant to the FFAR's mission. All FFAR grants must be conducted with the highest standards of scientific integrity.

Grant Terms and Conditions

The Foundation for Food and Agriculture Research expects applicants to have reviewed the Grant Agreement prior to applying to ensure that the applicants are aware of the applicable terms under which the grant is offered. FFAR will only entertain potential modifications to the Grant Agreement under the most exceptional circumstances. Successful applicants are strongly encouraged to sign the Grant Agreement as presented.

Contact Information

1. Technical Help Contact

- i. Hours of Operation: 8:30am – 5:00pm Eastern Time (Monday – Friday)
- ii. Telephone: 800-875-2562 (Toll-free U.S. and Canada)
+1-703-964-5840 (Direct Dial International)
- iii. Email: pcsupport@altum.com

2. Scientific and Grants Questions Contact

- i. Email: grants@foundationfar.org

We only accept scientific or programmatic and grants inquiries by email. We strive to respond to inquiries within two business days, but our response time depends on the volume of questions we receive and the complexity of the questions asked. Please note that we do not monitor this mailbox on evenings, weekends, or federal holidays.

References

1. FAO. (2011). Review of the state of world marine Fishery resources. FAO Fisheries and Aquaculture Technical Paper No. 569. Rome, 334 pp.
2. FAO. (2016). The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all. Rome. 200 pp.
3. Hibbeln *et al.* (2007). Maternal seafood consumption in pregnancy and neurodevelopmental outcomes in childhood (ALSPAC study): an observational cohort study. *Lancet*, 369(9561):578-85.
4. Kite-Powell, *et al.* (2013). The Future of the US Seafood Supply. *Aquaculture Economics & Management* Vol. 17, Iss. 3.
5. Lowther and Liddel (Eds.). (2015). Fisheries of the United States. NOAA National Marine Fisheries Service Office of Science and Technology
6. OECD/Food and Agriculture Organization of the United Nations. (2015). Agricultural Outlook 2015. OECD Publishing, Paris. http://dx.doi.org/10.1787/agr_outlook-2015-en
7. Thilsted *et al.* (2016). Sustaining healthy diets: The role of capture fisheries and aquaculture for improving nutrition in the post-2015 era. *Food Policy*, Vol 61:126–131
8. USDA-National Agricultural Statistics Service (NASS). (2013). Census of Aquaculture. Volume 3, Special Studies, Part 2