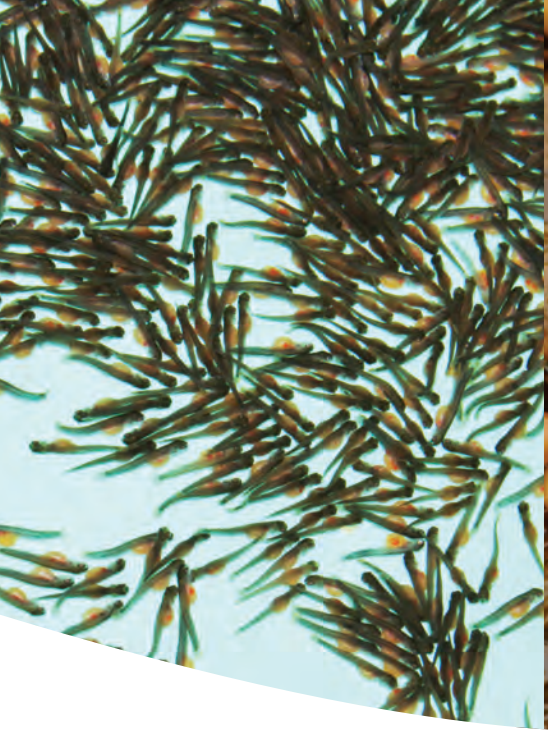

WRAC Western Regional Aquaculture Center

Alaska • Arizona • California • Colorado • Idaho • Montana • Nevada • New Mexico • Oregon • Utah • Washington • Wyoming

REQUEST FOR

Regional Research and Outreach Project Pre-Proposals FY2021

WRAC
WESTERN REGIONAL
AQUACULTURE CENTER

USDA

United States Department of Agriculture
National Institute of Food and Agriculture

REQUEST FOR WRAC

REGIONAL RESEARCH AND OUTREACH PROJECT PRE-PROPOSALS

for FUNDING YEAR 2021 (FY2021)

TABLE OF CONTENTS

For more information, go to the WRAC website at http://depts.washington.edu/wracuw/ and click on *Funding Opportunities*.

Dr. Graham Young, Executive Director, 206-543-4291, grahamy@uw.edu
Julie Hahn, Program Manager, 206-685-2479, jkhahn@uw.edu

Pre-Proposals are due by 5 PM, Friday, April 3, 2020.

Cover photos, left to right: Courtesy of Christopher Myrick, istock.com/musashi2000, istock.com/pflemming

Western Regional Aquaculture Center
Request for Regional Research and Outreach Project Pre-Proposals for Funding Year 2021

Overview

Proposed Research Areas

Based on extensive input from aquaculture industry, extension and research representatives throughout the region, the Western Regional Aquaculture Center (WRAC) is seeking Pre-Proposals for nine research areas, listed here in no specific order or rank:

1. New and Emerging Species
2. Prevention and Treatment of Diseases Affecting Aquaculture Production
3. Aquaculture Opportunities Through Genetics
4. Characterization/description of Aquaculture in Western United States
5. Aquaculture: Applied Technology Solutions
6. Diet Nutrition/Innovation
7. Aquaculture Water Quality
8. Regulatory Obstacles to Aquaculture Development
9. Increasing Product Quality Through Farm Practices, Food Science, and Quality Control

Project Submission & Review Schedule

Pre-Proposals are due by	5 PM, Friday, April 3, 2020
Notification of Pre-Proposal review outcome	Late May
Full proposals due by 5:00p p.m.	Mid-July
External, IAC/TC, and Board reviews	July through November
Notification of funding decisions	Early December
Projects scheduled to begin 2021 (dependent on release of funds)	September 1

General Criteria for WRAC-funded Research & Outreach Projects

- The region includes Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.
- Priority will be given to projects that include participation by two or more states located within the western region (see specific criteria on the next page).
- Partnerships may be formed among all elements of federal, state, and local government; public institutions; and the private sector.
- Project partnerships should depend on the nature of the problem and the most effective use of resources.

NEW Requirements for RFP FY2021

- Any member of the proposed research team who has served as Work Group Chair on any WRAC project in the past five years must report on whether outreach objectives have been completed for that project. Instructions for submitting this information are included in the Appendix, page B2, of this document.

Specific Criteria for Regional Projects

The following criteria are used to prioritize cooperative regional research and outreach projects for receiving WRAC funding:

Proposed Project

- Involves at least two institutions and activities within two states and the most effective use of resources within the western region. However, depending on the nature of the problem, if the research expertise to solve the problem resides in a single state, and the results will have significant positive impact on multi-state industries, an exception for funding can be made. Strong justification is required. Priority will be given to projects with multi-state research approaches.
- Is likely to attract additional support for research and/or outreach on the problem, which is not likely to occur through other programs and mechanisms.
- Can be made sufficiently specific to promise significant accomplishment within four or fewer years.
- Can be effectively organized and conducted on a regional level, ensuring coordinated and complementary contributions by all participants.
- Produces results that can provide the solution to a problem of fundamental importance or fill an information-gap in knowledge from the standpoint of present and future aquaculture in the western region.
- Contain an outreach component with defined objectives and deliverables according to Appendix B, Attachment F - Outreach and Evaluation Plan (page B8).

Research on the Problem

- Requires more scientific labor, equipment, and facilities than are generally available at individual research institutions. (Priority will be given to projects with multi-state research approaches.)
- Is adaptable and particularly suitable for inter-institutional cooperation, resulting in better use of limited resources and research funds.
- Complements and enhances ongoing research by participating research institutions.

Importance of the Outreach Component in Assessing WRAC Pre-Proposals and Full Proposals

A well-considered and appropriate outreach component is an essential part of any WRAC project. Increasing attention to the quality of outreach has been emphasized by USDA-NIFA, and has received considerable emphasis from WRAC's Board of Directors. To ensure the necessary Extension Outreach components are included in the Pre-Proposal, please see Appendix B (page B8).

Other Information

- Guidelines for development of Pre-Proposals and the Pre-Proposal format are enclosed for your information (see pages B1–B8). These guidelines are also posted on the WRAC website: http://depts.washington.edu/wracuw/
- Please note that while each of the priority statements indicate that funding requests should not exceed the stated maximum dollar amount, the WRAC Pre-Proposal and full proposal review processes are highly competitive, and the proposed budget is an important criterion used in assessment of Pre-Proposals and full proposals.
- **New** for RFP FY21: any member of the proposed research team who has served as Work Group Chair on any WRAC project in the past five years must report on whether outreach objectives have been completed for that project. Instructions for submitting this information are included in the Appendix, page B2, of this document.

Pre-Proposals Submission and Deadline

(*See Appendix B for specific instructions*)

Submission

1. Email submission is preferred and electronic signatures are allowed. Submit entire Pre-Proposal as a single PDF to the WRAC Administrative Office by email to Julie Hahn at jkhahn@uw.edu.
2. Mailing address, in case you are unable to email your document.
   Mail one (1) signed, printed copy to:
   Western Regional Aquaculture Center
   c/o Julie Hahn
   University of Washington
   School of Aquatic and Fishery Sciences
   Box 355020
   Seattle, WA 98195-5020

   For deliveries that require a street address, use:

   Western Regional Aquaculture Center
   c/o Julie Hahn
   University of Washington
   School of Aquatic and Fishery Sciences
   1122 NE Boat Street
   Seattle, WA 98105

Deadline for Submission of Pre-Proposals is 5 PM, Friday, April 3, 2020.

Notes

- WRAC encourages early submission of Pre-Proposals. If a Pre-Proposal is received at least two weeks prior to the final deadline, it allows time for the Administrative Office to review the Pre-Proposal using the checklist and to notify the authors if any requirements are not met. Thus, the authors will have time to adjust and re-submit their Pre-Proposals before the final deadline.
- WRAC strongly encourages investigators who are submitting a Pre-Proposal for the first time to consult with the relevant contact person listed for each problem statement. Executive Director Graham Young (grahamy@uw.edu) and Program Manager Julie Hahn (jkhahn@uw.edu) are also available to answer questions regarding the Pre-Proposal submission process.
- Please plan accordingly to ensure inclusion of all necessary components and signatures by the deadline of 5 PM on Friday, April 3, 2020.

Problem Statements for Pre-Proposals—FY2021

Based on extensive input from aquaculture industry, extension and research representatives throughout the western region, WRAC is seeking Pre-Proposals for ten research areas listed here by title, in no specific order or rank. The complete statements are linked to the title and by page number.

1. New and Emerging Species

Problem

Aquaculture is currently expanding rapidly worldwide to meet seafood demand. For the US aquaculture industry to remain competitive on the world stage and decrease reliance on imported seafood products into the US, culture of new or alternative marine and freshwater species of fish, shellfish, and aquatic plants is needed. Operations need to diversify production of species to meet market pressures from imports. Aquaculture opportunities may exist for polyculture or production of new species that can be reared sustainably and compete at a commercial scale. Existing aquaculture operations must respond to changing economic circumstances and environmental regulations that require improved production efficiency. Alternative species used in isolation or combination with other species may provide economic opportunity and increase efficiencies, or species or products that address known sustainability issues.

Solution

This priority area seeks proposals that address any needs related to development of alternative aquaculture species that have market potential. Research may be specific and targeted to one or two specific objectives that would address any bottleneck preventing commercial development (i.e., seedstock production, disease concerns, nutrition, etc.). Proposals should propose new or emerging species for existing aquaculture industries or systems and/or new or underutilized resources. Priority alternative species would be those that can provide an economic benefit and/or encourage development in states with minimal aquaculture. An example would be mitigating an adverse environmental impact from another species in cultivation. Examples for consideration may include, but are not limited to:

- Production of a species of potential commercial value that currently is not being produced commercially in the western states. Examples include:
    - Freshwater or marine fish (could include tropical fish)
    - Freshwater or marine shellfish
    - Crustaceans and other invertebrates
    - Aquatic plants (e.g., macro algae)
    - Existing species in novel environments (e.g., brackish water)
- Polyculture of multiple species of commercial value, including multi-trophic
- Development of marine or freshwater hatchery, larval, nursery rearing, and grow out technologies for new or emerging species

Outreach

A funded participant responsible for outreach must be included as part of the project Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects. Outreach products should target the states and/or industries that the project addresses. Outreach products should include information for consumers such as FAQ sheets and infographics, where applicable. Expected products of the research could include outreach publications, workshops for interested industry and regulatory members, presentations at scientific meetings and any other products that would provide information on project results. Applicants are required to develop proposals that would involve cooperating with extension personnel and/or aquaculture coordinators.

Duration and Funding Level

Anticipated project duration is up to 4 years, and requests from WRAC should not exceed $120,000/year. In-kind and leveraged funds from industry, academia and other entities are strongly encouraged.

Contact

Leo Ray (leoray@fishbreedersofidaho.com) can be contacted for further information about this problem.

2. Prevention and Treatment of Diseases Affecting Aquaculture Production

Problem

Disease occurrence in aquaculture results in significant economic impact due to direct mortality or reduced performance. In the western region, aquaculture is characterized by a large diversity of farmed species and production systems. Emerging and re-emerging diseases and disorders may cause substantial losses to commercial fish and shellfish operations and require further investigation. Examples of diseases and pathogens that impact aquaculture include but are not limited to: *Ostreid herpesvirus* (OsHV-1 µvar), strawberry disease, *Flavobacteriosis*, PKD, chronic sturgeon mortality, *Tenacibaculum maritimum*, *Henneguya salminicola*, etc.

Solution

There is a need to identify more sustainable solutions for disease management. Research should develop new practical solutions that can enhance fish health and reduce disease impacts (e.g., vaccines, immuno-stimulants, probiotics/beneficial bacteria, antimicrobial peptides, other biological products, etc.). Research should be specific and targeted to areas that increase our knowledge and understanding of emerging or existing diseases and potentially lead to management solutions (i.e., control/prevention tools, further pathogen characterization, husbandry changes, nutrition, etc.). Proposals should identify and address the problem in the context of impacts to the industry. Therefore, it is recommended that Principal Investigators (PIs) establish close partnerships with industry to ensure that the pathogen, disease, or solution is economically applicable. Practical recommendations on how to better manage disease and/or apply new tools are expected from this project.

Outreach

A funded participant responsible for outreach must be included as part of the project Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects. Outreach products should target the states and/or industries that the project addresses. Expected products of the research could include outreach publications, workshops and presentations to stakeholders and other products that would inform and educate target audience on emerging problems or disease management practices that impact aquatic animal health and survival.

Duration and Funding Level

Project duration of up to 4 years and up to $120,000/year will be considered, but shorter projects are encouraged. In-kind and matching funds from industry, academia and other entities are strongly encouraged.

Contact

Jeremy Liley (jeremy@lileyfisheries.com) or Sean Nepper (sean.nepper@riverence.com) can be contacted for further information about this problem statement.

3. Aquaculture Opportunities Through Genetics

Problem

Various types of genetic improvement are used in the production of many aquatic species. Existing commercial applications include traditional selective/pedigreed breeding, hybridization, sex reversal, polyploidy, genomics and marker-assisted selection, and other emerging genetic tools. Traits that can be directly measured on a broodstock population include growth rate, survival, feed conversion ratio, disease resistance, and body conformation. Indirect traits include growth and survival under changing environmental conditions, processing yields, and product quality. Additional types of investigation may include production of monosex stocks without the use of chemicals, assessing the genetic basis for resistance to *Ostreid herpesvirus* 1 (OsHV-1 µvar) and other pathogens in shellfish, and genome-wide association studies for sex determination in sturgeon and other species. A variety of techniques can be used to address different production objectives, including improved growth performance or desired marketing characteristics.

Sterility is increasingly required in stocked fish to reduce impacts on native fish. However, genetic techniques are still not developed for many species. For example, genetic improvement resulting in single-sex populations would seem to have great utility for sturgeon and shellfish, and possibly many other species. Additionally, current techniques for many species could benefit from further refinement. In some cases, genetic improvement techniques have been developed for certain species (e.g., shellfish, catfish hybrids), but not widely adopted by commercial growers due to uncertainty on their performance characteristics under production conditions. Although the time scale of the funding cycles does not support traditional or pedigreed selective breeding programs, commercial scale testing of promising stocks could demonstrate their value to west coast aquaculture operations.

Solution

This problem statement invites research that develops and/or quantifies the efficacy and feasibility of genetic improvement to achieve production objectives. Research may address improvements upon existing practices and/or develop new techniques or novel species. Production benefits, such as growth, survival, feed conversion and disease resistance, reduction of production costs, as well as economic performance of genetically improved vs. pure strains, should be considered. Research that addresses tools for selection for improved traits such as growth, improved feed efficiency, increased survival, increased disease resistance, and overall genetic improvement in shellfish production is also desired. Examples of research include:

- Genomics
- Marker-assisted selection
- Challenge studies
- Final yield processing traits
- Growth assays

Outreach

A funded participant responsible for outreach must be included as part of the project Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects. The expected product or products, such as a manual or digital media, would describe guidelines for the implementation of species-specific techniques.

Duration and Funding Level

Project duration can be up to 4 years, and request from WRAC should not exceed $120,000/year. In-kind and leveraged funds from industry, academia and other entities are strongly encouraged.

Contact

The following can be contacted for further information: Finfish: Sean Nepper (Sean.nepper@riverence.com); Shellfish: Sue Cudd (whiskeycreek1@mac.com); Seaweed: Beau Perry (beau@blueevolution.com).

4. Characterization of Aquaculture in the Western U.S.

Problem

Aquaculture in the Western Region is not well understood by the general public. This lack of familiarity with aquaculture farms, their farming practices, and their products, can lead to adverse policies and lack of public support. In addition, there is little understanding of the various supply chains supported by aquaculture and the myriad of economic sectors supported by the aquaculture businesses in the Western Region. Moreover, the value, volume, and diversity of individual aquaculture products and their flow through the economy have not been described.

Solution

A team of aquaculture extension, natural resource, and/or agriculture production specialists in addition to species trade associations will compile current synopses of key segments of aquaculture in their respective states and across the region. Building on previously funded WRAC projects and available published literature where necessary and as appropriate, additional survey methodology may be justified (e.g., live fish food and recreation markets). The team could include one or more economists to document economic impacts of the industry.

The proposed project should provide information to be obtained and synthesized to construct a comprehensive and cohesive picture of the aquaculture industry and its effect on the region. The analysis, reports and products of this work may be used to enhance awareness among stakeholders and the public, and to improve communication with policy makers.

Outreach

This project would aim to develop digital media, including, but not limited to: publications, fact sheets, and infographics that summarize the contributions of aquaculture in the western region. These products would highlight the economic sector supported, employment created, and overall impact on local, state, and regional economies.

Another product would be the development of a webpage, hosted or linked through the WRAC website, that gives access to the digital products. This webpage would emphasize key sectors of aquaculture in the western region, using photos and video vignettes that highlight aquaculture facilities. Webpage information would include descriptions of production facilities, species, and the products produced sand include downloadable publications and infographics.

Duration and Funding Level

Anticipated project duration can be up to 2 or 3 years, and requests from WRAC should not exceed $120,000/year.

Contact

Ken Beer (Beerfishery@yahoo.com) can be contacted for further information about this problem statement.

5. Aquaculture: Applied Technology Solutions

Problem

The aquaculture industry could greatly benefit from new, innovative technologies that increase efficiency, streamline production, or increase profitability. This project could test new technology or examine existing technology and include management tools and process control solutions for freshwater and marine fish or shellfish farms, including production management and recordkeeping. Examples include: biosecurity, traceability, husbandry, fish quality, efficient use of water (e.g., aquaponics, recirculation systems, water quality, and water treatment systems), disease control, production management harvest systems, and transportation systems.

Solution

Applicants should propose a project to test systems on the farm, comparing productivity, profitability, or overall utility. Transfer of existing technology to aquaculture would be appropriate. Commercially relevant trials are to be included within the scope of work to demonstrate targeted benefits or improvements through comparison with current systems, including cost effectiveness. Applicants are expected to work with an industry partner. A demonstration project that addresses a specific problem on site and for a particular industry segment needs to be incorporated into the Pre-Proposal. Regional cooperation is required and regional applicability mandatory. Metrics that show benefits must be included.
Examples include:

- Gas super-saturation systems, oxygen systems, efficiency, cost, and safety
- Zero discharge systems and sludge management
- Imaging systems for fish (e.g., ultrasound)
- Applications of water reuse systems
- Technologies for improving stability of stabile feed components
- Bioreactor to culture algae or microorganisms
- Hatchery management (e.g., water quality, water reuse)
- Transfer of rapid testing methods for: gender selection, growth, disease, water contamination, etc.
- Software/management tools for modeling tracking and monitoring: tracking cohort/rearing unit and stock grow-out, stock management, survival and growth, water use, water quality, lot tracking, and supplier verification for seed, feed, etc.
- Production parameters (water velocity, fish grading, etc.)

Outreach

A funded participant responsible for outreach must be included as part of the Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects. Development of appropriate technology for remote sites can also be included. Applicants are strongly encouraged to develop proposals that could involve cooperation with extension personnel and/or aquaculture coordinators.

Duration and Funding Level

Anticipated project duration is 1–3 years, with up to $120,000/year requested from WRAC. In-kind and leveraged funds from industry, academia and other entities are encouraged.

Contact

Mark Francis (Markf@aquaneering.com) or Dallas Weaver (deweaver@mac.com) can be contacted for more information about this problem statement.

6. Diet Nutrition/Innovation

Problem

Feeds are reported to represent from 50% to upwards of 70% of the variable costs of aquaculture production. Growers are faced with the increasing challenges of decreasing water flows, increasing temperature and other climatic effects, a lack of awareness of novel alternative and supplemental ingredients, and limited supplies of marine-derived ingredients. Out of necessity, growers in arid regions of the Western U.S. are increasingly turning to recirculating aquaculture systems as a means to produce high value species. Because initial capital investment in such intensive recirculating systems can be relatively high, optimizing diets in these production systems is needed to increase potential for economic growth. Additionally, there is an increasing consumer demand for locally sourced food and feed ingredients, which necessitates continued evaluation of nutrition solutions.

Solution

Innovative approaches are needed to reduce these challenges without compromising growth and feed efficiency, product quality, and marketability, in addition to the health of fish and the environmental health. Proposals that examine novel ingredients that are not approved must include estimation of the process through which regulatory approval can be achieved. Metrics should include cost per unit/gain live production. Laboratory testing that culminates in on-farm trials is required. Examples include:

- Continued evaluation of alternative protein and lipid products for finfish, shrimp, and other aquatic animals
    - Such as, but not limited to: camelina/cottonseed meal, spirulina, algae, microalgae, single-cell organisms
- Phased/feeding and finishing feed approaches for alternative lipid strategies that include economic benefit analysis and product quality evaluations
- Dietary optimization for improving economic growth potential for less understood aquaculture species, high value species, species' life stage (e.g., catfish feed for growing sturgeon), or production systems (e.g., shrimp grown in recirculating systems/aquaponics systems)
- Feed and ingredient processing technologies and feed management approaches that improve feed digestibility and reduce waste production
- Innovative methods to characterize nutrient utilization in aquatic animals

Outreach

A funded participant responsible for outreach must be included as part of the project Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects. Researchers are expected to include participation with feed company representatives from inception of the project.

Duration & Funding Level

Anticipated project duration is up to 4 years and should not exceed $120,000/year. In-kind and leveraged funds from industry, academia, and other entities are encouraged.

Contact

Jackie Zimmerman (Jacqueline.Zimmerman@merck.com) can be contacted for further information about this problem statement.

7. Aquaculture Water Quality

Problem

Growing awareness of environmental issues and the desire to be good environmental stewards, coupled with increasing regulatory restrictions, have prompted the aquaculture industry to find new and innovative ways to decrease effluent nutrients, particularly phosphorus and ammonia, and improve effluent water quality. Furthermore, the aquaculture industry is continually trying to maximize production and produce more income from their allotted water resources. To accomplish this, growers must maintain or improve water quality of their influents and effluent to meet animal requirements on influents and regulatory standards on effluents. Research is needed so that growers can maximize the utilization of their water resource while maintaining quality of the effluent. Potential issues related to poor water quality include:

- Decreased quality of intake waters from wells, springs, and surface water
- Aquatic chemistry changes resulting from climate change, changing aquifer utilization
- Indirect impacts created by effluents such as algae blooms and die-offs
- Indirect impacts on macrophytes
- Regulatory limits: nitrogen, phosphorus, total suspended solids

Solution

Research is needed to evaluate different methods to enhance the water quality of aquaculture influent and effluent. Proposed solutions for one operation (e.g., recirculating) may not work for another (e.g., flow through). Multiple technological solutions will need to be developed. WRAC encourages innovative solutions that currently may not be economically feasible for all sectors of the industry or regions. However, over time these innovative technologies will be refined to work in larger segments of the industry or become scalable. Solutions could include strategies addressing nutrient and other inputs to the system. Examples include:

- Modified fish feeds and/or fish-feeding regimens
- Input water treatment systems, including bacterial and photosynthesis based systems
- Different fish-rearing management systems
- Alternative solutions could encompass strategies mitigating outputs from the system. Examples include:
    - Chemical processes (precipitation reactions, sequestering agents, zeolites, etc.)
    - Biological organisms (e.g., plants, animals, and microbes) that can utilize, metabolize, or reduce effluent nutrients. This could include:
        - Filter-feeders such as mollusks
        - Other fish species
        - Seaweeds and specialty crops or other plants (e.g., chives, mint, etc.)

WRAC encourages cooperative research at existing aquaculture operations for pilot studies. Multi- and interdisciplinary collaborative approaches are strongly encouraged. A well thought-out and designed economic component (cost-benefit analysis) is required.

Outreach

A funded participant responsible for outreach must be included as part of the project Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects.

Duration and Funding

Anticipated project duration is 2–4 years and should not exceed $120,000/year. In-kind and leveraged funds from industry, academia, and other entities are strongly encouraged. Short-term exploratory projects with lower levels of funding will be considered.

Contact

Dallas Weaver (deweaver@mac.com) or Mark Francis (markf@aquaneering.com) can be contacted for more information about this problem statement.

8. Regulatory Obstacles to Aquaculture Development

Problem

Inefficient regulation presents one of the greatest obstacles to aquaculture enterprise in the Western Region, whether the operations are large or small. Lack of understanding and/or scientific basis for regulations related to aquaculture result in policies that frustrate enterprise formation and viability. There is a clear need to identify these bottlenecks and offer fact-based solutions to shortfalls in the decision-making process. Environmental, biosecurity and stakeholder concerns drive the bulk of relevant decision-making. Given that many of the product markets are global, the current landscape of inefficient regulations undermines the competitiveness of US aquaculture.

Potential issues include:

- Broodstock collection, outplanting, strain improvement, stock transport restrictions that adversely impact business operations
- Stock health testing regimes, which burden producers and may be inconsistently applied
- Gaps in research and scientific data needed to inform changes in policies and regulations, especially for new species/products
- Lack of QA/food safety guidance, especially for new species and products.
- Spatial use/stakeholder conflict
- Lack of coordination, inconsistencies, agency overlap/confusion, excessive and/or redundant data collection in permitting processes
- Lack of adaptive regulatory management practices

Solution

WRAC requests proposals that address both identification of and solutions to regulatory obstacles to aquaculture development through scientific research. Projects should facilitate a shift in regulations and enforcement from an uninformed precautionary posture towards a scientifically-grounded, risk-based management approach. Deliverables should provide scientific data, analysis, and tools to support improved cooperation between industry, government, key stakeholders and the public. Projects could highlight case studies of effective or ineffective examples of public/private interactions. The goal is to focus on desired policy outcomes and develop recommendations for regulatory frameworks to better balance a thriving industry with risks to environment, biosecurity and stakeholders.

Examples of potential solutions include:

- Environmental risk analyses/modeling for aquatic organisms (e.g., escapement risks to genetic integrity of wild populations, or ecosystems more generally)
- Regulatory review/statistical analyses of existing stock health inspections/biosecurity management, environmental protections, spatial use plans/zoning, stakeholder management mechanisms, etc.
- Economic and systems analysis of agency functions in permitting and management of aquaculture sectors
- Socio-economic research and analysis of stakeholder conflicts and related regulations, with outreach products and programs

Outreach

A funded participant responsible for outreach must be included. A minimum of one outreach publication is required for all-WRAC funded projects. Outreach products should target the states and/or industries that the research addresses. Expected products of the research could include outreach publications, workshops for interested industry and regulatory members, presentations at scientific meetings and any other information. The lead researcher will be expected to work with the outreach coordinator to conduct

industry/stakeholder workshops to present findings. Active participation with regulatory agencies, industry and other key stakeholders is encouraged.

Duration & Funding Level

Duration of the project is anticipated to be up to 4 years and requests from WRAC should not exceed $120,000/year. In-kind and leveraged funds from industry, academia and other entities are strongly encouraged. Cost effectiveness of the proposal will be considered as part of the decision for award.

Contact

Beau Perry (beau@blueevolution.com) can be contacted for more information about this problem statement.

9. Increasing Product Quality Through Farm Practices, Food Science, and Quality Control

Problem

Producing a quality aquaculture product does not occur by accident. It is the result of good management practices before, during and after harvest. Management practices have been shown to affect flavors, texture, shelf life and consumer acceptability. Product quality can be negatively impacted by a lack of understanding of food science, logistics, technology, and workforce training. There is a need to develop new quality control measures and practices especially for new products.

Solution

We are seeking proposals that identify and define methodology that improves product quality to further differentiate US farm raised products to compete in the global aquaculture marketplace. A series of science-based guidelines should be developed that address specific practices that affect product quality.

Examples for consideration may include, but are not limited to:

- Off flavor mitigation
- Husbandry practices
- Harvest practices
- Increased shelf life
- Supply chain
- Product quality
- Value added products

Outreach

A funded participant responsible for outreach must be included as part of the Work Group from the inception of the project. A minimum of one outreach publication is required for all WRAC-funded projects. Projects should provide written outreach publications and preferably a demonstration project for industry representatives and stakeholders. Applicants are strongly encouraged to develop proposals that could involve cooperation with extension personnel and/or aquaculture coordinators.

Duration and Funding

Anticipated project duration is 1-3 years with up to $120,000/year requested from WRAC. In-kind and leveraged funds from industry, academia and other entities are encouraged. Smaller demonstration projects are also encouraged.

Contact

Leo Ray (leoray@fishbreedersofidaho.com) can be contacted for more information about this problem statement.

Timeline for FY2021 Research & Outreach Projects*

Development of Problem Statements to Selection of Full Proposals

2019

Summer

- Solicit from all stakeholders identifiable Research Priority Areas.
- Industry Advisory Council (IAC) meets to compile priority suggestions into a short list.

Fall

- IAC/Technical Committee (TC) meets to review priority listing and develop Problem Statements for submission to WRAC Board of Directors (Board).
- Board meets to review and approve Problem Statements.

2020

Winter

- Administrative Office (AO) produces and distributes Request for Pre-Proposals.

Early Spring

- **Pre-Proposals are due by 5 PM on Friday, April 3, 2020.**
- Executive Committee (EC) reviews Pre-Proposals and recommends to Board.

Spring

- Board meets—reviews and acts on recommendations from EC regarding Pre-Proposals.
- AO notifies Pre-Proposal authors of Board's decisions and instructs PIs regarding preparation of Full Proposals with due date (generally in July).

Summer

- Full Proposals are due. AO distributes new project proposals for external peer review.

Fall

- AO forwards new Full Proposals with compilation of peer reviews to the IAC/TC for review.
- IAC/TC meets to review Full Proposals and make recommendations to the Board regarding program funding.
- Board meets to act on IAC/TC recommendations for new and ongoing program funding.
- Notification to Lead PIs of Full Proposal status.

2021

Details regarding funding will follow final selection of projects with an anticipated start date of September 1, 2021. However, funding has been delayed in recent years. Be aware that funding could be received anytime from September 2021 to January 2022.

* This timeline has been adjusted for FY2021

Appendix B Pre-Proposal Guidelines

WRAC policy requires that each project include participation by two or more states located within the western region (Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming). Research partnerships may be formed among all elements of federal, state, and local government; public institutions; and private sectors as long as appropriate research activities are conducted in at least two of the above states.

Components

The Pre-Proposal must include:

Pre-Proposal Attachment A – Pre-Proposal Checklist (page B3)
The Checklist is intended as a guide.

- The lead PI must check each box and sign at the bottom of the Checklist to confirm the inclusion of each element.

Pre-Proposal Attachment B – Cover Page (page B4)

Pre-Proposal Attachment C – Table of Contents (page B5)

Pre-Proposal Attachment D – Summary Budget (page B6)

Pre-Proposal Attachment E – Biography (page B7)

Pre-Proposal Attachment F – Outreach and Evaluation Plan (page B8)

Note: please contact the WRAC office at 206-685-2479 for a sample Pre-Proposal if needed.

Requirements

A Pre-Proposal must meet the following requirements or it will not be accepted:

- Received by the announced deadline. Electronic submission by the due date qualifies as meeting the deadline—the printed copy must be received within a day of the deadline.
- Each element is addressed in the order presented on the Checklist.
- Include checked and signed Checklist (by the lead Principal Investigator [PI]).
- Cover page signed by the lead PI.

Length

The body of the project narrative should be a maximum of five (5) pages—this limit does not apply to the reference, budget, or biography pages.

Submission

1. Email submission is preferred and electronic signatures are allowed. Submit entire Pre-Proposal as a single PDF to the WRAC Administrative Office by email to Julie Hahn at jkhahn@uw.edu.
2. Mailing address, in case you are unable to email your document.
   Mail one (1) signed, printed copy to:
   Western Regional Aquaculture Center
   c/o Julie Hahn
   University of Washington
   School of Aquatic and Fishery Sciences
   Box 355020, Seattle, WA 98195-5020
   Street address: 1122 NE Boat Street, Seattle, WA 98105.

   Questions: Please contact the WRAC Office at 206-685-2479

Format/Content

Cover Page: Title of the project, participating institutions, PIs, Outreach Representative, Industry Advisor, and suggested Project Monitor. The cover page must be signed and dated by the lead PI. (Pre-Proposal Guidelines, Attachment B, page B4)

Table of Contents: Follow the format indicated (Pre-Proposal Guidelines, Attachment C, page B5).

Project Narrative:

Justification: Include a brief statement of the benefits to be gained by applying the results anticipated as a result of the project.

Related, Current, and Previous Work: Assess the current state of knowledge concerning the problem or opportunity to be assessed and include a brief summary of previous applicable research.

Objectives: List the objectives to be achieved including those of research and outreach.

Procedures: Provide a detailed description of the approach(es) to address the problem or solution, striking a balance between information and brevity in the description. If a multi-year project is proposed, indicate the activity that would take place each year.

Outreach and Evaluation Plan: (Pre-Proposal Guidelines, Appendix B, Attachment F, page B8)

Resource and Facility Commitment from each Institution: List the institutions involved in the project and the resources that are to be used from each.

Note: Pre-Proposals should show industry participation in the form of contributions of funds, matching funds and in-kind services.

References: Include the references that are included in the Pre-Proposal text.

Budgets: Include preliminary budgets for each year proposed, according to the spreadsheet format indicated on Pre-Proposal Guidelines, Appendix B, Attachment D, page B6). Pre-Proposals **must contain** itemized budget breakdowns for each budget item for each PI.

Note: Per Section 1473 of Public Law 95-113, **indirect costs and tuition remission cost are NOT allowable on any portion of the sub-awards of the WRAC grant from USDA/NIFA.**

Industry and Academic Salary Support

- ***Industry:*** No industry PI salary is allowed. Industry technician funding is allowed with adequate justification; however, this may affect the competitiveness of the proposal.
- ***Academic:*** Payment of percentages of faculty salaries from WRAC funds is **strongly discouraged** by the Board of Directors, although it is recognized that in some cases it is essential for the success of the project. Up to one month's academic salary under certain circumstances with strong justification can be requested, but this may affect competitiveness of the proposal.

  Include specific breakdown of any **salary funds** required (i.e., who will receive the salary: Principal Investigators, Graduate Student/Research Assistant, etc.).

Biographies: Provide a one-page biography for each investigator and outreach personnel according to the format indicated (Pre-Proposal Guidelines, Appendix B, Attachment E, page B7)

Multi-state institution requirement met? See page 2 for details regarding regional requirements.

NEW - Completion of previous outreach objectives: If your checklist indicates lack of completion of outreach objectives for any WRAC-funded project in which a listed investigator has served as Work Group Chair within the last five years, provide a detailed justification/explanation (not included in the 5-page narrative page limit).

Appendix B Pre-Proposal Guidelines

Attachment A Checklist

See Pre-Proposal Guidelines (pages B1–B8) and Sample (on WRAC website) for more information.
Note: The PI must check each box below to confirm inclusion of each element and then sign at the bottom.

Page # (if applicable)	***Does the Pre-Proposal include/identify the following?***
	Required Elements ❑ **Cover Page**: to include the following: • Title • Funding Levels • Submission Date • Duration of Project • Statement matching Pre-Proposal to identified Problem Statement • Industry Advisor • Suggested Project Monitor • Outreach Coordinator • Principal investigators and institutions ❑ **Table of Contents** ❑ **Project Narrative**: to include the following: • Justification • Objectives • Outreach and Evaluation Plan (*see Outreach & Evaluation Plan, page B8, for details*) • Resource/Facility Commitments • Related Current and Previous Work • Procedures ❑ **References** ❑ **Budgets** (*see Budget Section below*) ❑ **Biographies**
	❑ **Multi-state/institution requirement met? YES ___ NO ___** (With justification provided)
	❑ **Page limit is 5 pages for the Project Narrative portion.** (Page limit does NOT include the reference, budget, biography, single-state justification, or incomplete outreach project justification pages.)
	Outreach Components (*Follow the guidelines in Pre-Proposal Guidelines, Appendix B, Attachment F, page B8*)
	Are the following Outreach elements included and clearly identified?
	❑ **Outreach Representative** within the western region identified and consulted in the preparation of the Pre-Proposal? (You may contact WRAC Extension Subcommittee members listed on the WRAC website; there is no requirement for the Outreach Representative to be a subcommittee member.*)*
	For each Objective are the following identified: ❑ **Target Audiences**; Who will benefit from receiving project information? ❑ **Intended Learning Outcomes**; What will be learned? ❑ **Intended Management and/or Behavioral Outcomes** ❑ **Procedures to Achieve Intended Outcomes:** • Inputs: Who will do what and at what cost? • Outputs: What products will be developed and at what cost? • What publications, workshops, demonstrations, etc., will be developed? ❑ **Evaluation Plan** ❑ **Has any listed investigator served as Work Group Chair for a WRAC-funded project in the last five years? YES ___ NO ___** If "YES," have all of the outreach objects been complete for the project(s)? **YES ___ NO ___** If "NO," has a detailed justification/explanation of why these have not been completed been provided? **YES ___ NO ___**
	Budget
	❑ **Follow the format of the Summary Budget** (Pre-Proposal Guidelines, page B6). Sample Excel budget sheets are available on the website.
	❑ **For each year, follow the format of the Itemized Budget Spreadsheet. Specify who will receive salary** (e.g., principal investigator, graduate student/research assistant, etc.) Sample Excel budget sheets are available on the website. Include any Excel sheets into your final PDF submission.

If the WRAC Administrative Office cannot verify inclusion of any element, the Pre-Proposal will not be accepted.

Principal Investigator Signature _____ Date _____

Appendix B Pre-Proposal Guidelines

Attachment B Cover Page

SUBMISSION

1. **Email submission is preferred and electronic signatures are allowed.** Submit entire Pre-Proposal as a single PDF to the WRAC Administrative Office by email to Julie Hahn at *jkhahn@uw.edu*.
2. **Mail address,** in case you are unable to email your document.

Mail one (1) printed copy to:

Western Regional Aquaculture Center
School of Aquatic and Fishery Sciences
Box 355020
University of Washington
Seattle, WA 98195-5020

For deliveries that require a street address, use:

Western Regional Aquaculture Center
School of Aquatic and Fishery Sciences
1122 NE Boat Street
University of Washington
Seattle, WA 98105

PROJECT TITLE:

Submission Date (mo/yr):

Duration of Project (number of years):

Funding Levels:
First Year Request:
Second Year Request:
Third Year Request:
Fourth Year Request:
Total Request:

Participating Institutions

Principal Investigator
Institution (name and address)

Principal Investigator
Institution (name and address)

Principal Investigator
Institution (name and address)

Principal Investigator responsible for Outreach
Institution (name and address)

Industry Advisor
Institution (name and address)

Suggested Project Monitor (Subject to approval by Board of Directors)
Institution (name and address)

_____ _____

Signature of Lead Principal Investigator | Date Submitted

Appendix B Pre-Proposal Guidelines

Attachment C Table of Contents

PROJECT TITLE:

TABLE OF CONTENTS

Page #

Appendix B Pre-Proposal Guidelines

Attachment D Summary Budget

PROPOSED SUMMARY BUDGET for YEAR _____
for All Participating Institutions
(additional budget pages should be prepared
for each year of proposed project)

PROJECT TITLE:

	Institution (PI name)	Institution (PI name)	Institution (PI name)	Institution (PI name)	PROJECT TOTAL
Salaries					
Benefits					
Supplies					
Equipment					
Other					
TOTAL					

Notes:
Include specific breakdown of any **salary funds** required (i.e., who will receive the salary: Principal Investigators, Graduate Student/Research Assistant, etc.). ***Payment of percentages of faculty salaries from WRAC funds is strongly discouraged by the Board of Directors, although it is recognized that in some cases it is essential for the success of the project.***

In addition to the summary budget (example above), Pre-Proposals **must contain** itemized budget breakdowns for each budget item for each PI. The budget sheets **must be generated using the spreadsheet format** that is available on the WRAC website for download at: http://depts.washington.edu/wracuw/funding/funding.html. (Samples of blank and filled-in itemized budget spreadsheets are included at the end of this document).

Appendix B Pre-Proposal Guidelines

Attachment E Biography

(One page per person)

NAME:

TITLE:

DEPARTMENT:

INSTITUTION:

ADDRESS:

TELEPHONE/FAX:

EMAIL:

EDUCATION: (degree, name of institution, year; ***please list most recent first***)

POSITIONS HELD: (title, name of institution, employment dates; ***please list most recent first***)

PROFESSIONAL MEMBERSHIPS:

SELECTED PUBLICATIONS: (***please list most recent first***)

Appendix B Pre-Proposal Guidelines

Attachment F Outreach and Evaluation Plan

Extension Outreach Criteria for WRAC Project Objectives
One of the principal goals of the Regional Aquaculture Center program is the application of project results for the benefit of industry; yet, without adequate and early attention to the outreach component of WRAC projects, research results and outcomes may be of limited value, or completely unknown to producers. The Board recognizes that a more detailed account of outreach plans at the proposal stage helps to identify project audiences, outcomes, and evaluation methods. This essential information ensures that results meet industry needs and that producers receive pertinent information that might be applied in their operations.

All Pre-Proposals must contain a comprehensive outreach plan containing the following information for ***each*** research objective:

Objective: [state research objective]

1. **Target Audience:** Who will receive the information generated?
2. **Intended Learning Outcomes:** What will be learned?
3. **Intended Management and/or Behavioral Outcomes:** What will be the management or behavioral outcomes?
4. **Procedures to Achieve Intended Outcomes**

   Inputs
   - Who will do what and at what cost?
   - How will target audience be contacted?

   Outputs (Outcomes?)
   - What products will be developed and at what cost?
   - What publications, workshops, demonstrations, etc. will be developed?
5. **Evaluation Plan:** What methods will be used to measure what learning or behavioral changes have occurred?

Outreach Publications
- The required outreach publication(s) portion of WRAC grants is funded through WRAC core funds and WRAC receives primary acknowledgment.
- The core funding for the WRAC outreach publication(s) may be supplemented by other funding sources, but WRAC should be acknowledged.
- Ancillary funding may be applied in support of additional outreach activities.
- A minimum of one outreach publication must be produced for any multi-year grant award, and the publication must address the associated research component.
- The primary outreach publication should cover the project in depth (a flyer or fact sheet is not sufficient). The publication should clearly indicate the benefits to the targeted audience.

Sample of Blank Required Itemized Budget Spreadsheet

Excel sample: http://depts.washington.edu/wracuw/funding/funding.html

INSTITUTION:	
PRINCIPAL INVESTIGAT	
SALARIES:	**$0**
BENEFITS:	**$0**
TRAVEL:	**$0**
SUPPLIES:	**$0**
EQUIPMENT:	**$0**
OTHER DIRECT COSTS:	**$0**
TOTAL:	**$0**

Sample of Filled-In Required Itemized Budget Spreadsheet

Excel sample: http://depts.washington.edu/wracuw/funding/funding.html

INSTITUTION:	University of Washington	
PRINCIPAL INVESTIGAT	Dr. John Smith	
SALARIES:		**$5,000**
Research Technician (0.08 FTE)	$3,000	
Graduate Student (12 mths @ 50%)	$2,000	
BENEFITS:		**$490**
Research Technician (@ 9%)	$270	
Graduate Student (@ 11%)	$220	
TRAVEL:		**$1,850**
WAS Meeting: room (3 days x $100)	$300	
Per Diem	$350	
Airfare	$500	
Work Group Meeting-Idaho (3 days x 100)	$300	
Per Diem (3 days)	$150	
Airfare	$250	
SUPPLIES:		**$1,600**
Chemicals	$500	
Fish Feeds	$600	
Reagents & vitamins for feeds	$300	
Glassware	$200	
EQUIPMENT:		**$0**
OTHER DIRECT COSTS:		**$800**
Publications - Page charges (4pg @ $50/p	$200	
Telephone	$100	
Photocopying & Printing	$500	
TOTAL:		**$9,740**

The Western Regional Aquaculture Center (WRAC) is one of five centers in the United States. Developed to take advantage of the best aquaculture science, educational skills, and facilities within a twelve-state area, WRAC works to enhance viable and profitable commercial aquaculture production in the U.S. for the benefit of producers, consumers, and the American economy.

To learn more about WRAC, go to the website at depts.washington.edu/wracuw.

Contact WRAC at:
Western Regional Aquaculture Center
School of Aquatic and Fishery Sciences
University of Washington
Box 355020
Seattle, WA 98195-5020

phone: 206-685-2479
email: wrac@uw.edu