

2010-2012 Summary of Funded Projects



The Regional Aquaculture Centers are funded through the USDA National Institute of Food and Agriculture with a history over 25 consecutive years. The combined five regional centers represent a national program that covers and reaches all states and territories in the US. The program is unique with the participation of aquaculture industry representatives appointed to an Industry Advisory Council who identify regional research and extension education priorities for project development and monitor progress and outcomes. Other project development and oversight bodies include a Technical Advisory Committee and Board of Directors.

This material updates past project summaries that covered the period 2005-2010. For more information about the listed projects as well as past projects, please visit the home page for each of the five Regional Aquaculture Centers that is referenced below.

Western Regional Aquaculture Center Projects

Director: Graham Young, University of Washington

Home page: <http://fish.washington.edu/wrac/>

AQUARIUS v.3.0: Shellfish Sanitation Simulator and Analytical Software Incorporating Fecal Coliform, Rainfall, and Tidal Activities

Funding level: \$20,000

Project start date: FY2010

Project duration: 3 years

Participants: University of California-Davis (Lead Institution), California
Department of Health Services, Pacific Shellfish Institute, University of
Washington, Hog Island Shellfish Company

This study developed *Aquarius 3.0*, a sanitation model and software designed to evaluate sanitation closure rules for conditional approved shellfish areas with incorporation into an integrated tidal program allows tide information to be used in formulas for assessing adverse conditions (rainfall + tide) in a shellfish growing area. In addition, a second sanitation model, *Pearl*, developed using non-WRAC funding, will be incorporated into *Aquarius 3.0*. *Aquarius 3.0* will use the daily rainfall data to generate a list of days, and the number of days, a shellfish growing area can remain open for harvest (simulated open periods) under different hypothetical closure rules. The *Pearl* model then uses the actual fecal coliform samples, of which sampling dates fall in the simulated open periods, to determine if harvesting shellfish during these new open periods pose any risk to shellfish consumers. The development of *Aquarius 3.0* with capabilities for rapidly handling massive

datasets and associated calculations with precision and confidence will provide financial savings and a labor- and time-saving advantage to the commercial shellfish industry and to public-health agencies. The innovative concepts associated with the programs will provide increased consumer safety and a greater confidence in the products of the shellfish industry.

Global Analysis of Eelgrass (*Zostera marina*) Standing Stock and Yield

Funding level: \$20,000
Project start date: FY 2011
Project duration: 1 year
Participants: University of Washington

Shellfish aquaculture overlaps with eelgrass (*Zostera marina*) in low intertidal and shallow subtidal zones of estuaries in the western U.S. Because of worldwide declines and U.S. no-net-loss policies, restrictions on activities in and near eelgrass beds may constrain aquaculture expansion. Eelgrass monitoring frequently addresses cover and extent, but could also include biomass and production. No global baseline is currently available regarding biomass and production of healthy populations of eelgrass and how these may differ geographically. The project will provide a meta-analysis of published literature on biomass and production of eelgrass (*Z. marina*) spanning its entire northern hemisphere range. Traits of eelgrass in the western US (eastern Pacific) will be compared to those in three other regions: western Atlantic, primarily US east coast; eastern Atlantic, primarily Europe; and eastern Pacific, primarily Japan and Korea. The project will describe common and unique features of eelgrass in these diverse geographic areas and information provided could be used to incorporate biomass and production-per-biomass into management of shellfish near eelgrass.

Environmental and Endogenous Factors Affecting Egg Quality and Caviar Yield in Farmed Sturgeon

Funding level: \$ 195,210
Project start date: FY 2010
Project duration: 3 year
Participants: Washington State University; University of California, Davis; Montana State University (MSU)/Bozeman Fish Technology Center (BFTC), and the College of Southern Idaho (CSI).

Caviar production from farmed sturgeon now exceeds that from capture fisheries. Production of farmed caviar has reduced pressure on wild, threatened, and endangered

sturgeon species and has earned accolades for sustainability from environmental organizations. The sturgeon farms of the Western region pioneered caviar production in the US. To compete successfully, sturgeon farms must be efficient and produce high-quality caviar. However, sturgeon farmers in California and Idaho observe highly variable roe yield in mature sturgeon associated with the accumulation of fat in the ovaries. This project aims to enhance production and quality of farmed caviar by determining how diet and genetics influence the deposition of fat into the ovary. Understanding these effects is essential for enhancing production of high-quality sturgeon caviar and expanding the US farmed sturgeon industry, a model for sustainable aquaculture, in the western region.

This project aims to improve the yield and quality of caviar in farmed sturgeon. The specific objectives include: 1) conduct feeding trials with adult sturgeon to determine the effect of dietary energy on roe yield in early- and late-maturing females; 2) conduct a feeding trial with pre-pubertal sturgeon to determine effects of dietary energy on accumulation of ovarian fat in early ontogeny; 3) determine the effect of farm, diet, and maturity age on chemical and sensory properties of caviar and evaluate the use of image analysis for measuring ovarian fat content; 4) determine the dietary effect on the crude chemical composition of sturgeon ovaries and proliferation of adipose tissue in pre-pubertal fish; (5) determine the effect of genotype on roe yield and ovarian adiposity in adults and on ovarian adiposity in pre-pubertal sturgeon; and 6) develop an integrated approach for management of farmed sturgeon with high caviar yield and quality as outreach for the project.

Optimizing Dietary Protein and Energy Utilization to Improve Production Efficiency of Tilapia in the Western United States

Funding level: \$67,728
Project start date: FY 2010
Project duration: 3 years
Participants: USFWS; University of Arizona; University of Idaho

The dependence of finfish and crustacean producers on fishmeal as the main protein source in aquaculture feeds is of increasing concern to the sustainability and growth of the aquaculture industry. Working with commercial tilapia feed manufacturers and researchers throughout the western region, this project works to develop initial formulations involving soybean oil with the goal of identifying the optimum dietary protein-to-energy ratio(s) in practical diets of two different size classes and species of tilapia. These formulations identified in the laboratory testing will then be tested in a pilot-scale on-farm trial ensuring direct applicability to the tilapia aquaculture industry. The results of this research will reduce the demand on fishmeal as the primary protein source thereby supporting the sustainability and growth of the aquaculture industry to meet the world's increased demand for healthy seafood.

The long-term goal is to optimize commercial tilapia diet formulations for the intensive culture systems utilized in the Western region of the United States. Toward that end, the

three-year goals include: 1) identify the optimum dietary protein to energy ratio(s) in practical diets for two different size classes and species of tilapia; 2) evaluate the ability of vitamin supplementation to improve growth performance at different protein : energy ratios; 3) further evaluate potential formulations identified by laboratory testing in a pilot-scale, on-farm trial; and 4) develop an integrated outreach program including at least one WRAC Extension publication to meet stakeholders' educational needs.

Cost-effective, alternative Protein Diets for Rainbow Trout That Support Optimal Growth, Health, and Product Quality

Funding level: \$119,789
Project start date: FY 2009
Project duration: 3 years
Participants: USFWS; University of Idaho; Colorado State University; USDA ARS; Washington State University

The dependence of finfish and crustacean producers on fishmeal as the main protein source in aquaculture feeds is of increasing concern to the sustainability and growth of the aquaculture industry. Working with the rainbow trout growers, this project will identify commercially available alternate ingredient combinations that can meet the production needs of rainbow trout. Further, comparing formulations in fish grown to market size and the influence of the formulations on growth, fish, health, product quality, and consumer acceptance will provide clear guidelines for growers throughout the Western region leading to increased production of healthy and safe seafood. The results of this research will reduce the demand on fishmeal as the primary protein source thereby supporting the sustainability and growth of the aquaculture industry to meet the world's increased demand for healthy seafood.

Long-term goals are to: 1) develop cost-effective, alternative-ingredient diet formulations that support maximal growth, health, and product quality; 2) increase the amount of information available to feed manufacturers regarding amino acid availabilities and retention efficiencies of synthetic amino acids, thus improving utilization of alternative ingredients in trout feeds. Toward these ends, our three-year goals are to: 1) identify commercially available alternate ingredient combinations that can meet the production needs of rainbow trout; 2) further refine amino acid balance as a means of reducing interactive growth depressions when novel combinations of ingredients are utilized; 3) compare formulations in fish grown to market size and the influence of the formulations on growth, fish health, product quality, and consumer acceptance; and 4) develop an integrated outreach program including at least one WRAC Extension publication to meet stakeholders educational needs.

Optimizing the Larval Nutrition of Marine Finfish Aquaculture Species Along the West Coast

Funding level: \$131,264
Project start date: FY 2009
Project duration: 3 years
Participants: Hubbs Sea World Research Institute; Oregon State University;
University CA, Davis

Specific objectives include: 1) establish baseline indices for marine species using current culture techniques as a benchmark for evaluating the project's success over time. Utilize a Culture Efficiency Index to determine transition points from one feed to another through the larval-rearing phase. Less time on live feeds will ultimately translate into increased efficiency (e.g. reduced labor costs). Utilize Biological Performance Indices at the end of the larval phase to measure: a) individual growth in length and weight, b) survival as a percentage from the egg stage, and c) quality using measures of morphology and/or stress tolerance. Objective 2 - refine and implement methods that allow assessment of larval feed intake and behavior to support research outlined in Objectives 3 and 4. Employ diet "tracers" as a measurement tool for food choice and manipulative feeding trials employ Lipid Spray Beads (LSBs) as a delivery vehicle for feed supplements to live prey and complex feeds. Employ a video monitoring system and image analysis software for documenting larval feeding behaviors, kinetics, and morphology under experimental feeding conditions; and seek to couple this system with a feeder. Objective 3 - increase survival and growth during the larval stage through optimization of live food types and enrichment formulations. Objective 4 - increase survival, fitness, and growth during weaning from live foods to formulated feeds through the development and/or identification of appropriate formulated microdiets.