



## Letter from the Director

Aloha,

The CTSA FY 2014 Development Process is off and running! Pre-Proposals have been trickling in, and my team and I are looking forward to receiving the remainder today. The next step in our process is the annual Industry Advisory Council & Technical Committee meeting in two weeks, where members will discuss and vote on the Pre-Proposals to determine which projects will be asked to submit full proposals.

I am always excited and encouraged by the innovative ideas brought forth during this process. It is my hope that the next round of CTSA-funded research and demonstration projects will positively impact food security and enhance economic opportunities for aquaculture producers in the Pacific region. For those Pre-Proposals that are not selected to move forward to the next stage, I encourage the P.I.'s to try again in the future, as industry needs fluctuate.

The highlight of this month's issue of e-notes is a 'Q & A' with Gary Jensen, former NIFA Aquaculture Program Leader. On behalf of CTSA and my Regional Aquaculture Center Program colleagues, I would like to express sincere gratitude to Gary for his contributions to aquaculture development in the United States, and best wishes for his future endeavors.

As always, please do not hesitate to contact me with any suggestions, questions, or concerns.

Mahalo,

*Cheng-Sheng Lee*

Executive Director, CTSA

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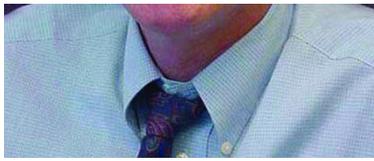
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## Past, Present, and Future of the RAC Program: 'Q & A' With Former Program Leader Gary Jensen



From 1990 to the end of 2013, Gary Jensen served as the National Aquaculture Program Leader for the United States Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA). In that role, he led the Regional Aquaculture Center (RAC) Program, which consists of five regional aquaculture centers (including CTSA) established to integrate individual and institutional expertise and resources in support of commercial aquaculture development. Six months after retiring from his position at the USDA, Gary has taken some time to reflect on the past, present, and future of the RAC program:

**CTSA: How has the RAC program impacted aquaculture in the**



### **United States?**

**Gary Jensen:** The RAC program, running more than 25 years now, has influenced how the industry, research and extension communities can cooperate and leverage unique strengths and abilities to solve critical regional problems. The program has fostered multi-state project team building rather than single investigator, extension education or institutional approaches to address often, complex industry challenges. Each region has success stories or notable accomplishments that vary in scale and scope based on the maturity and economic value of the industry sector targeted for assistance. For more specific information, I suggest visiting the home page for each region besides CTSA (Southern Regional Aquaculture Center; Northeastern Regional Aquaculture Center; North-Central Regional Aquaculture Center; and Western Regional Aquaculture Center). The program has generated foundational science-based information that has influenced national regulations and policies as well as solved immediate and short-term industry problems. Numerous project teams created with RAC funding have used project findings to successfully obtain larger extramural grants (competitive grant awards) to advance problem solving with RAC seed funding. The program has also greatly enhanced state extension programs with additional project planning and implementation funds not available through state programs and strengthened regional or multi-state collaborations and capacity building that have been sustained beyond RAC funding. The program has developed many high-quality educational materials and products that serve a broad national audience with publication cost savings to state programs. With such a long-standing program, it has become somewhat institutionalized in each region with hundreds of persons throughout the country contributing service on various industry, research and extension committees, and board of directors. As state and extramural funding decreases for aquaculture, RAC funding becomes even more critical for applied, solution-focused projects. It is important to always keep in mind the desired endpoint of projects and assure that appropriate steps are made to realize benefits from the federal investment by reaching targeted audiences in ways they can actually learn and successfully adopt improved practices or technologies as appropriate.

### **CTSA: What sets the RAC program apart from other aquaculture funding organizations?**

**Gary Jensen:** The RAC model was developed with much input in the early 1980s with the premise that industry representatives play a direct and active role to direct and guide multi-state research teams to address problems and issues of high industry relevancy to further aquaculture development at regional levels. In addition to relevant research projects, the model integrates multi-state extension project teams to actually reach and educate targeted clientele with new and promising research-based knowledge. Extension and outreach project components can translate, synthesize and mobilize educational programs and teaching tools to inform, demonstrate and educate interested clientele on new practices, technologies, and more to improve aquaculture enterprises. A key factor to support this model is the role of an Industry Advisory Council composed of producers and others directly involved in business with experience to identify key real-world problems or barriers to business success. The regional basis of the program recognizes unique conditions and critical issues that exist at different locations in the nation. Few federally funded extramural programs have built-in structures (committees or councils) to formally engage industry representatives, researchers and extension professionals in annual priority setting and program planning forums. This diverse mix of experiences, backgrounds and career roles presents unique challenges to prioritize problem areas among many viewpoints under level funding conditions and actual decline of inflation-adjusted dollars by about 50% since the program's inception. Rather than an agency-level extramural program with a national scope, each of the five centers can address problems and challenges that are often unique to a region with some allocated funding. Finally, a Board of Directors is also unique to this program. It consists of university administrators and directors as well as chairs of industry, research and extension committees. The board oversees administrative operations and procedures with the director and recommends proposals for funding before final review and approval by USDA's NIFA.

### **CTSA: In your 23 years as Program Leader, what personal contributions to the RAC program are you most proud of?**

**Gary Jensen:** This is a tough question to answer as so many persons contribute to the success and continuity of the RAC program, especially the directors, many who also balance the administrative responsibility with other demanding roles in their institutions. The director's job can be very challenging with so many persons involved in program planning, including a Board of Directors, and many critical issues that cannot be addressed with increasingly limited funds notwithstanding managing RFAs and federal administrative and budgeting requirements. My role was always to support the directors, and more recently to standardize a more efficient reporting process with more

focus on reporting actual impacts and accomplishments to the agency and others in USDA responsible for budgeting recommendations for USDA programs. The Aquaculture Centers is a separate line item in the NIFA budget and all line items are scrutinized each fiscal year by Congress and the Administration for continuation, consolidation and funding level. The RAC program is reauthorized every five years in Farm Bill legislation.

**CTSA: What are your hopes for the future of the RAC program?**

**Gary Jensen:** As stated previously, there is no other federally funded aquaculture program that uses the model employed by the RACs in the program planning process and engagement of so many persons over the years. In the last Farm Bill, the authorized funding was reduced for the first time since the program's inception from \$7.5 M to \$5 M with the hope to increase funding to the new amount of \$5 M in future years. Across all federal agencies there are few budget line items specific to aquaculture with assurance of appropriated funds to support this sector. The lifetime level funding for the RAC program is disheartening because there are so many people familiar with the program across industry and academic sectors. Clearly there are wide ranges of experiences and perceived value over the years depending on recognized benefits to industry and funding to institutions or individuals. More importantly, of the federal funds that support research, most is directed to intramural (federal only) programs with fewer dollars available for short- and medium-term industry problem solving. Most programs seek more funds, however this program will eventually reach a tipping point if more funds do not become available soon. There are increasing inflation-adjusted administrative and project costs and fewer dollars available for regional activities. The program will have to find new ways to reduce administrative and program planning costs to maintain level funding for regional projects. My hope is that effective support for the long-term continuation of the RAC program is not too late. The needed support justifiably depends on program performance and delivery of recognized invaluable contributions to advance industry development as envisioned since the program's inception.

**CTSA: Now that you have retired as the National Program Leader, do you have plans to remain active in the aquaculture industry?**

**Gary Jensen:** With more than 40 years of work in various aquaculture roles, my passion and interest remain very high to continue engagement and participation in numerous activities. I am currently a member of a Ph.D. student advisory committee and serve on the promotion and membership committee of the United States Aquaculture Association. I am available to assist federal agencies as requested in various ways as well as any industry organization or group. I need to complete two papers with project team members before the end of the year. One is on the role of interagency efforts to address use of drugs and producer quality assurance programs since 1990. The other paper reports the findings from a national assessment of aquaculture education at postsecondary institutions in the US. I am behind schedule on both papers because my post-USDA activities have been much busier than anticipated!

**CTSA Ongoing Projects: Midterm Updates**

Each June, every ongoing CTSA-funded project must submit a Midterm Progress Report on the status of the work. Although shorter and less detailed than Annual Progress Reports (due every November), these reports are an important way for CTSA to track milestones and ensure that projects remain on track to meet their target objectives. The following are partial summaries from some of the reports we received this month. To read the complete summaries from all ongoing projects, [please click here](#).



*Marphysa sanguinea* cultured at OI

## **Aquaculture Potential of Hawaiian Polychaetes for Use as a Shrimp Maturation Feed**

Several species of polychaetes have been collected from various locations around Oahu including sediments at He'eia Kea state park, He'eia Kea boat harbor, Wai'āhole beach Park and Maunalua Bay, and on floats beneath a dock at Pearl Harbor. The species that were identified as candidate species for culture include *Marphysa sanguinea*, *Lumbrineris japonica*, *Sabellastarte spectabilis*, *Malacoceros indicus*, *Chaetopterus variopedatus* *Sipunculida* sp. On each occasion that polychaetes were collected for transport to Oceanic Institute (OI), 20% of the collected worms were screened for the presence of White Spot Syndrome Virus, Taura Syndrome Virus, Infectious Hypodermal and Hematopoietic Necrosis Virus, and the bacterium causing Early Mortality Syndrome. In addition to screening of worms prior to transport to OI, a subsequent disease screening was performed on tissue from shrimp that were maintained in the effluent water from the polychaete culture vessels and/or consumed tissue from the cultured polychaetes. Specimens of all previously mentioned species and some unidentified species have been successfully cultured for over three weeks in the OI culture system...

## **Broodstock Management, Seed Production and Grow-out of Rabbitfish, *Siganus lineatus* (Valenciennes, 1835) in Palau, Year 2**

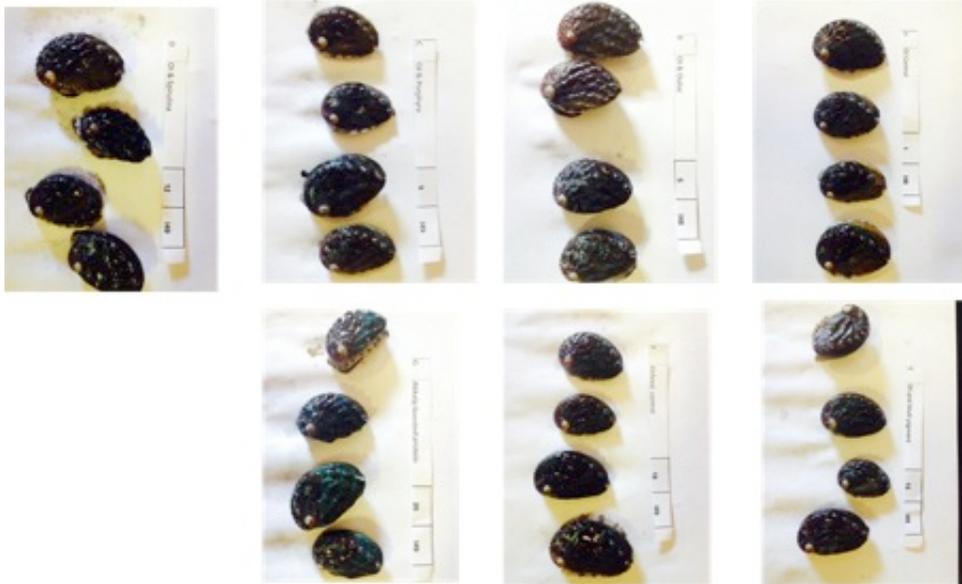
Rabbitfish broodstock have been spawning in two tanks (1,266,334 and 1,200,667 eggs collected in March 2014 with 74% and 68% viability, respectively), and larval rearing and grow-out trials have begun. In the preliminary trial, about 250,000 newly hatched larvae were stocked in a 5ton capacity larval rearing tank. About 2,352 larvae have survived after 21 days of culture making the survival rate equivalent to about 1%. Another larval rearing trial using 4 units of 5ton capacity larval rearing tanks was conducted in May 12, 2014. The purpose of this trial was to compare the survival rate of the rabbitfish larvae when frozen algae paste product and live micro-algae were added into the larval rearing water as food for the rotifers. Larval rearing was terminated after 21 days of culture and the larvae in tanks fed with frozen algae paste product had an average survival rate of 2.8% while those larvae in tanks fed live microalgae had only 1%. The 2,352 pieces of 21days old rabbitfish fries that were produced in April 2014 were further grown inside the same tank to continue the nursery phase of rearing until they metamorphose into about 0.5 to 1inch fingerlings. At Day 37, the rabbitfish fry were observed to have completely metamorphosed and about 798 1-inch fingerlings were harvested. The survival rate on this preliminary nursery rearing trial was about 34%. To document the growth and survival of hatchery-produced rabbitfish, a preliminary grow-out trial was conducted utilizing the fingerlings that were produced. A total of 798 pieces 40 days old fingerlings with average body weight of 1.02g and total length of 1.8cm were stocked in a 2m x 6m rectangular concrete tank with a water depth of about 0.5m. The tank was designed to have a flow-through water system and the fingerlings were fed with commercial feed powder and crumbles. After 50 days of culture the rabbitfish fingerlings were sampled and the average body weight and total length of the 3 months old was already 6.69g and 7.11cm respectively...

## **Establishing Bivalve Farming in Hawai'i**

Researchers are assessing the effects of seasonality on reproduction and condition index (CI) for *Crassostrea gigas* in Hawaiian fishponds and other sites to determine ideal harvest and stocking schedules and maximum stocking densities. Preliminary results indicate that although the growth rate is high enough to produce 3-4 inch oysters in 6-9 months, the condition index is low. This indicates that diploid oysters are not "fattening" well, i.e. glycogen deposition is low. This is common with diploid oysters in warm water areas. While the oysters are still marketable, this indicates the need to develop a diploid oyster that performs better in the warm waters that characterize Hawaii. The alternative is to use triploid oysters for culture in Hawaii. The issue with triploids is that there is a general scarcity, and new or small producers have difficulty in obtaining small amounts of large, triploid spat on a regular basis. Additionally, the patent that covers production of tetraploids, which are the most efficient way to produce triploids, expires in early 2015. Hawaii needs to assure it can produce its own tetraploids and triploids once the patent expires or risk stifling Hawaii's industry development at this early stage. Researchers have also been selectively breeding *Dendostrea sandwichensis* for three years and larger sizes (over 2 1/ inches) have been obtained; these oysters may now be a feasible market product. He'eia pond has approximately 4000 *D. sandwichensis* under culture. Keawanui has approximately 2000. Aside from the possibility of marketing these oysters, the Hawaiian fishpond practitioners are also interested in working to restore the species in the wild, as it is now uncommon in areas where it was found before...

## Developing diets for Hawaii cultured abalone with normal shell color and high growth performance using local algae and their co-products - Year 2

Five diets were formulated including control diet and the diets supplemented with 3% dried pacific dulse, porphyra or spirulina pigment ingredients or 0.015% extracted shell pigment. The diets were processed by extruder method at Feedmill of Oceanic Institute (OI) and shipped to BIAC for the five-month feeding trial. Each of 20 buckets was stocked with around 1000 abalone (4.0 kg). Each of the five diets singly fed three repetitive buckets and Kelp seaweed (protein enhanced) from BIAC fed two repetitive buckets. Two commercial feeds currently used by BIAC, Abfeed and Abkelp boosted protein were used as reference diets in the feeding trial. The five-month growth data found that OI formulated and processed diets had better growth performance than Abfeed from South Africa ( $P > 0.05$ ) and Abkelp boosted protein diet from Mexico ( $P < 0.05$ )...



Comparing shell color appearances of abalone fed the different diets.

## Developing Strategies for the Prevention and Mitigation of *Francisella noatunensis* subsp. *orientalis* (syn. *F. asiatica*) Outbreaks in Cultured Tilapia in Hawaii

Researchers have successfully isolated and cultured Fno bacteria from an outbreak. To address the objective to determine whether Fno remains in the environment after infected fish are removed, an Fno challenge test is being planned where naïve *O. honorum*, *O. aurea* and *O. mossambicus* will be exposed to the Fno pathogen and the infection can be monitored both in the infected fish and also the water column. Currently, project work group members have established a means when Fno has been identified in a private backyard aquaponic system, the tilapia are removed from the system for a minimum of two weeks. The system is allowed to go fallow during that time and no disinfection is done. It has been found that the available nitrate remains elevated and may represent a cost effective means of eliminating the pathogen, particularly in an aquaponic system...

## AquaClip ~ Hawaii-based Cellana signs on to work with Israeli algae company

By Duane Shimogawa. Pacific Business News. June 23, 2014

Cellana, a Hawaii-based developer of algae-based feedstocks for biofuels, animal feed and omega-3 nutritional oils, has signed a letter of intent with Israel-based Galil Algae Cooperative Agriculture Society Ltd. to produce high-value algae products for aquaculture uses.

Cellana produces industrial-scale quantities of ReNew Algae - high-value algae biomass rich in omega-3 nutritional oils, proteins, fuel-grade oils, cosmetic-grade oils, acids, and polysaccharides, as

well as other valuable micronutrients - at its Kona Demonstration Facility on the Big Island. Galil Algae currently produces at its facility in northern Israel a variety of whole-algae products that are rich in omega-3s for aquaculture applications.

The main goal of the program is to identify, cultivate, develop and scale up algae strains with immediate commercial value, emphasizing the high-value components for existing aquaculture, mariculture, nutraceuticals, pharmaceutical and/or cosmetic applications.

[Click here to read the full article.](#)

The Center for Tropical and Subtropical Aquaculture (CTSA) is one of five regional aquaculture centers in the United States established and funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) under grants 2008-38500-19435, 2010-38500-20948, and 2012-38500-19566. The regional aquaculture centers integrate individual and institutional expertise and resources in support of commercial aquaculture development. CTSA was established in 1986 and is jointly administered by the Oceanic Institute and the University of Hawaii.

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