

Application Score Sheet

Proposed Project: Florida A&M University, Artificial Intelligence and Training in Advanced Aquaculture (#245)

Proposed Project/Program County: Regional

Board of County Commission Support: N/A

Total Projected Project Cost:

Match Provided: \$5,390,679

Triumph Funds Requested: \$5,204,840

Triumph Funds Recommended by Staff: \$5,204,840

Score: A

ROI: a benefit per Triumph dollar spent of \$25.7

Economic Impact Analysis and Score

The Florida Agricultural and Mechanical University (FAMU) proposal seeks funding to create a finfish aquaculture business program and associated infrastructure and related certificate programs for teachers and students. They propose to provide a total of 1,600 certifications over eight years at a cost to Triumph of \$5,204,840, or \$3,253 per certificate attained. The proposed Triumph contribution would represent 49.1 percent of the total project cost of \$10,595,519.

The FAMU application describes certifications in aquaculture training (100/yr), training teachers (10/yr), UAS safety (30/yr), UAS visual line of sight system operator (30/yr), and underwater drone training (30/yr) for a total of 1,600. They propose that FAMU would develop curriculum tracks in Certified Finfish Aquaculturist Program and Aquaculture Business Skills Certification Program.

At least some certificates are envisioned to be earned by students who have been through a one-week summer boot camp. Others will be recruited from the population of first time in college students, community college and other university AA transfer students. They will be contacted through a calling campaign, email campaign, and text messages. The School of the Environment (SOE) will lead the effort.

The letter from Dr. Ibeanusi mentions that FAMU plans to have this program placed on the next County Commission meeting agenda in Okaloosa County in order to gain their approval for Triumph funding. The program also plans to stimulate activity in “Bay, Wakulla, Franklin, and Okaloosa Counties and beyond.” FAMU has existing contacts in Gulf County as a land grant University.

The application package commits excellent sources of match that rely primarily on grant and contract funding already obtained by FAMU. Proposal updates have provided further details on

the content and timing of spending, both for Triumph dollars and for the dollars proposed as match.

The cost per cert is \$3,253, which would yield a benefit per TGC dollar spent of \$25.7. For these reasons staff score the project as an “A” and recommend that the Triumph Board ask staff to proceed with term sheet negotiations.

Project Summary (based on information provided by the applicant)

Florida Agricultural and Mechanical University (FAMU) is requesting a Triumph grant of \$5,204,840 to expand advanced aquaculture artificial intelligence (AI) and data science-based education and training into Okaloosa County and across the Triumph region. The project proposes to increase NWFL’s aquaculture research, education and training in K-21 programs.

The National Oceanic and Atmospheric Administration (NOAA) has stated that marine aquaculture is an important part of building economic and environmental resiliency in coastal communities. Seafood farming, if done responsibly—as it is in the United States—is increasingly recognized as one of the most environmentally sustainable ways to produce food and protein. Aquaculture, an ever-growing portion of the seafood industry, can enable available, accessible, and affordable seafood while also supporting job creation.

70 to 85 percent of seafood is imported into the United States, with nearly 50 percent of imported seafood made available through aquaculture. As of 2019, the US seafood trade deficit approached \$17 billion. The proposed project is intended accelerate innovation to amplify existing markets and create new ones. Consumers are becoming more health conscious and demanding high quality products. FAMU’s aquaculture curriculum and accompanied proposed technologies provide new certifications and skills related to fish production, genetic improvements, and control of parasitic diseases.

It is estimated that food production needs to double by 2050 in order to feed the world’s projected world. The world’s oceans represent significant potential sources of protein by generating 30x more yield per acre of water versus an acre of land. The Global Aquaculture Market was valued at approximately \$31.94 billion in 2019 and is anticipated to increase with a healthy growth rate of more than 7.1% over the forecast period 2020- 2027.

Based on available spatial analysis data and current industry interest in developing sustainable aquaculture operations in the region, NOAA Fisheries has designated federal waters off of the Gulf of Mexico (GoM) as one of the first two Aquaculture Opportunity Areas (AOAs). The Promoting American Seafood Competitiveness and Economic Growth 2020 Executive Order defines AOAs as *geographic areas that have been evaluated for their potential for sustainable commercial aquaculture*. Ten AOAs are expected to be named nationwide by 2025. The selected AOAs are expected to support multiple aquaculture farm sites of varying types including finfish, shellfish, seaweed, or some combination. To identify each area, NOAA will use scientific analysis and public engagement to highlight spaces that are environmentally, socially, and economically appropriate for commercial aquaculture. **FAMU is the host**

institution for NOAA's Centre for Coastal Marine Ecosystem and will play a vital role in this process.

For over fifteen years FAMU has been awarded funding from NOAA that has established the Environmental Cooperative Science Center (ECSC), supporting research in Ecosystem Processes, Forecasting and Modeling, Human Dimensions, and Ecosystem Characterizations. Established in 2001 as part of the NOAA Educational Partnership Program, ECSC was charged to address ecological and coastal management issues at specific National Estuarine Research Reserves (NERR) and the Florida Keys National Marine Sanctuary. The Apalachicola NERR is located in Franklin County.

For this proposed project, FAMU will develop educational and training programs for students that will establish pathways to careers in the rapidly growing aquaculture industry, develop a business framework for the finfish aquaculture industry that will assist small businesses in creating jobs and economic growth throughout Northwest Florida, and commercialization of newly isolated strains of microalgae (patent pending) to significantly enhance the overall health and productivity of finfish aquaculture that is economically and environmentally cost-effective relative to the existing algal feedstock.

The program will also train students to utilize state-of-the-art underwater drone school (multiple drones operating in tandem) technology (patent pending), that uses SASER (Sound Amplification by Stimulated Emission of Radiation) energy to protect against invasive species and harmful micro-algae, while providing real-time environmental monitoring and control.

Many predators and pests are native to the region and others were inadvertently introduced into the environment. FAMU's patent-pending underwater drone schools and aerial drone swarms identify and deter these predators using environmentally harmless Microwave Amplified Through Stimulated Emissions of Radiation (MASER) and SASER signals, providing a safe-haven for aquaculture in the designated AOAs.

Laboratory studies have also identified that SASER pulses are an effective means of communication as well as a reliable 3D mapping tool. This combined with water quality sensors and LiDAR could make these schools of drones ideal underwater dwellers. Moreover, if equipped with foldable solar panels they can charge themselves and return to work autonomously. The curriculum for training is still under development as the development of these patent-pending technologies are still in progress.

Curriculum development for the proposed project is underway and is expected to result in two curriculum tracks, a Certified Finfish Aquaculturist Program and an Aquaculture Business Skills Certification Program in addition to drone certifications focused on predators and pests in Florida waters. To serve today's evolving Aquaculture workforce needs, industry certifications developed in alignment with the industry are needed. The curriculum developed in this project will be submitted to the FLDOE for approval and listing on the CAPE list.

Through funding from The DuPont Foundation, FAMU established a Pathway- to-College initiative with Wewahitchka High School in Gulf County and proposes to expand the program to

scholars interested in aquaculture as a business and for job creation. FAMU also proposes to conduct hands-on summer activities at demonstration sites in Triumph counties where students will learn finfish classification and production techniques describing the health and safety issues associated with the production.

The FAMU Center for Environmental Equity and Justice (CEEJ), along with the FAMU Cooperative Extension Program (Community Resource Development), will serve as a resource base for the Educational and Training programs. The CEEJ was established in 1994 through a Florida Legislative Act (Florida Law CH 94-219) to assist communities with disproportionate impacts from environmental hazards. Additionally, FAMU's Cooperative Extension Program has had a presence in the North Florida region for many years in areas including agriculture & natural resources.

The focus on finfish aquaculture will require training of students who understand the challenges in optimizing sustainable food production, new methods for pest control, technologies to mitigate nitrogen and phosphate, ensuring sustainable water supply for agriculture; "closing the loop" for nutrient life cycles; innovations to prevent waste of food and energy; and maximizing biomass conversion to fuels, chemicals, food, and materials. These research areas have been identified by the National Science Foundation (NSF) as topics with knowledge gaps, requiring student training (NSF-FEW Report, 2014).

The U.S. Department of Defense has designated fish imports as a serious national security issue as finfish imports are often used for trafficking weapons and narcotics. Large-scale seafood imports also provide a basis for the use of biological weapons against the United States, emphasizing domestic production and achieve self-sufficiency in finfish production.

In summary the project proposes to:

- Develop educational and training programs for students that will establish pathways to careers in the rapidly growing aquaculture industry, especially in the disproportionately affected.
- Develop a business framework for the finfish aquaculture industry that will assist small businesses in creating jobs, investments and economic growth for communities throughout Northwest Florida.
- Lead job creation, investments, and economic growth for communities throughout Northwest Florida through the creation of a vertical business model for finfish aquaculture that builds on the growing aquaculture industry in multiple Triumph counties.
- Scale-up and commercialize newly isolated strains of microalgae (patent pending) to significantly enhance the overall health and productivity of finfish aquaculture that is economically and environmentally cost-effective relative to the existing algal feedstock;
- Ensure the use and promotion of aquaculture best practices, and
- Implement a state-of-the-art underwater drone school technology (patent pending), that uses SASER (Sound Amplification by Stimulated Emission of Radiation) energy to ensure the protection against invasive species and harmful micro-algae, while providing real-time environmental monitoring and control.