Application of real-time environmental monitoring to improve the resilience, production, and sustainability of the local aquaculture industry

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Abstract
To aid in the growth and sustainability of Rhode Island's aquaculture industry, the interdisciplinary SEA-BREED-IN initiative aims to apply environmental monitoring of local waterquality to allow researchers and aquaculture practitioners to maximize shellfish health andenvironmental resilience, and improve synergies with local industry and researchers at URI. Bydeploying ocean sensors and developing real-time data transmission to users, researchers atthe URI Graduate School of Oceanography will empower collaborators and stakeholders torespond rapidly to water quality threats to improve stock health and production withinaquaculture farms. A participating RII-NEST summer intern will have the opportunity to work onthis project alongside a dynamic team of faculty and staff mentors to develop skills in appliedmarine technology, data collection and analysis, and fieldwork, all while contributing to the localblue economy.

Project Objectives
The Marine Ecology and Technology (marecotec) research group at the University of Rhode Island's Graduate School of Oceanography (URI GSO) is seeking a motivated student interested in hands-on fieldwork, marine technology, and data analysis to support the SEA-BREED-IN initiative (Enhancing SEAfood security through precision BREEDing, (epi)genome design, *IN situ* smart monitoring, and high-performance computing/artificial intelligence). This initiative aims to enhance the safety, sustainability, and resilience of Rhode Island's local aquaculture industries through an interdisciplinary approach of environmental monitoring, prescriptive intervention, and selective breeding/genome design of commercially important organisms.

Seafood consumption in the United States has been on the rise, in part a reflection of an increased awareness of the health and environmental benefits of fish, shellfish, and algae. Moreover, due to population growth, seafood demand is expected to increase by at least 60% by 2050. Great potential for a sustained increase in US seafood production exists throughwell-managed fisheries and a sustainable aquaculture industry that preserves natural ecosystems, supporting enhanced food production and other ecosystem services without increasing the environmental footprint. In Rhode Island, aquaculture generates more than $570 million in sales and supports more than 3,100 jobs within the state. Sustainable seafood production to meet demand is threatened by challenges imposed by disease, climate change, and environmental pollution. A better understanding of the potential for acclimation andadaptation to climate change in aquaculture species will aid in the development of innovative practices and technologies to enable sustainable growth in food production.

Foundational to this work is the real-time surveillance of local waterways that support aquaculture systems in order to (1) assess changes in water quality and overall habitat health, (2) explore connections between environmental conditions and stock performance/resilience, and (3) allow for rapid responses to water quality impacts such as disease, pollution, or climate impacts. To meet these