Enhancing Bivalve Aquaculture Through Species Improvement and Diversification

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Bivalve aquaculture is one of the most important aquaculture industries in the U.S. and around the world. Bivalve aquaculture is environmentally friendly and important to the socioeconomic well-being of coastal areas that are depressed by the decline of wild fisheries. Further growth of bivalve aquaculture is hindered by diseases, unpredictable mortality and a lack of crop diversity. These obstacles can be overcome through the development of superior stocks and alternative crops.

Bivalve aquaculture along the Atlantic coast of the U.S. is dominated by two species, the eastern oyster and the hard clam. Both species are threatened by diseases. Disease-resistant stocks have been developed for eastern oyster aquaculture, but most of the selected stocks so far are developed for low-salinity estuaries. Superior stocks that survive and grow well in high-salinity water are needed for developing oyster aquaculture in coastal bays.

Crop diversity is especially important for the growth and resilience of bivalve aquaculture under the threat of diseases and changing climates. Vast areas in coastal waters of New Jersey and the northeastern U.S. are well suited for the culture of diverse bivalve species. Two native bivalves, the bay scallop (*Argopecten irradians*) and Atlantic surfclam (*Spisula solidissima*), are promising alternative aquaculture species for high-salinity environments, but they face challenges by winter and summer mortalities, respectively. Their vulnerability to mortalities can be genetically improved by selecting for high survival. Selection for fast growth may also allow early harvest and reduce exposure to mortalities.

This project aims to enhance bivalve aquaculture through the development of oyster stocks and alternative species for high-salinity environments. Specifically, the project intends to: 1) develop superior eastern oyster stocks that survive and grow well in high-salinity environments; 2) improve growth of bay scallops to enable within-year harvest; 3) develop surfclams with fast growth and heat tolerance to enhance survival and enable early harvest; and 4) transfer project results to New Jersey and regional shellfish farmers.

This project will utilize the high-salinity capability of the New Jersey Aquaculture Innovation Center and work closely with bivalve farmers. It extends Rutgers' long history in oyster breeding, which through the development of disease-resistant and triploid oysters, has contributed significantly to bivalve farming in the U.S. and the world.