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VIRGINIA INSTITUTE OF MARINE SCIENCE

Operating Budget Amendments Submitted to the 2020 General Assembly

Manage Aquatic Diseases

\$225,000 (ongoing) 2.2 FTE

Recent outbreaks of disease have damaged economically important and ecologically sensitive marine resources in the Commonwealth and nation. Examples include mycobacterial infections in striped bass, Dermo and MSX diseases in oysters, Hematodinium in blue crabs, morbillivirus in dolphins, wasting disease in seastars, bacterial infections in scallops, and parasitic infections in eels, among many others. The pathogens responsible for these outbreaks are not well known, their risks to marine life and potential to spread remain poorly understood, and their ecological impacts have been difficult to assess with existing resources.

To meet the challenge of diseases in marine systems, this initiative will provide science-based guidance on the management of existing and emerging disease threats to critical fishery and aquaculture resources in the Commonwealth and Chesapeake Bay region. VIMS scientists have considerable expertise working with diseases of marine animals; however, we aim to leverage this expertise by:

- establishing and effectively communicating state and regional response protocols;
- identifying and liaising with key groups such as state and federal resource managers and public health officials, as well as the fishing and aquaculture industries, to serve as a clearinghouse for information to policy makers; and
- developing numerical models that forecast disease outbreaks and incorporate the resulting mortality into fisheries management models to support improved fisheries management.

The health of marine resources such as fish and shellfish is fundamental to the growth of industries and the revitalization of coastal communities dependent upon them. Emerging diseases can decimate a fishery, sending economic and environmental waves through one of the Commonwealth's most important resources. VIMS scientists have an enviable record of supporting disease research through competitive grant awards but these federal grants do not fund the vital step of providing expert guidance on the management and mitigation of existing and emerging disease threats to vital fishery and aquaculture resources, nor do they provide resources for investigating an emerging disease before it becomes a problem for a fishery. This initiative will significantly enhance our responses to known pathogens and provide a clear framework, based on state-of-the-art science conducted at VIMS, for addressing the dangers of emerging diseases.

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Support Virginia Department of Health (VDH) and Virginia Marine Resources Commission (VMRC) Needs in Shellfish Aquaculture Management

Shellfish aquaculture is one of the fastest growing economic drivers in coastal Virginia, especially in rural areas. With this growth has come the need for new monitoring and assessment programs to support the work that VDH does in protecting human health and that VMRC does in managing the use of the state's aquatic resources. VIMS has the technical skills to conduct these new programs, but lacks the state-supported personnel to conduct the monitoring and some of the required field sensors. Federal grant funding, which we employ with great success in supporting our research programs, is typically not available to support monitoring programs. State support, in three separate monitoring programs, will allow us to meet the needs that have been expressed to us directly and frequently by VDH and VMRC.

- Improve Risk Management of Vibriosis. A key threat to the growth and sustainability of shellfish aquaculture is the association of human-pathogenic Vibrio bacteria with product marketed for raw consumption, in particular oysters. Infections by the two Vibrio species of concern, Vibrio vulnificus and Vibrio parahaemolyticus (or vibriosis) are responsible for an estimated 80,000 illnesses and 100 deaths in the U.S. annually, with most of these infections associated with consumption of raw or undercooked shellfish. These bacteria can also have significant repercussions for the shellfish industry through product recall, closure of harvest beds and reduced opportunity for sales associated with negative publicity. Because these bacteria occur naturally in shellfish and their surrounding environment, preventing illnesses relies on a robust monitoring program. Within this context, increased monitoring of our local waters and shellfish will enhance our understanding of the factors driving the distribution and abundance of these bacteria in the environment and in shellfish. We will collaborate with VDH to foster science-based risk management strategies.
- Determine Carrying Capacity for Shell Production. Sustaining Virginia's shellfish aquaculture industry and enabling future expansion are dependent on an adequate food supply for the shellfish; this supply comes from primary production by a microorganism called phytoplankton which sets the amount of shellfish that can be grown in an area (carrying capacity). Increasingly, VMRC is seeking VIMS' guidance on the carrying capacity of shellfish-growing areas throughout Virginia's coastal waters. To satisfy this request, we need accurate, up-to-date measurements of local rates of phytoplankton production, a quantity that changes as nutrient inputs and temperature vary. This initiative will allow us to conduct monthly surveys in shellfish growing waters throughout Tidewater Virginia to build and maintain a spatially-explicit database that can be used to develop carrying capacity estimates for oyster and clam production in these waters. In conjunction with this we will develop user-friendly decision support modeling tools that can be directly used by VMRC and the shellfish aquaculture industry to assess carrying capacity and make informed decisions about the production capacity of a given water body.

PRE-READ

\$390,000 GF (one-time) 2.4 FTE

\$315,000 GF (ongoing) 2.4 FTE

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• Assess Coastal Acidification and its Impact on Shellfish Aquaculture. Coastal acidification, caused by increased atmospheric carbon dioxide, presents a serious and credible threat to the marine resources of the Commonwealth, including shellfish aquaculture industry, fisheries stocks, and health of Chesapeake Bay and the Eastern Shore ecosystems. Coastal acidification, basically a change in water chemistry, affects the ability of marine life to build shells and skeletons, stay healthy, and to be more resilient to diseases. By monitoring acidification to determine its severity, an early warning system can be developed for industry, program managers, and the public. Ultimately, this will allow us to predict its impacts on living resources and help the shellfish aquaculture industry mitigate its impacts on hatchery production. In recent years, VIMS has developed observational capacity, advanced modeling tools, and sophisticated experimental facilities that are capable of providing the underpinning support for an early warning system.

Without this funding VIMS will not be able to provide:

- 1. VDH with the needed level of monitoring for Vibrio bacteria and other potential human pathogens in Virginia's rapidly expanding shellfish aquaculture industry;
- 2. VMRC with the decision-support tool that it needs to make informed decisions about the capacity of a given water body to support increases in shellfish aquaculture; and
- 3. an early warning system for acidification-related impacts to fisheries and aquaculture in Virginia waters in response to VMRC and industry needs.