



Black Gill in Georgia Shrimp: Causes and Consequences

Principal Investigators: Marc Frischer, University of Georgia Skidaway Institute of Oceanography; Kyle Johnsen, University of Georgia Research Foundation, Inc.

ABSTRACT

The long-term goals of this proposed project are to identify the causes, drivers and consequences of shrimp Black Gill (sBG) to the Georgia shrimp fishery and to facilitate the dissemination and use of this information to the benefit of a sustainable and healthy shrimp fishery in Georgia. Building from our recent research advances and based on recommendations from Georgia's management, extension and commercial fishing communities and following the recommendations from the 2015 Crustacean Health Research workshop (Brunson et al 2015), we will address specific objectives.

Our research objectives are to definitively identify the ciliate responsible for sBG and increase spatial and temporal resolution of sBG prevalence monitoring and to relate these patterns to fishery performance. Develop a statistical model to quantitatively relate visual-, histological- and molecular-based sBG detection that can be used to calibrate ongoing state monitoring. Also to identify non-shrimp reservoirs of the sBG ciliate and quantify context dependent mortality and its mechanisms including direct mortality, physiological and behavior effects and secondary mortality.

Outreach objectives include sustaining and expanding the engagement of the research, management and stakeholder communities. Also, we hope to involve and engage shrimpers in data collection. Addressing these questions, particularly determining whether sBG is killing shrimp and improving predictive capabilities, is of primary concern for the industry and managers charged with protecting the resource for a sustainable fishery. Although realistically management tools of marine epidemics are limited, the results of these studies will provide local and regional managers with the information necessary for science-based decision making and information dissemination concerning sBG in Georgia and the South Atlantic Bight.

Preliminary studies have indicated that sBG impedes physiological endurance and can affect behavior, but seems to only minimally increase direct mortality rates. These findings suggest that mortality from secondary effects (e.g. predation, failed reproduction, poor feeding, opportunistic infection etc.) is likely. To address this hypothesis we will conduct controlled and well-replicated laboratory studies to determine the rates of direct mortality attributable to sBG, the effects on physiology and behavior and the impact of sBG on susceptibility to predation. Collectively these

experiments will provide an integrated understanding of sBG effects on shrimp populations. Ultimately, this data will be used to develop models that, together with accurate prediction of prevalence and environmental conditions, will be used to predict mortality rates and population stress of the wild shrimp population due to sBG.

Shrimp, Georgia's largest fishery has been declining since the early 2000's. A suspected contributing factor is a condition commonly referred to as shrimp Black Gill (sBG). However, critical information about sBG is lacking. In consultation with management, fishing, extension and research communities three research priorities related to sBG have been identified and will be addressed in this proposal. These priorities include identifying the sBG causative agent, determining whether sBG is responsible for shrimp mortality and increasing the resolution of sBG monitoring to improve forecasting capability for sBG severity.

In addition to these research priorities, there is also a critical need to provide the framework for dialog and information exchange between all stakeholders concerning sBG and the state of Georgia's wild shrimp fishery. Over the past several years the University of Georgia Marine Extension Service has received more requests for research on sBG than for any other commercial fisheries topic (L. Liguori, personal communication). For this reason, outreach and extension are extremely important throughout the project. By strengthening existing avenues of communication and working with shrimpers to collect data and discuss results, local knowledge and the large network of "eyes on the water" will be combined with scientific expertise, to understand the causes and consequences of sBG and to develop best management practices.