Linking Changes in *Vibrio parahaemolyticus* Populations to Phytoplankton Abundance and Composition in the Puget Sound Area and Coastal South Carolina

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In the past decade the Pacific Northwest region has experienced increases in shellfish-associated human illnesses due to the bacterium *Vibrio parahaemolyticus* (Vp) as well as sustained high concentrations of shellfish toxins produced by several genera of algae that can form harmful algal blooms (HABs). Both Vibrio-associated and algal toxin-related illnesses pose a public health hazard, and severely impact the economic vitality of the shellfish industry. Shellfish closures due to Vp first occurred in 1997-1998 and again in 2006-2007. Closures due to toxin produced by the dinoflagellate, *Alexandrium*, have occurred in Puget Sound since the 1950s whereas closures due to the toxic species of the diatom *Pseudo-nitzschia* first occurred in 2003 and 2005. Although the health risks associated with increased concentrations of Vp and toxins from HABs have historically been assessed separately, the association of pathogenic Vibrios with copepods has been well documented. In addition, smaller sized phytoplankton has been suggested to be important reservoirs of these bacteria.

In this study water samples were collected from five geographically distinct shellfish growing areas in Washington State between April 2008 and August 2009. Over the same time period, samples were also collected at four sites located on a coastal barrier island ~40 km SE of Charlston, SC. Concentrations of total (*tl*+) and "pathogenic" (*tdh*+) Vp, as well as total *V. vulnificus* (*vvh*+) were determined for each sample. Comparison of data from sites in these two areas of the country revealed considerable differences in Vibrio populations with respect to species abundance and genotype. Water temperature and salinity data were also collected at the time of sampling and water was later analyzed for chlorophyll a, macronutrients, shellfish toxins, and phytoplankton species. Statistical analyses will be performed on all data to establish any relationship between Vp, phytoplankton species/abundance and all other variables. The goal of the study is to gain a better understanding of the environmental conditions that promote the onset and blooms of HAB species and increased concentrations of pathogenic vibrios. An understanding of the bacterial and HAB bloom dynamics could ultimately be used to improve risk assessment models and/or forecast outbreaks of both vibriosis and HABs.