

SGER: Microbial and HAB Reconnaissance Measurements in Lake Pontchartrain and Vicinity in Response to the Hurricane Katrina Disaster

Shortly after Hurricane Katrina made landfall in the Gulf Coast Region, widespread flooding in the New Orleans area resulted in sewage overflows and contamination of floodwaters. These floodwaters are currently being pumped into Lake Pontchartrain without treatment, resulting in the spread of contaminants into the Lake which ultimately discharges towards the Gulf of Mexico.

The primary **objective** of this proposed Study is to document the extent to which the waters in Lake Pontchartrain and vicinity have been contaminated with pathogenic microbes and harmful algal bloom (HAB) organisms. Analyses will include DNA and RNA extraction followed by on-site analysis of bacteria and viruses using readily available kits containing lyophilized reagents which are ideal for field conditions. The results from these kits will be compared with more traditional assays providing documentation of available technologies for rapid response to water-related disasters. Finally, the proposed Study will document the levels and spread of microbial pollution along with HAB organisms, information which will be useful for subsequent modeling efforts.

Specifically, this Proposal will focus on the collection of samples, extraction of microbial RNA and DNA from water samples, and analysis of samples for viral pathogens (enterovirus and Norovirus) and protozoan pathogens (*Cryptosporidium* and *Giardia*). In addition, samples will be collected for analysis of HAB organisms and their toxins as part of the NSF NIEHS funded Oceans and Human Health "Toxic HABs" Research Project at the University of Miami. The planned sampling program, as identified in complimentary proposals from LSU and UH, will be augmented with remote sensing technology available through the University of Miami CSTARS Center and Louisiana State University (LSU). This Project represents a collaborative effort between LSU, the University of Hawaii (UH) NSF-NIEHS Oceans and Human Health (OHH) Center, and the University of Miami (UM) NSF-NIEHS OHH Center. The UM team is also very willing to work with other groups (such as Woods Hole/MIT) which have indicated interests in splitting samples. Although this Proposal is a stand alone proposal, funding of the LSU and UH Proposals would greatly facilitate local access to sampling locations and laboratory facilities as well as enrich the microbe and the HAB database resulting from this sampling.

The **intellectual merit** of the proposed activity is that it will provide data concerning the distribution of viruses, protozoans and HAB organisms in the aftermath of a natural disaster. Along with funding from LSU and UH, these distributions can be compared with the distribution of indicator microbes to evaluate whether or not the "indicators" are true indicators of microbes of known public health concern. This is of significance as correlations have not been observed in warm humid climates not impacted by sewage. In this case, the site has been highly impacted by sewage, and it would be important to document if, in fact, strong correlations exist between the indicators and the pathogenic microbes. The samples collected through this study will be used to document the HAB organisms which emerge as a result of widespread pollution.

The primary **broader impact** of this Proposal is due to the fact that it provides much needed information in the aftermath of a natural disaster. The microbes released by the sewage can potentially impact a large area including Lake Pontchartrain, and subsequently the Gulf of Mexico. There are significant human populations and fisheries in both these areas that can experience acute and chronic disease from these microbial and HAB organism exposures now and in the future. From a basic public health perspective, it is important to document the extent to which the microbial contaminants have migrated. Currently the degree of such migration is unknown. Furthermore, there is little known about the contribution of microbial pollution to the subsequent growth of HAB organisms in these circumstances. The results from the samples collected will also be invaluable for establishing policy for those who remain within the disaster zone during recovery efforts, and will be helpful to establish when the general population can return back to the city. The sample archive established for this Study will be especially powerful as samples can be analyzed after the fact for microbes and HAB organisms and their toxins (including additional analyses not yet imagined). This Project will promote information exchange and training among the researchers who plan to participate in the Louisiana field exercises (between LSU, UH-OHH, and UM-OHH). Results from this study will be disseminated to local groups within Louisiana, including the Louisiana DEQ and DOT. Communication with other groups, such as the Centers for Disease Control (CDC), will be facilitated through Dr Lorrie Backer PhD, a CDC employed epidemiologist, and co-PI within UM-OHH. All efforts will be made to disseminate results in a rapid and efficient fashion as well as through the traditional academic means via publications and conference presentations.