



## NOTABLE ACCOMPLISHMENTS at the Center for Human Health Risk at HOLLINGS MARINE LABORATORY & NOAA Center of Excellence for Oceans and Human Health

The Center for Human Health Risk at Hollings Marine Laboratory (HML), one of five NOAA National Centers for Coastal Ocean Science (NCCOS), and The Oceans and Human Health Initiative (OHHI) Center of Excellence at HML embraces an interdisciplinary approach to coastal research through the integration of expertise brought to the research from five dedicated partner institutions. The HML partner institutions include NOAA, the National Institute of Standards and Technology, the College of Charleston, the South Carolina Department of Natural Resources, and the Medical University of South Carolina.

Research at HML brings basic, applied, and medical researchers together to identify and understand factors that affect the health of coastal ecosystems and the humans who live in or visit the coastal zone. The science focus of the HML is to develop technology to identify and evaluate linkages between coastal development, the condition of the marine ecosystems, and public health and well-being. To accomplish this goal the HML is developing new methods and approaches that enhance the Nation's capacity to identify and characterize chemical and microbial threats to coastal ecosystems and human health and to evaluate the responses of marine organisms and ecosystems to coastal development.

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The major societal questions the Center is addressing include:

Are coastal waters safe for swimming and is the seafood they contain safe to eat?

To answer these questions, the HML conducts research projects in the two main research themes:

### **Marine Ecosystem Health and Marine Natural Products.**

The OHHI thematic areas that support the HML and NOAA coastal research missions include:

*applied marine genomics; chemical contaminants; source tracing of marine pathogens;  
and ecosystem monitoring and assessment.*

HML also maintains *education and outreach* and *data and information management* functions that support all research areas.

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Research within the **Marine Ecosystem Health** theme has successfully developed and applied multiple indicators that link environmental and biological conditions to human health including the use of animals as valuable biomedical models in coastal environments.

*A few examples of these successes include the development of:*

- A conceptual model linking coastal development to the ecological condition, human uses and health risks associated with a sentinel habitat (e.g. tidal creek ecosystems). This model is currently being used by local development planners as a scientific basis for developing planning and stormwater control ordinances in several southeastern states.
- Reliable and sensitive analytical methods for high priority emerging chemical contaminants of concern including flame retardants, antifouling biocides, and pharmaceuticals in marine waters and sediments. These methodologies did not exist prior to the establishment of the OHHI at HML.
- Nuclear Magnetic Resonance technology to identify biomarkers of marine animal health and provide new insights into marine organism responses to multiple stressors.
- A web-accessible database with chemical, environmental, and toxicological information on more than 200 chemical compounds to support preliminary risk assessments for these compounds in the estuarine environment. This database did not exist prior to the establishment of the OHHI at HML.

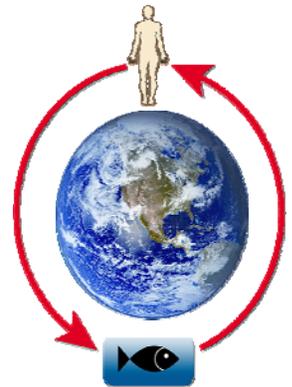


- Improved techniques for identifying the sources and pathways of fecal contamination and microbial pathogens within the coastal zone that assist in developing appropriate remediation actions, including beach closure and shellfish management actions.
- Novel techniques for rapidly detecting marine pathogens in water and shellfish including naturally occurring pathogens [*Vibrio*, *Mycobacteria* and harmful algae bloom (HAB) species], indicator bacteria (e.g. *E. coli*, *Enterococci*), and viruses (e.g. *Noroviruses*, *Enteroviruses*).
- Genetic microarrays for oysters, shrimp and dolphins that are used to discover animal response to multiple environmental stressors at relevant physiological levels.
- Standardized protocols for assessing physiological and immunological condition and assessing health of oysters and other marine animals.

Research in the **Marine Natural Products** theme has successfully developed and applied capabilities in aquaculture and assessments of human health risks and benefits associated with seafood consumption to enhance and protect human health and well-being.

*A few examples of these successes include the development of:*

- A risk-benefit model and approach for comparing the beneficial effects of healthful fatty acids in seafood against the harmful effects of the contaminants that seafood may contain.
- Tools to evaluate diets and culture approaches for marine fish and shrimp that enhance the beneficial fatty acid content and reduce the consumable tissue contaminant loads. These methods also have the potential to reduce the environmental impacts associated with culture operations.
- A tool to distinguish wild and cultured shrimp by evaluating their fatty acid composition. This capacity did not exist prior to the establishment of the OHHI at HML.



**Data and Information Management:** The HML maintains a data and information management program to share, synthesize, integrate and archive the information it produces across application, enterprise, and scientific boundaries (e.g., estuarine ecology or marine genomics). The intent is to ensure that all facts and relationships known about a subject are related within a data and information management system and facilitates the development of novel integrated models. For example, investigators and database managers are currently integrating demographic and socio-economic data into an environmental stress and response database for tidal creeks.

**Education and Outreach:** The Center also supports education and outreach activities that transfer the knowledge and technologies produced to potential users, including natural resource and public health managers, scientists, regulatory agencies, local decision makers, university students, teachers and the public. Multiple methodologies are used to transfer information including teaching trainings, undergraduate and graduate student research mentoring, public lecture series, and brochures. Multiple partners ensure that these efforts are effectively reaching broad audiences successfully.



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