

# National Ocean Service

## Center for Coastal Environmental Health and Biomolecular Research

- 1) The most recent review of this laboratory was conducted in 2000 and 2001 by an internal team within the National Ocean Service. The volume fills a two-inch thick binder and is not readily available in pdf format. Print copies can be made available.
- 2) Please provide a brief history, and mission of your laboratory /center.

Following its relocation from Maryland in 1978, the Charleston, SC Laboratory, then a NMFS research facility, embarked on a series of programs focusing on the needs of fisheries managers. The common theme was the use of the latest advances in science technology to resolve complex fisheries issues. Major efforts included development of nutritional and microconstituents information on numerous fish species, chemical contaminant studies leading to the development of improved analytical methods and toxicological investigations, seafood safety issues associated with human pathogens found in shellfish, marine biotoxins associated with fish species, and fish oil test materials for use in human disease studies. These programs led to significant improvements in methods of detection, assay systems, and the growth of broad expertise applied to marine resources. Major NOAA and NMFS programs such as the National Status and Trends Program, the Model Seafood Surveillance Program, the National Indicator Study, the Biomedical Test Materials Program, the Microconstituents Program, and the Seafood Safety Marine Biotoxins Program enabled the Laboratory to grow and change direction with the needs of the agency. In 1997 the Charleston Laboratory was legislatively moved to the NOS, and in February, 1999 it formally became part of NCCOS under NOS as the Center for Coastal Environmental Health and Biomolecular Research (CCEHBR). At the same time the Oxford Cooperative Laboratory was transferred from NMFS to NOS and was incorporated as a branch of CCEHBR. The Oxford Laboratory brought with it its longstanding expertise in the areas of fish and shellfish diseases. With these administrative changes came a redirection of the research programs to meet the goals and objectives of NOS. Specifically, CCEHBR's mission is now to conduct research that identifies stressors, describes their impacts on environmental health, and develops science-based strategies to sustain coastal ecosystems.

- 3) Please provide a listing of *major* customers of the laboratory /center, with a one sentence description of what is being done for them.
  - Land Use Management & Planning Authorities – Research on effects of point and non-point sources of pollution on the coastal environment and ecology to support land use planning and permitting activities.

- NMFS and State Law Enforcement/US Fish & Wildlife – Forensic evidence to support legal actions taken under the Marine Mammal Protection Act (MMPA) and other protected species legislation.
- State Shellfish Agencies – Information on human pathogens (viruses, bacteria) in shellfish including sources, modes of transmission, control points, and corrective measures to support both public health and pollution mitigation actions by state agencies.
- NMS & NERRS Managers – Scientific data and field support to provide basis for effective management of Marine Sanctuaries, NERRS, and other protected areas.
- State, national, international agencies – Research and transfer of technical information on harmful algal blooms, their occurrence, distribution and dynamics, toxin production and detection methods to improve national and international efforts to control environmental and human health impacts from marine biotoxins.
- Coral Disease and Health Consortium (CDHC) – The CDHC was established by the US Coral Reef Task Force to organize and coordinate scientific resources nationally and internationally to address coral health issues, with emphasis on the diagnosis, etiology and epizootiology of coral diseases and bleaching.

4) Please provide a short summary of research being conducted

- Coastal Ecology Program conducts research with special emphasis on benthic studies and sediment quality guidelines to support nationwide efforts aimed at assessing and predicting changes in the quality of coastal ecosystems subject to both human and natural influences. Emphasis of research includes estuarine research reserves and coastal sanctuaries, which are marine protected areas, as well as regional/national coastal condition assessments. Research is regional, national and international at intermediate and long term timeframes.
- Living Marine Resources apply expertise in biochemistry, genetics, molecular and cellular biology, risk assessment and wildlife epidemiology to evaluate marine organism responses to environmental stressors. Research including both the development and application of new molecular technology to focus on highly managed and protected marine species such as marine mammals and sea turtles. Research is regional and national at intermediate and long term timeframes.
- Marine Ecotoxicology conducts research on contaminant chemistry, toxicology, and environmental microbiology which is then integrated into environmental modeling efforts to predict impacts and effects of land use on coastal ecosystems. This provides coastal resource managers with the necessary tools to predict effects from urbanization, agricultural NPS runoff, port development, as well as other coastal development activities and allows development of mitigation strategies to reduce impacts from land based pollution sources. Research is local, regional, national and international at short, intermediate and long term timeframes.
- Marine Forensics efforts focus on the examination of case evidence to provide science based conclusions on a variety of managed and protected species issues. Research focus is in developing tools and improving methods to support Federal

- and State Law Enforcement of fishery/environmental regulations. Research is national and international at short and intermediate timeframes.
- Risk Analysis and Information Management studies synthesize, analyze and disseminate information on processes, including anthropogenic factors, that influence coastal resource and environmental conditions and societal impacts. Research is regional and national at intermediate timeframes.
  - Coastal Research Branch conducts research on factors promoting harmful algal blooms and the extent of harmful effects. Research investigations includes methods to identify and quantify toxins and active metabolic products, define their mechanism of action, trace their bioaccumulation/transfer through the food web, methods to detect biotoxins remotely as part of coastal ocean observing systems, and potential environmental mitigation methodologies. Research is regional, national and international at short, intermediate and long term timeframes.

5.) Major accomplishments in the last five years.

- The Analytical Response Team of the Marine Biotoxins Program has provided analyses to federal, state, local, and international partners for 40 investigations related to algal blooms and their toxins. Major cases have included first time confirmation of toxins in sea lions, otters, dolphins, and a grey whale in California; dolphins and manatees in Florida; and most recently humpback whales in Massachusetts.
- The Bottlenose Dolphin Health and Risk Assessment Project to evaluate health of dolphins in the Indian River Lagoon, FL and Charleston, SC uses a comprehensive suite of diagnostic tools and integrate impacts from environmental stressors to help in identifying factors that may influence health. This research not only provides foundation and information about the health of these protected species but also employs dolphins, at the apex of the trophic structure, as integrators of environmental and anthropogenic stressors.
- The Shellfish Information Management System (SIMS) serves as a website resource of shared information on U.S. coastal waters managed for shellfish harvest. SIMS was successfully deployed on schedule allowing users, primarily state agencies, the ability to input state generated geo-spatial data and supporting information. The SIMS project team is resolving numerous, highly complex technical issues to complete this project, including linkages with EPA STORET databases, USGS river gauges, and NWS rainfall stations. The broader utility of SIMS in its completion is the ability to access and query the multi-state assemblage of data for in-depth analysis at the state, regional and national levels.
- The Risk Assessment and Modeling Program conducts research as part of the Urbanization and Southeast Estuarine Systems (USES) study with a focus on best management practices (BMPs) such as retention ponds. Highly predictive models of fecal coliform, total and dissolved nitrogen, and total and dissolved phosphorus concentrations in ponds that discharge directly into harvestable oyster growing areas have been developed and are being actively discussed and transferred to

coastal managers, government officials and interest groups toward more environmentally-informed land use decisions.

- CCEHBR provides extensive research support to the Olympic Coast, Gray's Reef and Florida Keys National Marine Sanctuaries. Current research examples include a comprehensive ecological study of OCNMS under a multiple federal and state partnership; impacts of commercial fishing on deep water corals and sponges at OCNMS; baseline benthic fauna and contaminant monitoring at GRNMS; and development and evaluations of biomolecular indicators of coral health in research at FKNMS.
- Marine Forensics program personnel testified as Expert Witnesses during a trial in October 2000 in a case involving multiple felony counts related to the illegal harvest and importation of over \$4 million of Caribbean spiny lobster tails from Honduras. The four defendants were found guilty by a Federal jury in Mobile, Alabama.

6.) Please provide a summary of legal mandates for the work in the laboratory/center.

- Reorganization Plan No. 4 of 1970
- Coastal Ocean Program
- Coastal Zone Management Act
- Coral Reef Conservation Act
- Endangered Species Act of 1973
- Estuary Protection Act
- Estuary Restoration Act of 2000
- Federal Insecticide, Fungicide, and Rodenticide Act
- Fish and Wildlife Coordination Act
- Harmful Algal Bloom and Hypoxia Research and Control Act of 1998
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act
- National Aquaculture Act
- National Climate Program Act
- National Coastal Monitoring Act
- National Contaminated Sediment Assessment and Management Act
- National Marine Sanctuaries Act
- National Invasive Species Act of 1996
- Exec. Order 13112 [Invasive Species]
- Exec. Order 13158 [Marine Protected Areas]
- Exec. Order 13089 - Coral Reef Protection

