U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
NATIONAL HEALTH AND ENIRONMENTAL EFFECTS RESEARCH LABORATORY
GULF ECOLOGY DIVISION
1 Sabine Island Drive
Gulf Breeze, FL 32561

The Gulf Ecology Division (GED), a Division of the National Health and Environmental Effects Research Laboratory (NHEERL) of EPA's Office of Research and Development (ORD), is dedicated to identifying, understanding, and solving current and emerging environmental problems of the coastal Gulf of Mexico and S.E. United States. See http://www.epa.gov/ged/ for information regarding the facility, staff, and research.

A. RESEARCH

The **mission** of the Gulf Ecology Division is to provide credible scientific approaches to assess ecological condition, determine effects and causes of ecosystem impairments, predict risks to populations and ecosystems, and support development of criteria to enhance and protect coastal systems of the Gulf of Mexico and the S.E. United States.

There are approximately 125 staff at the Gulf Ecology Division. Of these, 66 are EPA employees; twenty-four have Ph.D. degrees and most of the remaining staff have B.S. or M.S. degrees. The non-EPA staff includes contractors, cooperators from other federal agencies, and guest workers. They conduct research in the following areas:

Coastal Assessment Research – Develop and implement methods to determine condition and ecological values of coastal habitats and identify stressors responsible for harm or deterioration.

Predictive Toxicology Research – Assess effects on estuarine organisms and provide predictive tools and models for estimating species sensitivity, chemical mode of action, and population-level responses.

Nutrients Research – Develop a suite of model applications, data products and other tools to assess and predict relationships between nutrients and ecosystem responses in estuaries and near-coastal receiving waters such as the Gulf of Mexico hypoxic zone.

Coral Research – Develop tools to assess coral condition, determine stressor-response relationships, and predictive models of the health of coral reefs.

B. RESEARCH FACILITIES

MARINE TOXICOLOGY & CHEMISTRY LABORATORY (12,500 ft²)

- **Wet Laboratory (5000 ft^2)** – 24 wet tables with flowing water; salinity controlled water; systems to control research contaminant concentrations, temperature and light; filtration to remove contaminants from treatment water; unique EPA facility or coral culture and controlled environmental exposures; laboratory tables around the perimeter of the facility.
- **Storage and Laboratory Support Space** (2500 ft^2)
- **Preparatory Laboratories and Workshop** (1250 ft^2) – hoods, scales, dishwasher, and other equipment to support research.
- **Analytical Chemistry Laboratory (2500 ft^2)** –
  - Mass Spectrometry
  - Gas Chromatography
  - High Performance Liquid Chromatography

MARINE ENVIRONMENTAL ASSESSMENT LABORATORY (6000 ft^2) –

- **Pathology Laboratory (1500 ft$^{2)}$** - Fully equipped histology laboratory with automated histology equipment and a well-equipped light microscope room.
- **Marine Environmental Assessment Wet Laboratory (1500 ft^2)** – Access to quality-controlled flowing seawater.
- **Biochemistry/Physiology Laboratory (1500 ft^2)** – State-of-the-art equipped facility to develop and validate proteomic methods for risk-based prioritization and screening of chemicals. Equipment includes QSTAR XL, Time of Flight MS/MS with MALDI/SELDI/HPLC interfaces used for protein identification; Thermo aQa HPLC-MS used for protein analysis and pesticide/contaminant analysis; and Pharmacia FPLC System used for protein purification.
- **Nutrient Laboratory (1500 ft^2)** – Fully equipped facility for processing and analysis of nutrients and other water quality parameters.

MARINE ECOLOGY LABORATORY (15000 ft^2) – This facility contains nine individual laboratories; six average 1500 ft^2 and three average 3000 ft^2. Numerous chemistry hoods and laboratory benches are strategically located within the labs.

GREENHOUSE AND HEADHOUSE - A 30 ft x 90 ft plastic-covered greenhouse with access to quality-controlled flowing seawater can be used for a variety of mesocosm-scale studies in marine or estuarine ecology.

BOAT FLEET – A fleet of six research vessels of various sizes (17 ft to 25 ft) are available to sample in- and near-shore waters. Skilled captains, deep water docks, boat house, tow vehicles, and a boat-launch support the frequent use of these research vessels.

INFORMATION TECHNOLOGY (2500 ft^2) – A new information technology (IT) facility is under construction to house IT network equipment and IT staff and to provide GIS support to researchers.

OFFICE SPACE (20,000 ft^2) – Six office buildings provide ample office space to technical and administrative support staff.

C. EXPERTISE HIGHLIGHTED

1. **DIVE TEAM -** Technical diving in near- and in-shore waters to collect environmental samples and/or assess environmental conditions. Work is performed by EPA-certified scientific divers, dive masters, and a Unit Diving Officer.

2. **ECOTOXICOLOGY –** Culturing and testing of estuarine fish and invertebrate species, static and flow-through exposures of aquatic species to natural and chemical stressors, and the development of population and predictive toxicology models.

3. **MATHEMATICAL MODELING -** Biogeochemical, population, and community modeling; spatial analysis and modeling of anthropogenic effects on coastal ecosystems and the services they provide to society, at local, watershed and regional scales.

4. **ENVIRONMENTAL ASSESSMENT –** Large-scale assessments of coastal habitats, including estuaries, near-shore marine waters, coral reefs, and tidal wetlands; sampling and analysis of water, sediment, and biota, probability-based spatial design and analysis, data management, reporting, and transferring technology to national, state, and regional partners.

5. **PROTEOMICS –** Discovery and development of environmental stressor induced MOA-specific protein biomarkers in aquatic animals.

6. **CORAL BIOLOGY AND ECOLOGY-** Coral bleaching, disease, and physiology; field assessments of coral health, multiple-stressor laboratory exposures, and development of predictive models. Facilities and expertise include maintaining cultures of intact corals and coral symbionts to support laboratory studies.