



U.S. Department of the Interior  
Minerals Management Service  
Gulf of Mexico OCS Region

March 2002

*Effects of Simultaneous Exposure to Petroleum Hydrocarbons, Hypoxia,  
and Prior Exposure on the Tolerance and Sublethal Responses of  
Marine Animals; Blue Crabs and Killifish: Final Report*

OCS Study MMS 2002-009

The Minerals Management Service (MMS), Gulf of Mexico OCS Region, announces the availability of a new study report, *Effects of Simultaneous Exposure to Petroleum Hydrocarbons, Hypoxia, and Prior Exposure on the Tolerance and Sublethal Responses of Marine Animals; Blue Crabs and Killifish: Final Report*.

Coastal Louisiana has been impacted by oil-field activities for the last half century, and the waters over the continental shelf west of the Mississippi River delta are also subject to extensive periods of hypoxia during the summer months. Marine and estuarine fish are sensitive to exposure to the water-soluble fraction (WSF) of crude oil, but their tolerance does not change much after 12- to 24-hour exposure because of the presence of an inducible cytochrome P-450 enzyme system for metabolizing aromatic hydrocarbons. In contrast, invertebrates tolerate high concentrations of the WSF for short periods, but their tolerance declines during long-term exposure. The determination of long-term tolerance and sublethal biomarkers have not been used to assess the effects of gradients of oxygen tension and the WSF of crude oil on marine and estuarine fauna. The intent of this project was to study the combined effects of the WSF of South Louisiana crude oil and hypoxia on the tolerance of the Gulf killifish and juvenile blue crabs and lesser blue crabs. In addition, the effects of chronic exposure of these species to sublethal concentrations of the WSF of crude oil on the tolerance, RNA:DNA ratios, and killifish condition and induction of cytochrome P-450 enzymes were compared under hypoxic conditions with the responses of these species from more pristine locales. Chronic exposure to sublethal concentrations of the WSF of crude oil leads to increased tolerance and condition of the Gulf killifish when exposed to the WSF of South Louisiana crude oil. Exposure to the WSF under hypoxia produces slight increases in sensitivity to crude oil in comparison with exposure under normoxia. Blue crabs and lesser blue crabs are not sensitive to the additive effects of hypoxia and the WSF of South Louisiana crude oil.

You can obtain copies of the report from the Minerals Management Service, Gulf of Mexico OCS Region, at a charge of \$5.00 by referencing OCS Study MMS 2002-009. You will be able to obtain this report also from the National Technical Information Service in the near future. Here are the addresses. You may also inspect copies at selected Federal Depository Libraries.

Minerals Management Service  
Gulf of Mexico OCS Region  
Public Information Office (MS 5034)  
1201 Elmwood Park Boulevard  
New Orleans, Louisiana 70123-2394  
Telephone requests may be placed at  
(504) 736-2519 or 1-800-200-GULF  
or FAX: (504) 736-2620

U.S. Department of Commerce  
National Technical Information Service  
5285 Port Royal Road  
Springfield, Virginia 22161  
(703) 487-4650 or FAX: (703) 321-8547  
Rush Orders: 1-800-336-4700

**MMS is the federal agency in the U.S. Department of the Interior that manages the nation's oil, natural gas and other mineral resources on the outer continental shelf in federal offshore waters. The agency also collects, accounts for and disburses mineral revenues from federal and Indian leases. These revenues totaled nearly \$10 billion in 2001 and more than \$119 billion since the agency was created in 1982. Annually, nearly \$1 billion from those revenues go into the Land and Water Conservation Fund for the acquisition and development of state and federal park and recreation lands.**

-MMS-GOM-

MMS's Website Address: <http://www.mms.gov>

[Return to Technical Announcements](#)