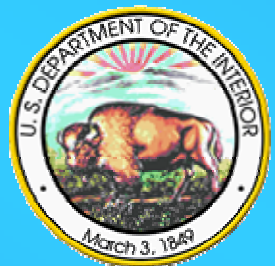




EVALUATION OF OIL AND GAS PLATFORMS ON THE LOUISIANA CONTINENTAL SHELF FOR ORGANISMS WITH BIOTECHNOLOGY POTENTIAL

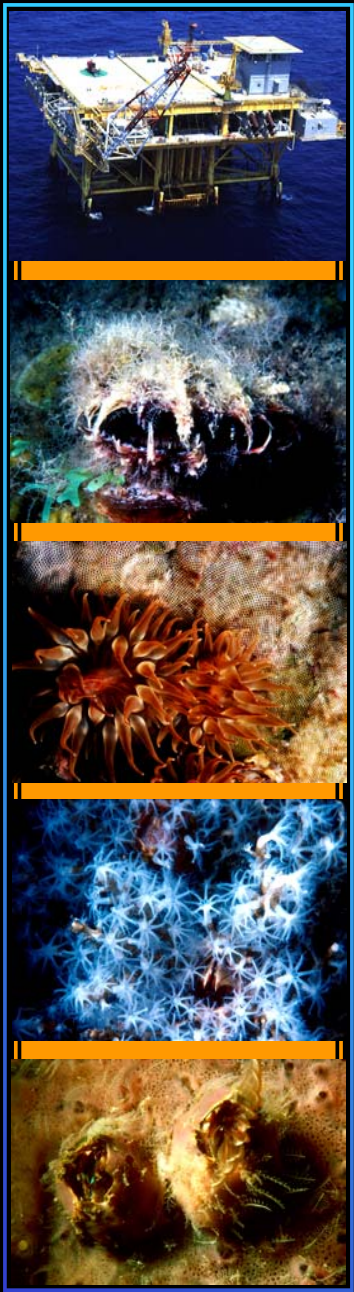


MMS *U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region*



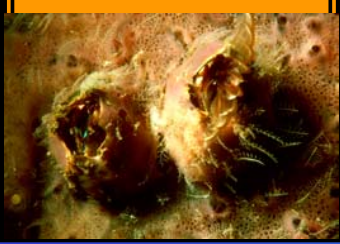
BACKGROUND

- **1998, the National Ocean Conference (NOC) was convened in Monterey, California**
- **Focus of the Conference was Turning to the Sea: America's Ocean Future**
- **Identified lack of information about baseline conditions of the marine environment making it difficult to assess the environmental impacts of biotechnology**



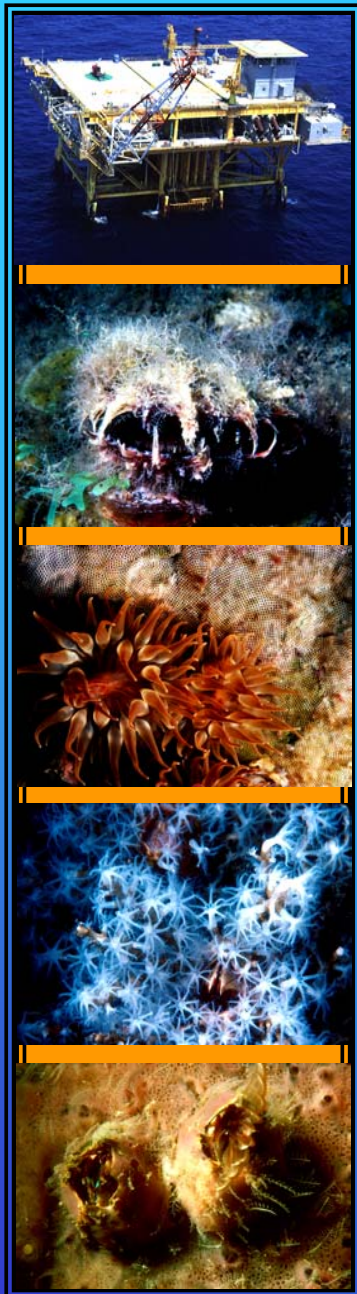
KEY RECOMMENDATIONS OF NATIONAL OCEAN CONFERENCE

- 1. Increase support for sustainable harvesting and testing of marine compounds by both government agencies and commercial pharmaceutical companies as possible treatments for AIDS, inflammatory or infectious diseases, and cancers**
- 2. Support research on the environmental effects of extracting marine organisms for biotechnology purposes**



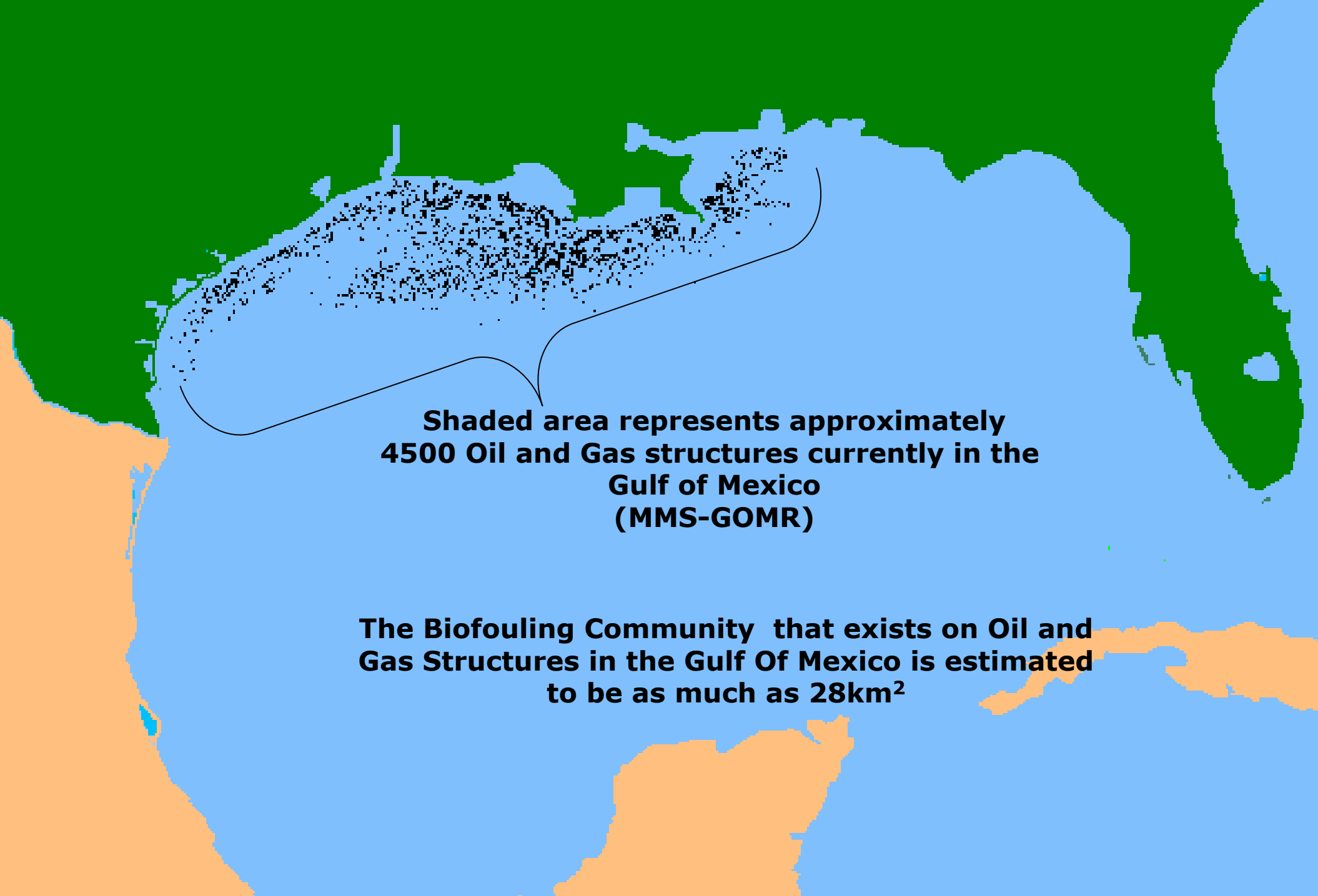
MINERALS MANAGEMENT SERVICE RESPONDS TO CONFERENCE

- **Recognition that offshore oil and gas platforms may serve as a harvestable source of organisms with pharmaceutical or other commercial application**
- **Providing funding for research to Coastal Marine Institutes**
 - ★ **Louisiana State University**
 - ★ **University of California, Santa Barbara**



HI A389

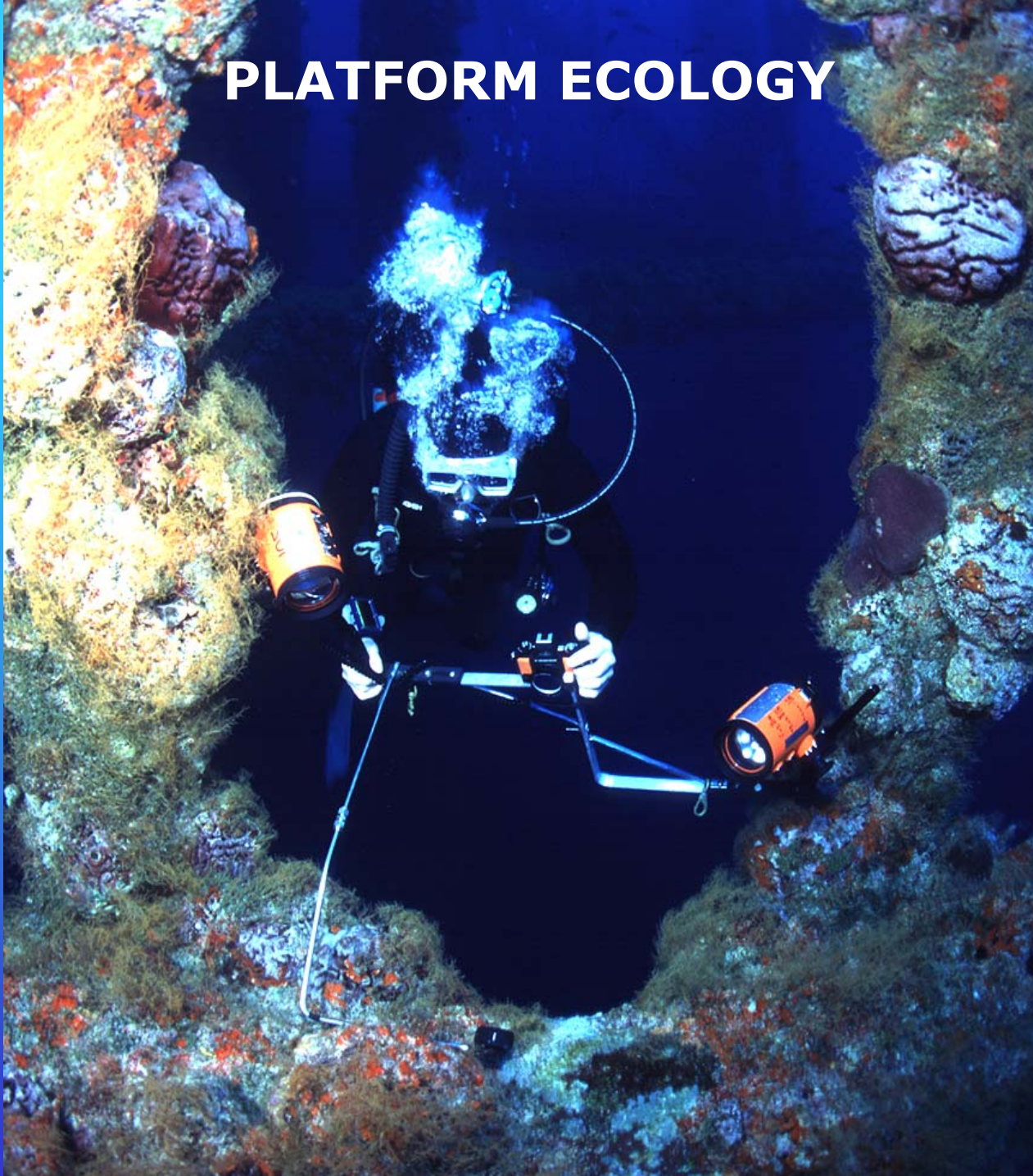


A map of the Gulf of Mexico region, showing the United States coastline to the north and the Gulf of Mexico to the south. A large area in the northern part of the Gulf is shaded in light blue, representing the MMS-GOMR. Within this shaded area, numerous small black dots represent oil and gas structures. A white callout box with a black border points to this shaded area.

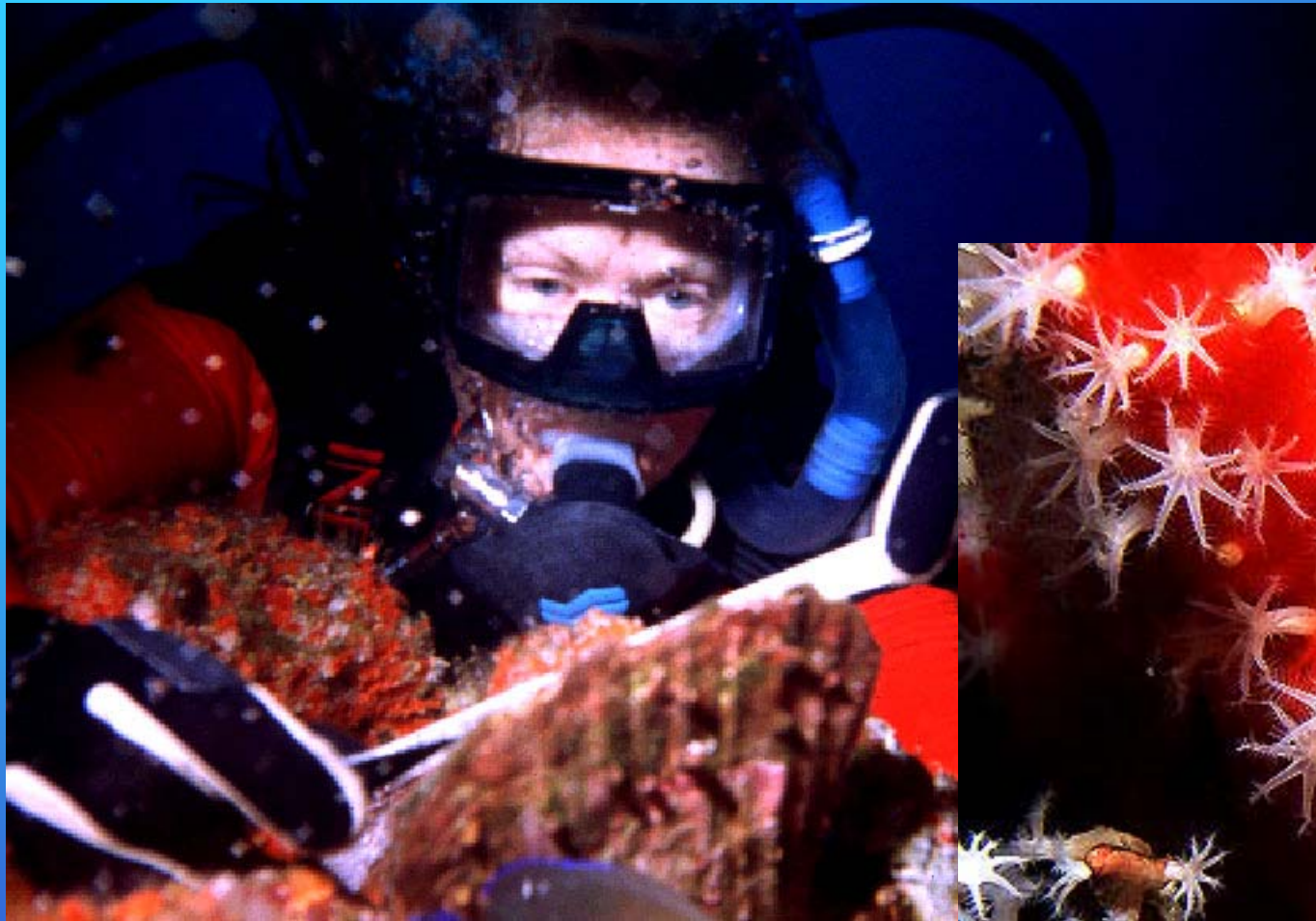
**Shaded area represents approximately
4500 Oil and Gas structures currently in the
Gulf of Mexico
(MMS-GOMR)**

**The Biofouling Community that exists on Oil and
Gas Structures in the Gulf Of Mexico is estimated
to be as much as 28km²**

PLATFORM ECOLOGY



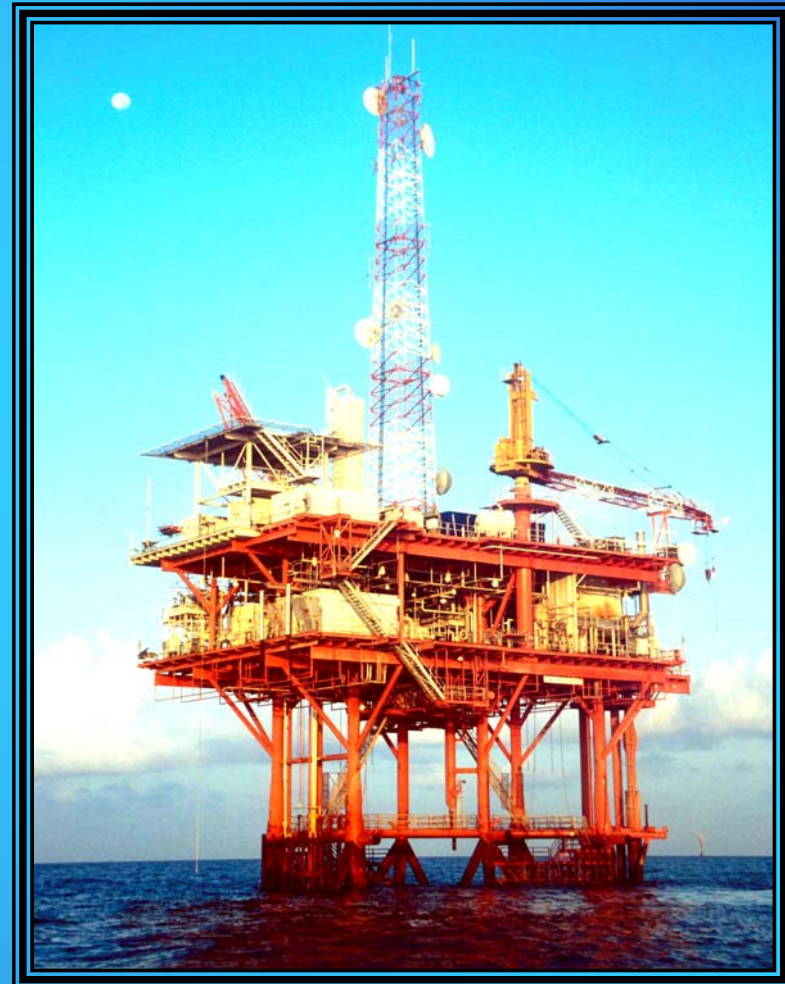
Example of Platform Community at HI 389 - 1 mile due east of Flower Garden Banks National Marine Sanctuary East Bank





Minerals Management Service & Louisiana State University

**Biotechnology:
*Exploring
America's
Oceans for Our
Health***



MMS GULF OF MEXICO REGION

LSU'S initial effort will be to answer the following questions:



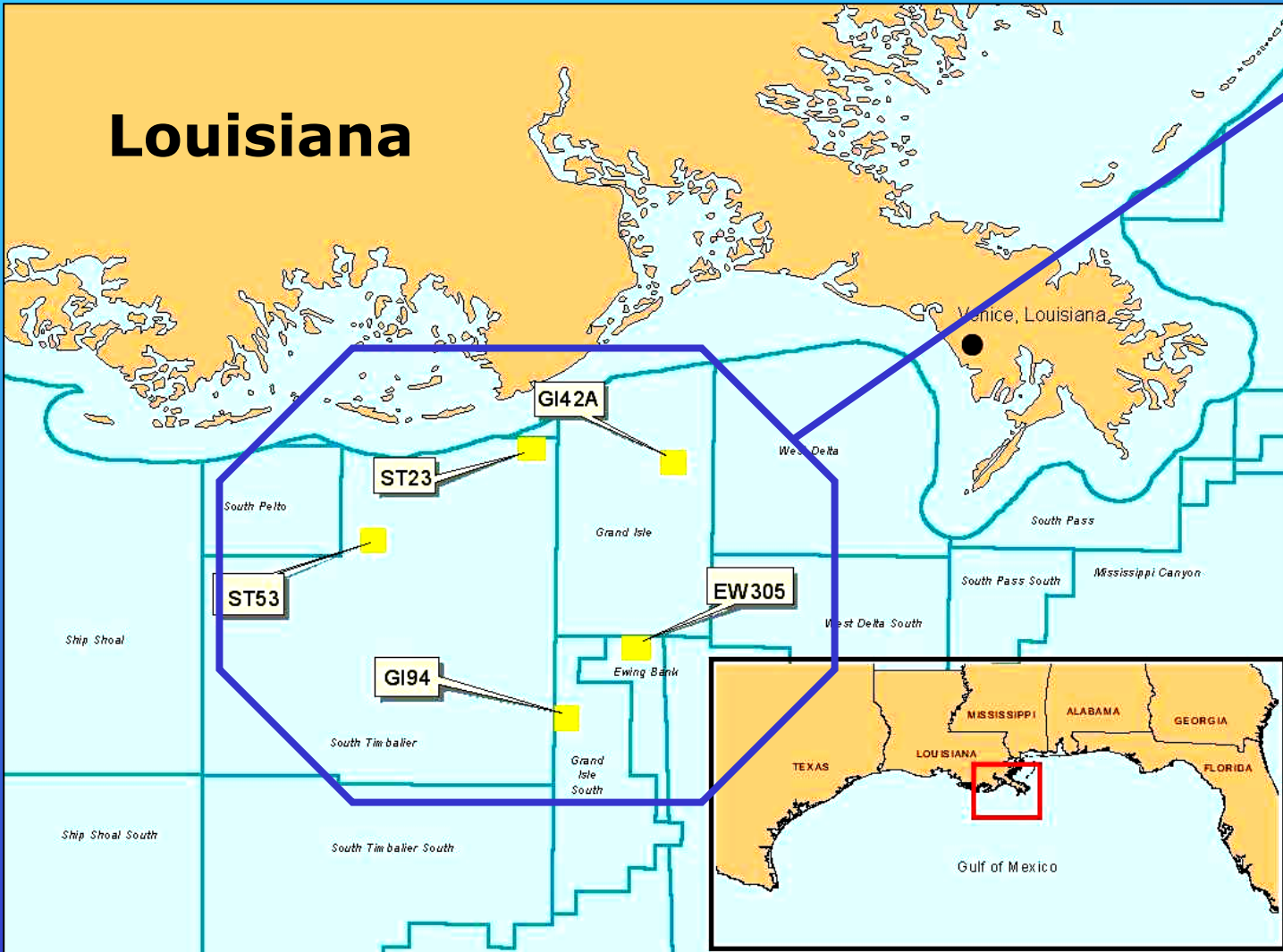
- **What organisms make up the biofouling communities on the platforms?**
- **Are any of these organisms potential sources of pharmaceuticals or other natural products?**
- **How do the organisms populate the platforms? What is the distribution and relative abundance of the organisms on a platform and how does this distribution vary between platforms and with depth and time?**

LSU'S PROPOSAL

- **Biofouling community composition**
- **Natural Product Sources**
- **Distribution and Relative Abundance**
- **Variability**
 - **Onshore - Offshore**
 - **Depth**
 - **Seasonal**



SAMPLING DESIGN



YEAR 1

Sampling design included six platforms in Brown, Green, and Blue Water. Investigation began Spring 2001



YEAR 2

Sampling design included six platforms and many of the specific objectives were based on Year 1 accomplishments.

SAMPLING REGIME INCLUDES

- **BACTERIA**
- **ALGAE**
- **BRYOZOANS**
- **BENTHIC FORAMINIFERS**
- **MOLLUSCS**
- **GENETIC ANALYSIS**
- **PHYSICAL OCEANOGRAPHY**



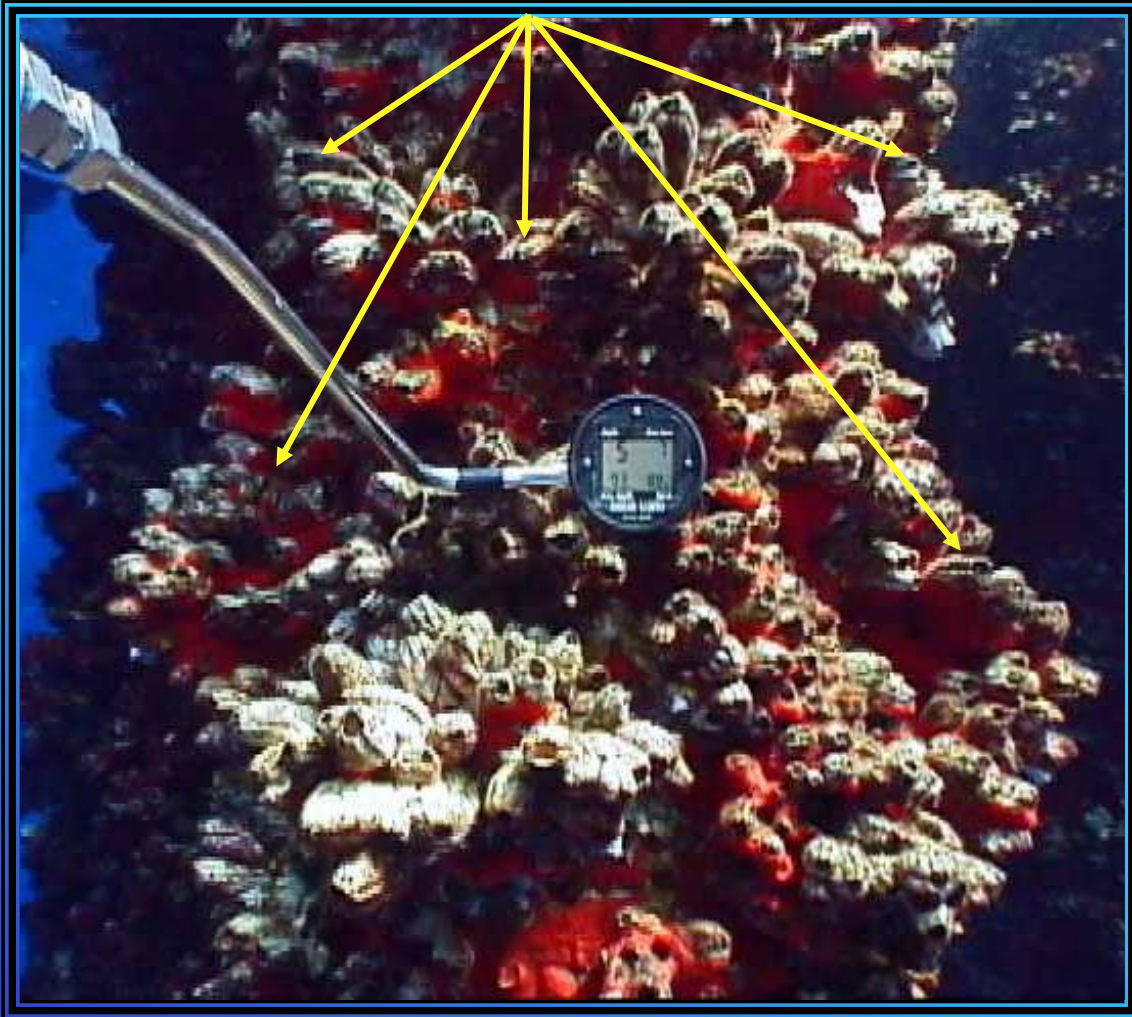
Bryozoa



To date the only marine compound to enter Phase II clinical trials is **Bryostatin 1**. Initially isolated from the bryozoan *Bugula neritina*, it is now known to be produced by symbiotic bacteria found within the animal.

Bryostatin 1 combats the growth of cultured cancer cells and has shown some promise in fighting non-Hodgkin's lymphoma and lymphocytic leukemia

Molluscs

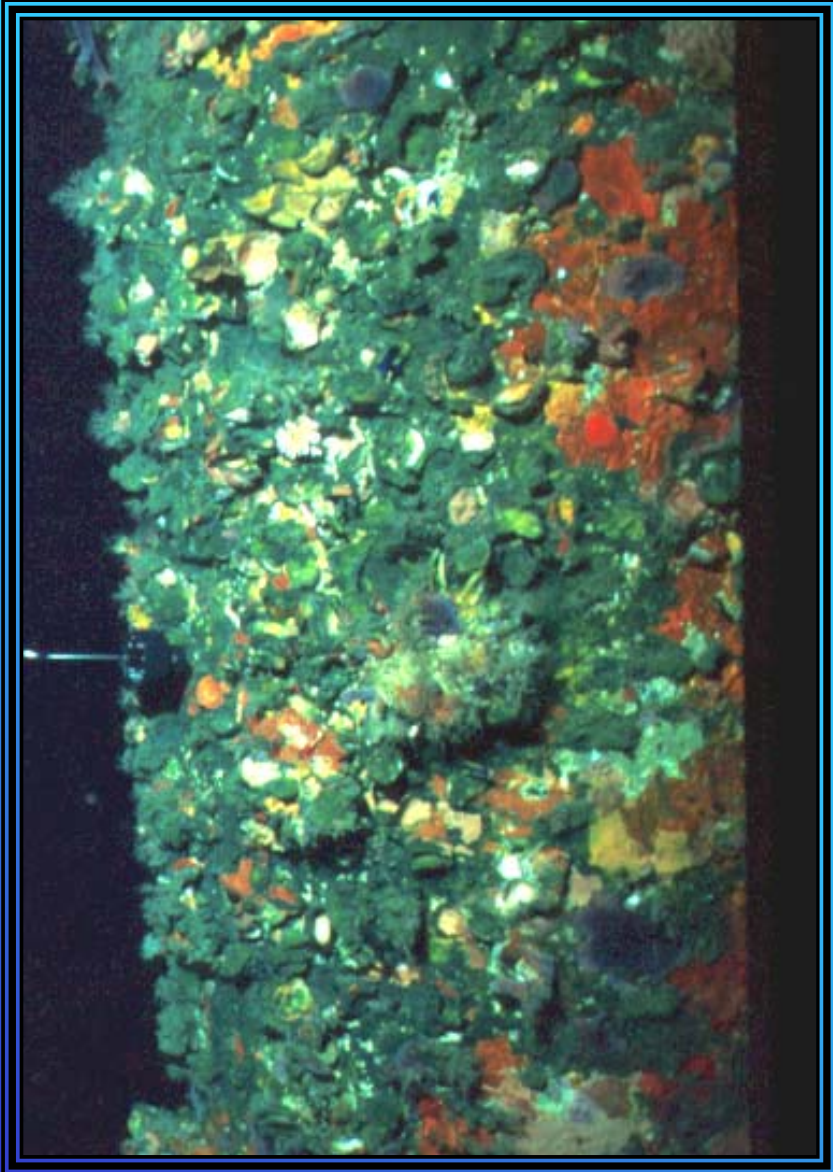


Bivalves (molluscs) comprise the largest portion of biomass on offshore platforms in the Western Gulf of Mexico.

Pharmacological uses of mollusc-derived compounds have been studied for decades. Compounds extracted from molluscs include:

- hypotensive agents**
- cardioactive substances**
- muscle relaxants**
- antibiotics**
- antiviral agents**
- antitumor**

Algae



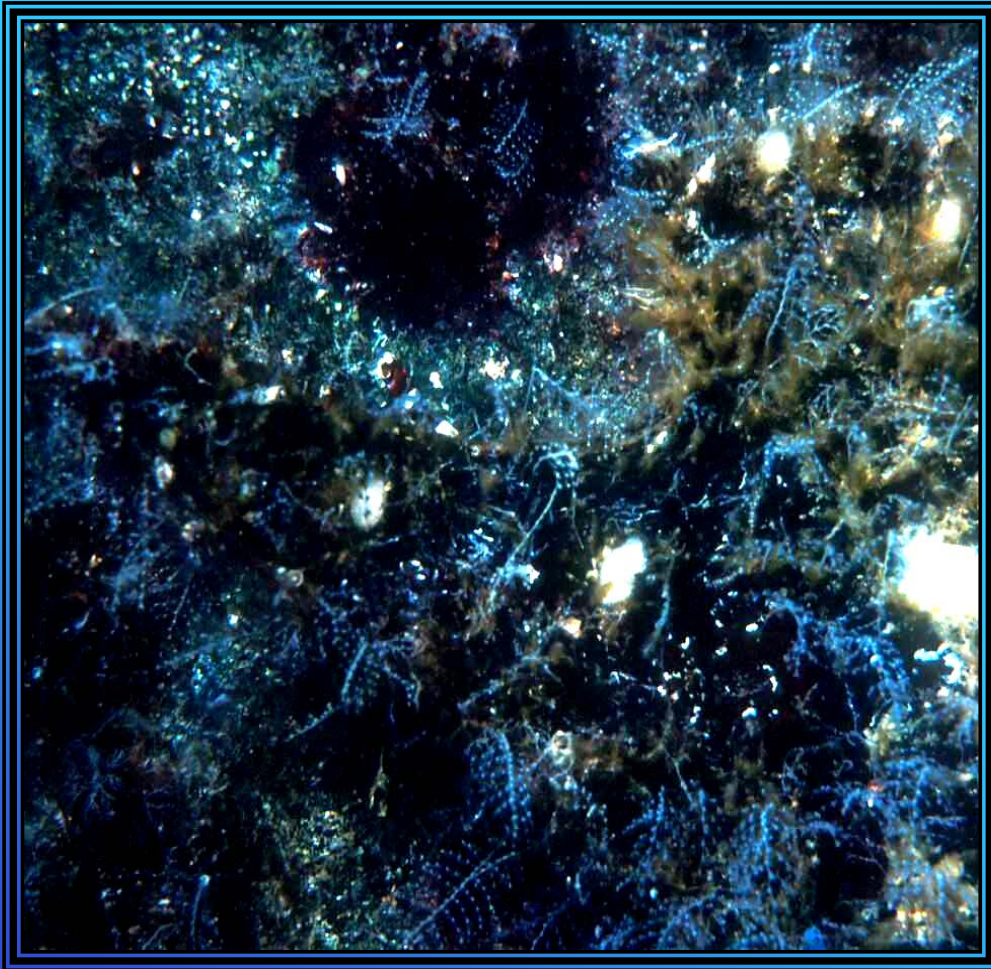
A major component of platform biota is algae. As photosynthesizers, algae are a factor in the increased productivity associated with these man-made habitats. Marine algae already provide various natural products from agar to pharmaceuticals, an important questions to be answered is:

“Can the algae of the Gulf of Mexico platforms be a major source of useful natural products?”

and

“Which of these algae are present on platforms?”

Bacteria



In 1997 34% of the 25 best-selling drugs were derived from natural products. Prokaryotes in general, and members of the class Actinobacteria in particular, have yielded numerous bioactive compounds making them of great economic value as a source of novel pharmaceuticals and enzymes. Many archaea and bacteria have been found to thrive when associated with structures either natural or manmade.



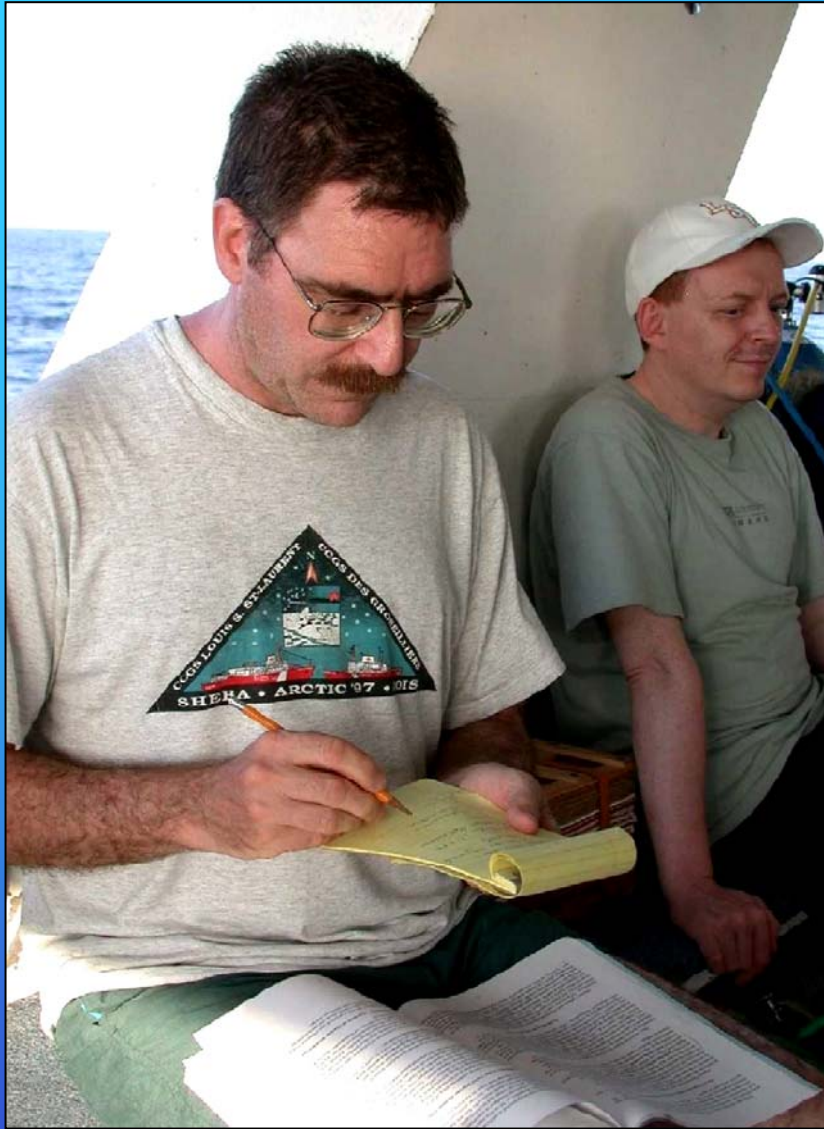
**BIOTECH SAMPLING CRUISE YEAR 2
MAY 2002**











**KEVIN KRAJICK
SMITHSONIAN
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**Photo by
Greg Boland**