



# Big Data and Science for the U.S. Outer Continental Shelf

Michael Rasser, PhD  
Marine Ecologist  
Office of Environmental Programs

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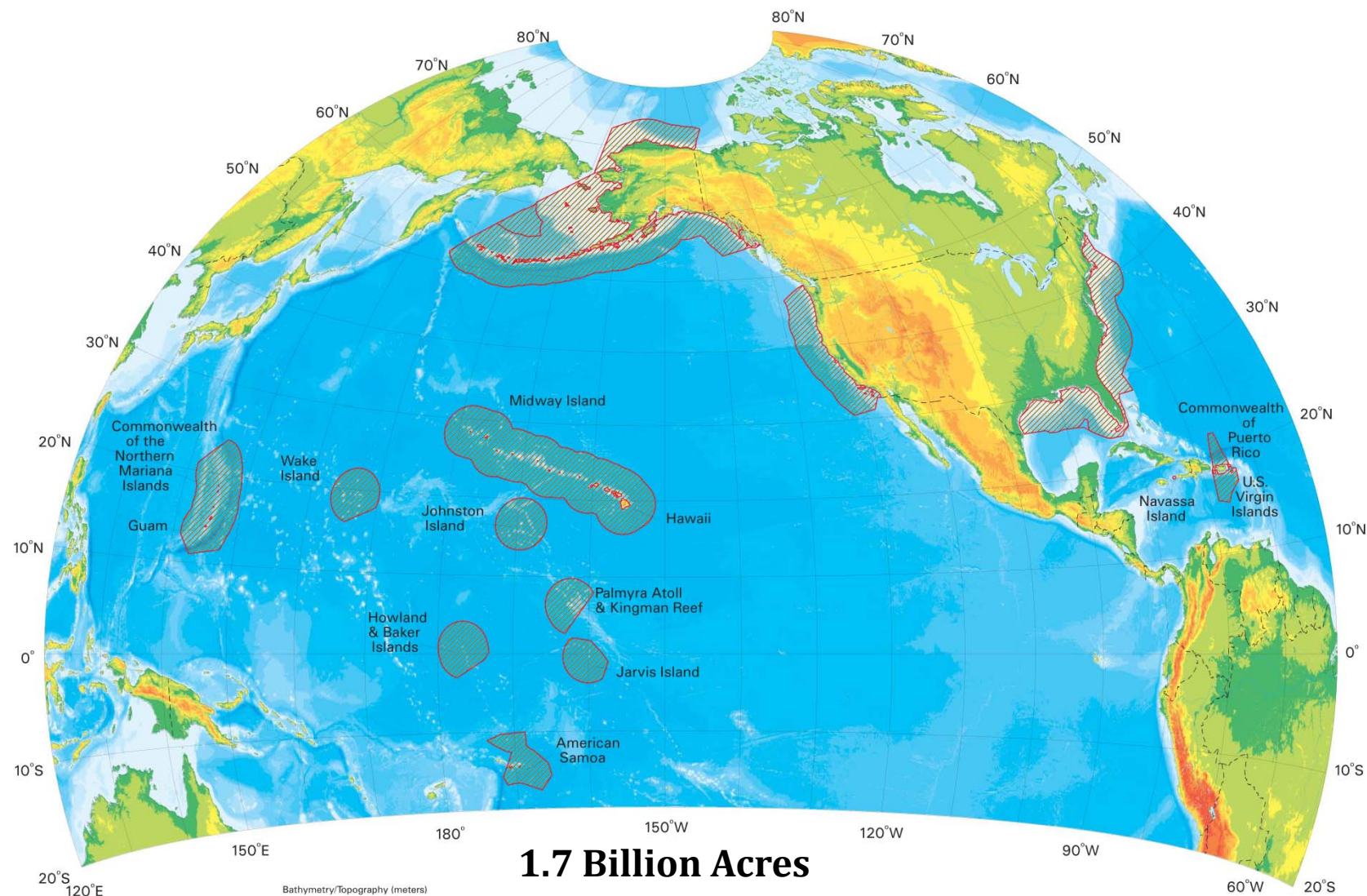


## The Bureau of Ocean Management (BOEM)

- Responsible for stewardship of the U.S. Outer Continental Shelf
- Authorized to grant leases on OCS
  - Renewable energy
  - Oil and gas
  - Marine minerals (sand and gravel)
- Statutory Authority
  - OCSLA (1953)
  - Energy Policy Act (EPACT 2005)

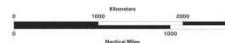
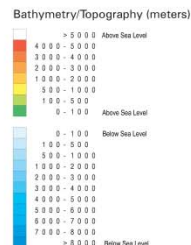


# United States Continental Shelf Boundary (CSB) Areas

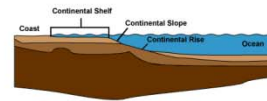


**1.7 Billion Acres**

Bathymetry/Topographic data: NOAA National Geophysical Data Center ETOPO2 (2001)  
 Coastlines, rivers, lakes, political boundaries: Defense Mapping Agency "Digital Chart of the World" (1992)  
 Offshore Treaty Boundaries: U.S. Department of State Public Notice 2237 (Federal Register Vol. 60, No. 163, 8/23/1995)  
 CSB Boundaries generated from coastline buffers in ArcGIS, EXCEPT the Continental U.S., U.S. Virgin Islands, and northern coast of Alaska.  
 The maritime boundaries and limits shown on this map do not necessarily reflect the full extent of U.S. sovereign rights under international and domestic law.



Lambert-Azimuthal Equal Area Projection  
 North American Datum 1983



The continental shelf is the extended perimeter of each continent and associated coastal plain. Much of the shelf was exposed during glacial periods, but is now submerged under relatively shallow seas (known as shelf seas) and gulfs. Under the United Nations Convention on the Law of the Sea (UNCLOS) the name *continental shelf* was given a legal definition as the seabed adjacent to the shores of a particular country to which it belongs. The legal definition of a continental shelf differs significantly from the geological definition. UNCLOS states that the shelf extends to the limit of the continental margin, but no less than 200 nautical miles from the baseline.

**BOEM**  
 BUREAU OF OCEAN ENERGY MANAGEMENT

*Managing responsible development  
 of America's offshore energy.*





## ***Science for Informed Decisions***



### **Mission:**

Provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments.

- Program more than 40 years old.
- \$1 Billion invested in research.
- Topics include:
  - Baseline / Benchmark
  - Cause and Effect, Process
  - Monitoring
- Over 1,700 studies.
- 345 Studies related to the Atlantic.





## How BOEM is Using Big Data

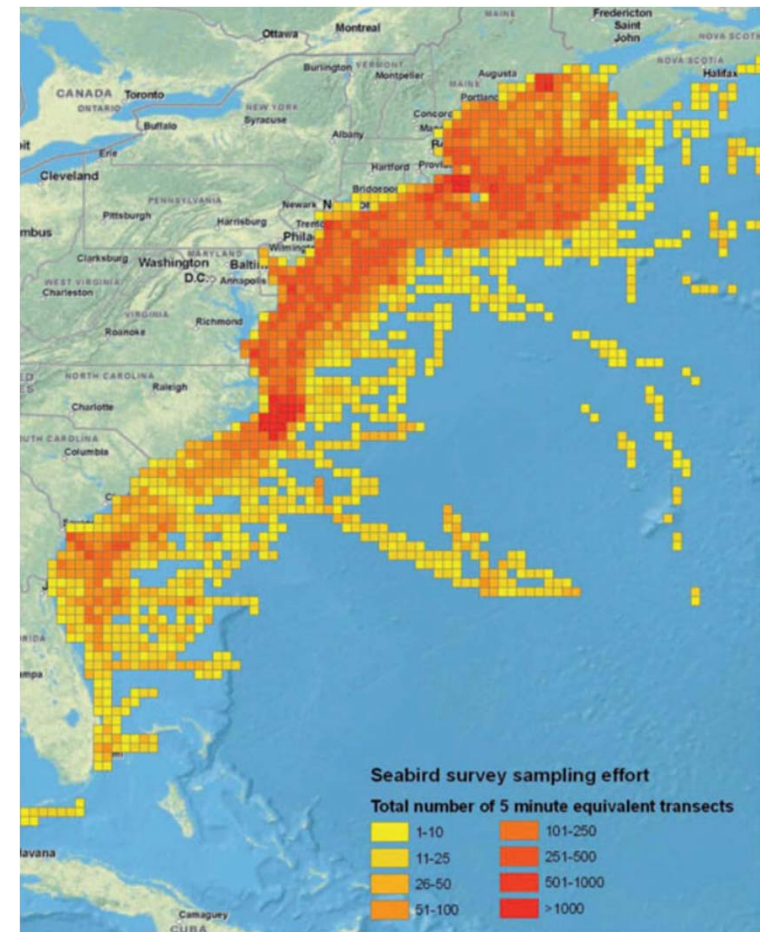
- Analysis of big data to create information for decision support
- Developing partnerships to create common standards for format, storage, and metadata
- Making data more discoverable and accessible





## Example 1. The Avian Compendium

- Goal was to compile existing data sets on marine birds
- Generates large amounts of data with very different formats, sampling schemes, assumptions ...
- Extensive spatial modelling was done to generate useful products.
- Products made available via a web mapping service





## Example 2. High Resolution Aerial Surveys for Seabirds and Sea Turtles

- Has many advantages over traditional aerial surveys
- Generates large amounts of data
- Need better methods to analyze the data
  - Object based classification
  - Crowdsourcing
  - Artificial intelligence







## Example 3. Passive Acoustic Monitoring for Marine Mammals

- Inconsistent data format and standards
- Do not have sufficient data for all species to create necessary algorithms
- Tethys metadata system – a community standard for bioacoustic data.
- NOAA National Centers for Environmental Information serves as the archive



Tethys, Antioch mosaic, 3<sup>rd</sup> century from Baltimore Museum of Art  
<http://tethys.sdsu.edu> v 2.3

Marie A. Roch, San Diego State University/Scripps Institution of Oceanography  
Simone Baumann-Pickering, Heidi Batchelor, Sean Herbert, and John A. Hildebrand – Scripps Institution of Oceanography  
Erin Oleson & Lisa Munger – NOAA PIFSC  
Catherine Berchok – NOAA NWAFSC  
Danielle Cholweiak, Denise Risch, Sofie Van Parijs – NOAA NEFSC  
Melissa Soldevilla – NOAA SESFSC





## Example 4. Environmental Studies Program Information System (ESPIS)

- Historically, only maintained the report, data archived with NOAA National Centers for Environmental Information
- Was very difficult to discover and access all studies information
- Solution- data “archeology” exercise compiled metadata for all of the studies including:
  - 4,364 Publications resulting from these studies ( e.g. peer reviewed publications, conference proceedings)
  - 1,591 Data Products (e.g. datasets, websites)
- Developed a search tool to access this information via text based or geographic searches

## Explore more than 40 years of Environmental Studies Program Ocean Science

FIND

fish



NEAR

gulf of mexico



SEARCH

GEOGRAPHY



Search using a map and other

Central **Gulf of Mexico**

fishery

Eastern **Gulf of Mexico****Gulf of Mexico**



ESPIS

FIND

fish

NEAR

gulf of mexico



YEAR

1974 - 2014



STATUS

SHOW ALL

REGION

SHOW ALL

RESET FILTERS

WE FOUND **437** RESULTS MATCHING YOUR SEARCH

SORT BY BEST MATCH



### Offshore Petroleum Platforms: Functional Significance for Larval Fish Across Longitudinal and Latitudinal Gradients

📍 Gulf of Mexico 📅 1998 - 2002 🧬 Biology

This study represents an important step towards understanding the ecological significance of oil and gas platforms to the early life history stages of fishes. Platforms represent hard substrate (i.e., "vertical benthos") imposed on the pelagic enviro



### Gulf of Mexico Fish and Fisheries: Bringing Together New and Recent Research

📍 Gulf of Mexico 📅 2000 - 2000 🧬 Workshop

The Information Transfer Meeting (ITM) provides a forum where interchange on topics of current interest relative to environmental assessments of the offshore oil and gas industry can occur. The accomplishments of the MMS Environmental Studies Program

A partnership between

BOEM  
BUREAU OF OCEAN ENERGY MANAGEMENT





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## Gulf Of Mexico Effects Of OCS Oil And Gas Activities On Reef Fish

📍 Gulf of Mexico

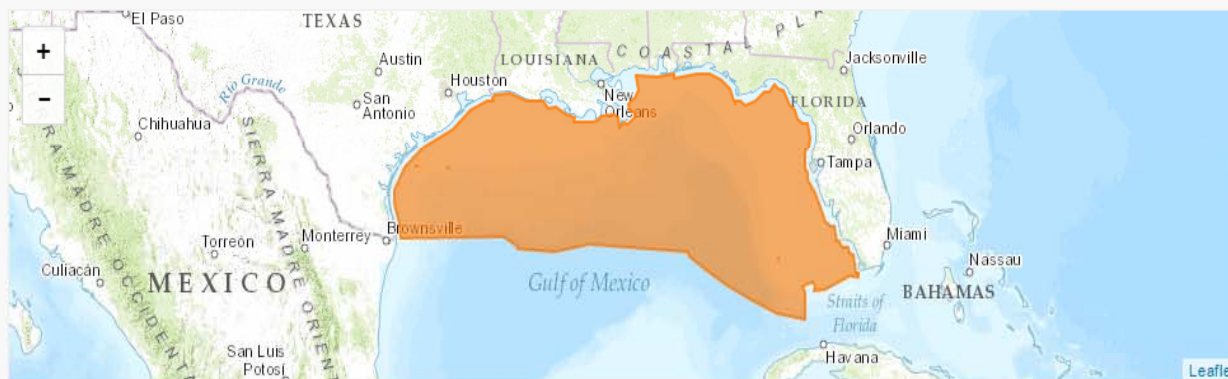
📅 Sep 01, 1979 - Apr 01, 1982

🔬 Biology

### ABSTRACT

Effects of offshore oil and gas development and production activities on fish populations in the Gulf of Mexico must be identified and quantified so that effective resource management policies can be designed. The first step in that direction is to estimate standing stocks of commercially and ecologically important fish species that are associated with natural hard-bottom areas and offshore oil and gas platforms. This study was funded to provide preliminary fish population estimates and to evaluate alternative methods of developing such estimates.

### STUDY FOOTPRINT



### STUDY INFORMATION

|                     |   |
|---------------------|---|
| PROJECT DATES       | September 01, 1979 - April 01, 1982   |
| REGION              | Gulf of Mexico  |
| CONDUCTING ENTITIES | Continental Shelf Associates, Inc.  |
| DISCIPLINE          | Biology   |
| KEYWORD(S)          | Central Gulf, Biology, Fish, Population, Census, Hard-Bottom, Platforms, Videotapes, Photographs, Time-Lapse, Abundance |

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## BOEM STUDY REPORTS AND DOCUMENTS



Final Report

[Study of the effect of oil and gas activities on reef fish populations in the Gulf of Mexico OCS area](#)

Continental Shelf Associates, Inc. | 1982



Technical Summary

[Study of the effect of oil and gas activities on reef fish populations in the Gulf of Mexico OCS area and executive summary](#)

Continental Shelf Associates, Inc. | 1982



Final Report

[Study of the effect of oil and gas activities on reef fish populations in the Gulf of Mexico OCS area, executive summary](#)

Continental Shelf Associates, Inc. | 1982



Final Report

[Video and photographic reconnaissance of Phleger and Sweet Banks, northwest Gulf of Mexico](#)

Continental Shelf Associates, Inc. | 1980

## RELATED PUBLICATIONS



Putt RE, Gettleson DA, Phillips NW. 1986. Fish assemblages and benthic biota associated with natural hard-bottom areas in the northwestern Gulf of Mexico. Northeast Gulf Science. 8(1): 51-63.



Hammer RM, Gettleson DA, Putt RE, Thompson MJ, "Fishery management considerations based on a study of the effect of oil and gas activities on reef fish assemblages in the Gulf of Mexico area." Presentation at Third International Artificial Reef Conference, Newport Beach, CA, November 3-5, 1983.



Thompson MJ, Putt RE, Gettleson DA, Hammer RM, Stevens RC, "Utilization of remotely operated vehicles (ROVs) for fish survey standing stock assessments." Presentation at Oceans '82, Washington, DC, September 20-22, 1982.

## DATA PRODUCTS



[Fishery Survey - Fishing Duration and Other Data from JIM LYTAL from 19800529 to 19801009 \(NODC Accession 8300001\)](#)

US Dept. of Commerce, National Oceanic and Atmospheric Administration, National Oceanographic Data Center



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**accessions\_id:** 8300001 | [archive](#)

**Title:** FISHERY SURVEY - FISHING DURATION and Other Data from JIM LYTAL from 19800529 to 19801009 (NODC Accession 8300001)

**Abstract:**

**Date received:** 19830103

**Start date:** 19800529

**End date:** 19801009

**Seanames:**

**West** -92.9

**boundary:**

**East boundary:** -82.5

**North** 28.9

**boundary:**