

***Summit on Long-Term Monitoring of the Gulf of Mexico Hypoxic Zone:  
Developing the Implementation Plan for an Operational Observation  
System***

January 30-31, 2007  
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**WHITE PAPER**

**Appendix A: Compilation of a Hypoxia Data Inventory**

**OVERVIEW**

In preparation for the 2007 *Summit on Long-Term Monitoring of the Gulf of Mexico Hypoxic Zone*, NOAA's National Coastal Data Development Center (NCDDC) was charged by the Summit Steering Committee to compile an inventory of hypoxia data sets in the United States. As directed by the Committee, the foci of the data set inventory were the Gulf of Mexico, Great Lakes, and Chesapeake Bay Regions.

The current data inventory contains 129 items comprised of reports, data sets (with and without metadata) and metadata records (without data sets). NCDDC performed initial data analysis using currently available tools. The Hypoxia Data Inventory was compiled in a spreadsheet, and the information was then ingested into the NCDDC Regional Ecosystems Portal (<https://ecowatch.ncddc.noaa.gov/>). Source metadata records were validated for FGDC compliance, and data collection areas were mapped in a geographic information system or GIS tool to clearly show overlap and gaps. This report presents a summary of the Hypoxia Data Inventory and initial analysis.

**CREATION OF THE HYPOXIA DATA INVENTORY**

For the compilation of this Inventory, NCDDC Liaison Officers contacted a variety of resource agencies within their regional focus areas, as listed below:

- Scott Cross, East Coast Liaison
- Scott Mowery, Northeast Shelf Liaison
- Rost Parsons, Eastern Gulf of Mexico Liaison
- Joe Stinus, Western Gulf of Mexico Liaison

As shown in Exhibit 1, state, academic and federal agencies and programs are represented in the Hypoxia Data Inventory. The dates of Inventory items range from 1905 to 2006. Data were collected by various methods including ships and buoys. The Inventory is intended to be an on-going project which will progress with additional data discovery as well as continued hypoxia research.

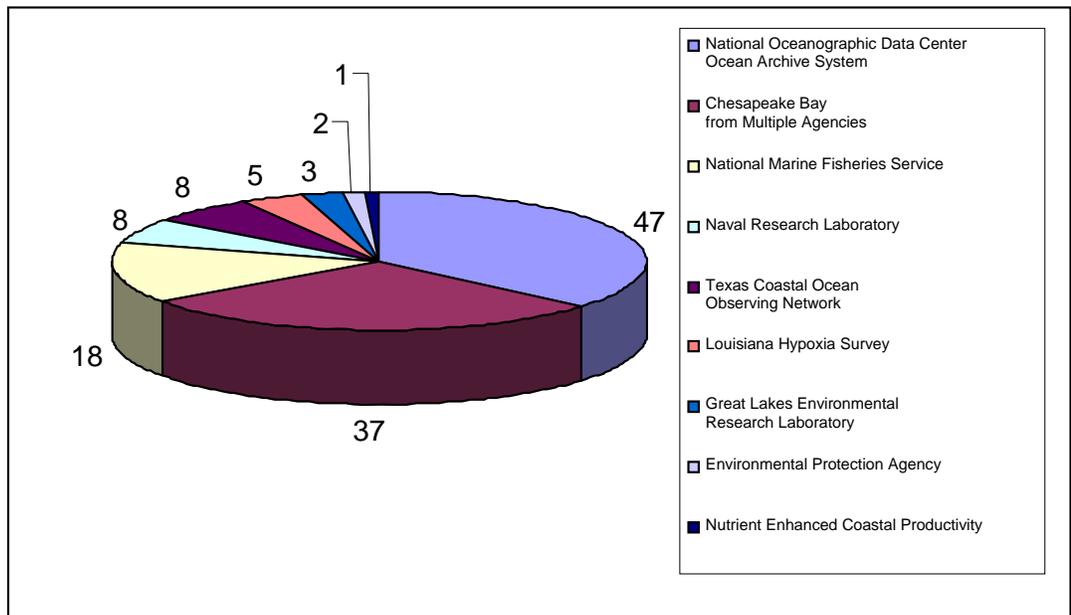


Exhibit 1  
Total Number of Hypoxia Data Inventory Items Grouped by Source

The Hypoxia Data Inventory fields were standardized to provide as much information about each data set as was available. Information is grouped in the following areas:

- Data Description – a brief summary title of the inventory item
- Instrument – the apparatus or device used to collect the data. If blank, no instrument information was provided.
- Site Name – the geographic or descriptive name of the physical location where the data was collected.
- Collection Years – the range of time that encompasses the data collection or data processing activity (in years.)
- Method of Collection – the manner in which the data collection was performed. If blank, no method of collection was identified.
- Hyperlink to Data – a direct URL link to the inventory item. If blank, no information was provided.
- Point of Contact – the name, address and phone number of the contact individual for the inventory item.

## INITIAL DATA ANALYSIS

As items were identified for the Hypoxia Data Inventory by NCDDC Liaison Officers, they were cataloged in the Inventory spreadsheet and collected at NCDDC. Data development staff began an initial assessment of each inventory item. A wide range of information was assessed, including summary reports, stand alone data sets (no metadata); metadata only (no data records); and data records with metadata.

### Metadata Processes

NCDDC supports the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) in accordance with Executive Order 12906 (<http://govinfo.library.unt.edu/npr/library/direct/orders/20fa.html>). In addition to providing FGDC authorized training, NCDDC support to the FGDC includes the development of a secure internet-based software tool to create, validate, manage, and publish metadata records. This tool, the Metadata Enterprise Resource Management Aid (MERMAid), has gained broad community acceptance and was used to evaluate the inventoried metadata records where feasible. Successfully validated records are compliant with the FGDC standard. (<http://www.ncddc.noaa.gov/Metadata>)

FGDC validation is significant because validated metadata records can be published as part of the National Spatial Data Infrastructure (NSDI) which facilitates data discovery and access. For purposes of the Hypoxia Data Inventory, once a record was validated, permission was sought from the contributing source for the record to be published. To date, 77 records have been received: 59 are complete and awaiting permission to publish, 15 have been published, and 3 are in the validation process. Exhibit 2 provides a graphical presentation of current metadata records available and their processing status. Once permission is obtained, MERMAid publishes the metadata record to the NCDDC Catalog. From here, the NSDI FGDC Clearinghouse indexes the record, making it searchable through the Clearinghouse metadata search engine. The published record is also harvested by the Geospatial One-Stop (GOS) using a Z39.50 server; this process makes the record discoverable from multiple sources.

### Regional Ecosystem Portal

The National Coastal Data Development Center has created a Regional Ecosystem website to assist NOAA and the Ecosystem Goal Team in meeting goals to improve ecosystem products and services. The Website provides an overview of the Ecosystem Approach to Management, and is designed to be both a gateway to and a management system for diverse, distributed coastal data.

Of particular interest is the Regional Ecosystem Portal, a prototypical implementation of the "semantic Web" which uses intelligent applications or systems where computers can effectively understand the meaning of the information transmitted. NCDDC created a *Semantic Catalog* for the Regional Ecosystem website. Using any standard browser, users may experiment with access methods including one of three textual search methods.

Hypoxia Data Inventory records were added to this catalog. The content of each record is based on Dublin Core elements, categorized into Identification, Classification, Spatial, and Contact Information. The information for each record in the Semantic Catalog is derived from the FGDC Metadata records. Where FGDC metadata was not available, the information was researched by contacting the data provider or by searching for historical information with such tools as the NODC accession search engine (<http://www.nodc.noaa.gov/cgi-bin/search/prod/accessionsView.p1/prefs>).

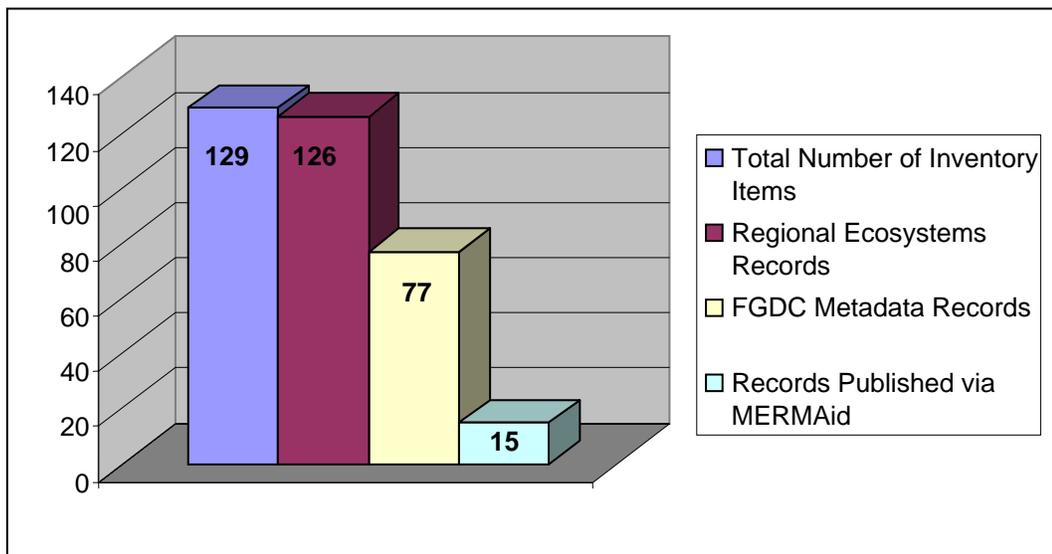


Exhibit 2  
Total Number of Hypoxia Metadata Records Received and Processed

### GIS mapping

Hypoxia Data Inventory items contained bounding coordinates which were typically extracted from a metadata record. A GIS map (Exhibit 3) was created in ESRI ArcMap® using this information. In a few cases, research was necessary to fill in spatial information. The bounding coordinates were used to create a polygon shapefile that represented the geospatial extent or "footprint" of the data sets. These footprints are difficult to distinguish on a static map because of the high degree of overlap and the large number of

data sets represented. In the future, an interactive map will be developed, allowing the user to filter the data display by selected criteria such as by year or data provider.

## **SUMMARY**

NCDDC accepted the task of creating the Hypoxia Data Inventory and strived to provide maximum accessibility to the inventoried data sets. By taking the extra step of ingesting the metadata records into MERMAid, NCDDC ensures standardized, quality assured records that comply with National standards. In this way, the information has the potential to be discoverable from multiple access points, including but not limited to the NCDDC Metadata Catalog, the NSDI/FGDC Clearinghouse, The Geospatial One-Stop, the Regional Ecosystem Portal.

Exhibit 4 is an abbreviated version of the information obtained for each of the 129 Hypoxia Data Inventory items. The complete Inventory spreadsheet, along with an image of the GIS map, is available on the website for the upcoming Ecological Impacts of Hypoxia on Living Resources Workshop ([www.ngi.msstate.edu/hypoxia](http://www.ngi.msstate.edu/hypoxia)).

It is NCDDC's expectation that the Hypoxia Data Inventory will continue to grow as more data, data products and information are discovered and as hypoxia research continues. It is our intent to continue to work with information providers, to maintain the Inventory and to update the products periodically for use by researchers and other stakeholders.

## **NCDDC CONTACTS**

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