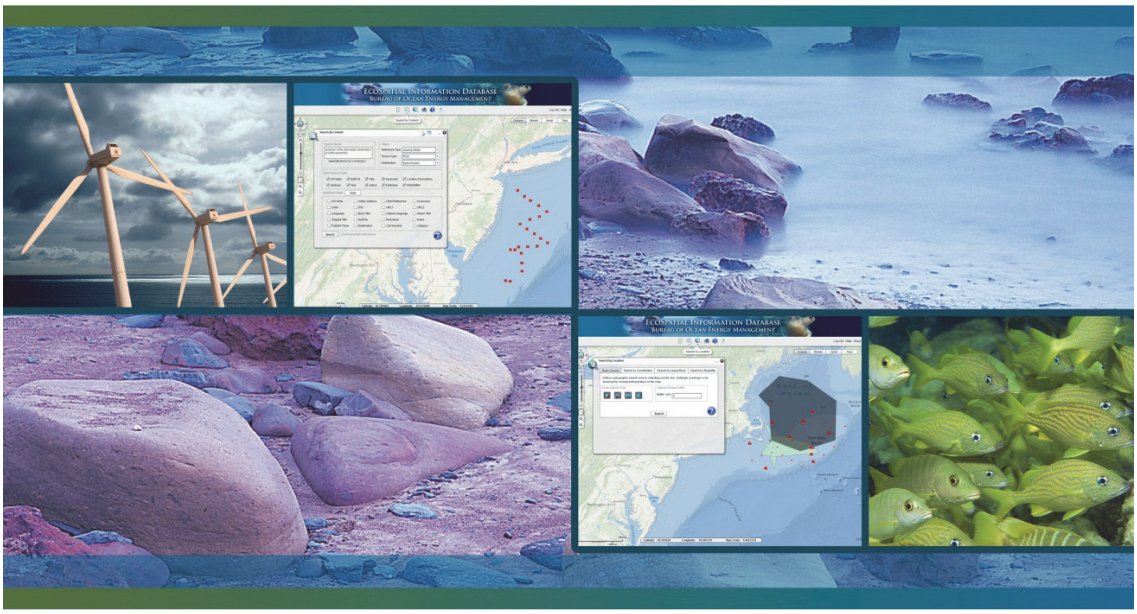
OCS Study
BOEM 2014-058

EcoSpatial Information Database: U.S. Atlantic Region



U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

BOEM
Bureau of Ocean Energy Management

OCS Study
BOEM 2014-058

EcoSpatial Information Database: U.S. Atlantic Region

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ABOUT THE COVER

A photo mosaic including screenshots from the ESID application illustrating the Search by Content and Search by Location functionalities. Fish image from Comstock Images/Thinkstock.

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ABSTRACT

An EcoSpatial Information Database (ESID, "ee-sid") has been created to make ecological data for the Outer Continental Shelf (OCS) of the U.S. Atlantic coast readily accessible through advanced geographic and content data search techniques. A web Geographic Information System (GIS) application, hosted in the Amazon Elastic Compute Cloud (EC2®; hereafter referred to as the cloud) was developed to provide broad access to the data and supporting documents. This report describes the processes used to search for, prioritize, and collect literature and datasets, and the development of the geodatabase and web portal that allows the system to be searched.

The ESID was developed by a project team led by AMEC Environment & Infrastructure (AMEC) and included contributors from Atkins (formerly PBS&J), CSA International, Inc. (CSA), Esri®, and GISbiz Inc. The ESID will help BOEM meet requirements of the National Environmental Policy Act (NEPA) to support its leasing decisions.

The ESID project area consists of Federal waters within BOEM's Atlantic OCS Region, which extends from Maine to central Florida (specifically, the North Atlantic, Mid-Atlantic, and South Atlantic Planning Areas). As specified by BOEM, the resources to be included in the literature and dataset searches were geology, water quality, pelagic ecology, and benthic ecology (including infauna/meiofauna, demersal fishes, coral and hardbottom communities, and seagrass). The project team conducted extensive searches of literature and datasets to incorporate into the ESID. The team developed a unique search protocol to identify and scientifically screen over 27,000 scientific papers and environmental reports, and approximately 10,000 web links to identify scientific datasets. During the prioritization process, it was determined that 2,717 documents and 391 web links (a total of 3,101 resources, spanning years 1884–2010) were relevant to the ESID. These resources were then geospatially referenced and included in the system. A rigorous Quality Assurance/Quality Control (QA/QC) program was implemented on all levels of the project to validate the process and the results.

The cloud-based ESID Web Application allows users to search by content and location, view citations and abstracts, export bibliographic entries, view and download documents that are not subject to copyright restrictions, print map views, identify mapped features, and upload additional resources (subject to system administrator approval). The system is designed to accommodate virtually unlimited expansion with any type of resource file on any subject for any geographic area.

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LIST OF ABBREVIATIONS, ACRONYMS, AND SYMBOLS

AMEC	AMEC Environment & Infrastructure
AMI	Amazon Machine Image
AOB	Acquisition Operations Branch
AOI	Areas of Interest
AWS	Amazon Web Services
BOEM	Bureau of Ocean Energy Management
BOEM	Bureau of Ocean Energy Management, Regulation and Enforcement
BSEE	Bureau of Safety and Environmental Enforcement
CORIS	Coastal and Offshore Resource Information System
COTR	Contracting Officer's Technical Representative
CSA	CSA International, Inc.
DOI	Digital Object Identifier
EA	Environmental Assessment
EBS	Elastic Block Storage
EDMS	Electronic Documents Management System
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ERA	Electronic Redistribution and Archiving
ESB	Environmental Studies Branch
ESID	EcoSpatial Information Database
ESPIS	Environmental Studies Program Information System
Esri®	Environmental Systems Research Institute
FGDC	Federal Geographic Data Committee
FIU	Florida International University
FTP	File Transfer Protocol
GIS	Geographic Information System
HBOI	Harbor Branch Oceanographic Institution
ISRT	Internal Science Review Team
IT	Information Technology
ITM	Information Transfer Meeting
GLORIA	Geological Long-Range Inclined Asdic
GOMR	Gulf of Mexico Region
LIDAR	Light Detection and Ranging
MMC	Multipurpose Marine Cadastre
MMS	Minerals Management Service
MRIB	Marine Realms Information Bank
MXD	Map Exchange Document
NCCOS	National Centers for Coastal Ocean Science
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NURC-NAGL	National Undersea Research Center North Atlantic and Great Lakes

NOS	National Ocean Service
OCLC™	Online Computer Library Center
OCR	Optical Character Recognition
OCS	Outer Continental Shelf
OPAC	Online Public Access Catalog
PDF	Portable Document Format
QA/QC	Quality assurance/Quality control
RD	Remove duplicates
RDP	Remote Desktop Protocol
RFP	Request for proposal
RSMAS	Rosenstiel School of Marine and Atmospheric Science
SDE	Spatial Database Engine
SDK	Software Development Kit
SRC	Scientific Review Committee
UML	Unified Modeling Language
USDOI	U.S. Department of the Interior
USGS	U.S. Geological Survey
XML	Extensible Markup Language

1.0 INTRODUCTION

1.1 BACKGROUND

On October 1, 2011, the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), formerly known as the Minerals Management Service (MMS), was reorganized into the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE). BOEM is responsible for overseeing the safe and environmentally responsible development of energy and mineral resources on the Outer Continental Shelf (OCS) of the United States. BOEM leases and manages the offshore bottomlands within Federal waters, i.e., from the boundary of State waters offshore to the limits of the Exclusive Economic Zone (EEZ), for mineral and energy development. BOEM's jurisdiction is divided into four OCS Regions: Alaska, Pacific, Gulf of Mexico, and Atlantic. BOEM's responsibilities have existed against a backdrop of presidential withdrawals and Congressional moratoria that previously prohibited leasing within certain offshore areas. These moratoria began in 1982 when Congress imposed a moratorium on oil and gas leasing for offshore California. Over the next 26 years, the moratorium was extended to include OCS acreage off the U.S. Atlantic and Pacific coasts. In July 2008, President Bush lifted the withdrawals on oil and gas leases enacted by previous presidents. In October 2008, the 26-year old Congressional moratorium on oil and gas leasing on the OCS was allowed to expire. (Withdrawals and moratoria were re-instituted after the *Deepwater Horizon* oil spill.)

More recently, wide interest has developed in renewable energy leasing on the OCS, including along the U.S. Atlantic coast. The Energy Policy Act of 2005 charges BOEM with leasing the OCS bottomlands for the development of alternative energy and other uses. The April 2009 *Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf; Final Rule* (30 CFR Parts 250, 285, and 290) established a BOEM program to grant leases for renewable energy development activities, such as the siting and construction of offshore wind farms on the OCS, and other forms of renewable energy (e.g., wave, current, and solar energy). With the issuance of the Final Renewable Energy Framework, updated in October 2011 to reflect bureau reorganization, the BOEM became responsible for ensuring that the appropriate environmental studies were performed in support of renewable energy activities on the Atlantic OCS. Since then, proposed wind energy projects and state activities have increased the BOEM's need for current, comprehensive environmental data in the Atlantic OCS areas (BOEM 2012).

Proper execution of BOEM's responsibilities requires that environmental and scientific data is readily accessible to BOEM scientists to use in preparing Environmental Assessments (EA) and Environmental Impact Statements (EIS) in support of leasing decisions. BOEM was aware that a sizeable body of environmental and ecological study data pertaining to these offshore areas had been conducted during the various moratoria. However, information about the existence of these studies, the study locations and methodologies used, and the data from these studies were difficult to access because there was no integrated database housing the information. BOEM recognized a need to identify and collect this environmental and ecological research information to use in the environmental studies required to meet the requirements of the National Environmental Policy Act. BOEM decided to collect these data into a database that could be readily accessed using a geographically-referenced mapping system based on commercial GIS

software. In late July 2009, BOEM released a request for proposal (RFP) for an ESID that would assimilate the research documentation and resources into a mapping application with a user interface for accessing this data to support BOEM in leasing decisions.

1.2 PROJECT OBJECTIVE

1.2.1 Expected Project Outputs

The purpose of the ESID is to support ecosystem-based management decisions for three of BOEM's Atlantic planning areas (North Atlantic, Mid-Atlantic, and South Atlantic – see Figure 1). The ESID project was to conduct a comprehensive bibliographic search and assimilate data about specifically identified scientific topics for the Atlantic OCS. These relevant documents and datasets would then be managed and stored in a robust, geospatial database that could be accessed by geographical and textual or contextual data search techniques using a GIS map interface. Together, the geodatabase and map interface would offer a decision support system to assist BOEM meet the requirements of NEPA in its leasing decisions.

The project was expected to provide three distinct, technical outputs that were to be accomplished through the execution of contract-defined tasks. These technical outputs were:

1. Assimilation of ecological data relevant to the three BOEM Atlantic Planning Areas, together with the scientific analysis required to determine what data would be applicable to the program objectives.

2. Design and implementation of a database architecture capable of storing the assimilated ecological resource data, and also providing user-friendly access to the data using both geospatial and word search methods. This technical element included populating the database with properly formatted data and creating useful applications that would allow the data to be fully used for the BOEM tasks.

3. Properly documenting the project results, allowing for peer review of the project data, and providing for broad dissemination of project history and results.

1.2.2 Project Area and Areas of Interest

BOEM's Atlantic OCS Region is divided into four Planning Areas: North Atlantic, Mid-Atlantic, South Atlantic, and the Straits of Florida (Figure 1). These planning areas include the submerged lands, subsoil, and seabed lying between the seaward jurisdiction of each coastal state (3 nautical miles/~3.3 statute miles) and the seaward extent of Federal jurisdiction. The North Atlantic Planning Area lies adjacent to the Atlantic coastal states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, and New Jersey. The Mid-Atlantic Planning Area lies adjacent to Delaware, Maryland, Virginia, and North Carolina. The South Atlantic Planning Area lies adjacent to South Carolina, Georgia, and Florida. The Straits of Florida Planning Area lies adjacent to the southern half of the Florida peninsula. Figure 2 shows the locations and boundaries of the ESID project area.

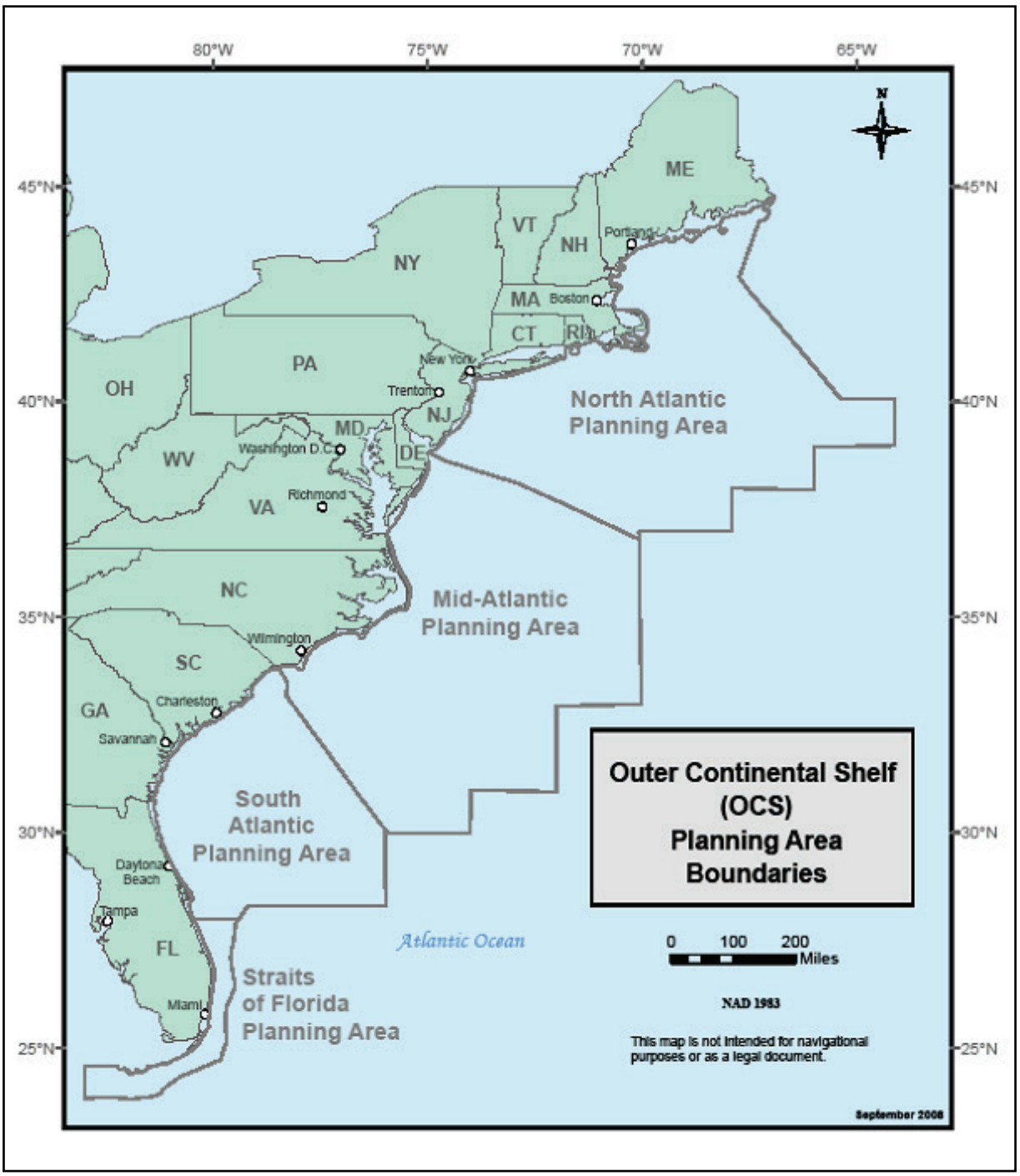


Figure 1. BOEM Atlantic Planning Areas (BOEM 2012).

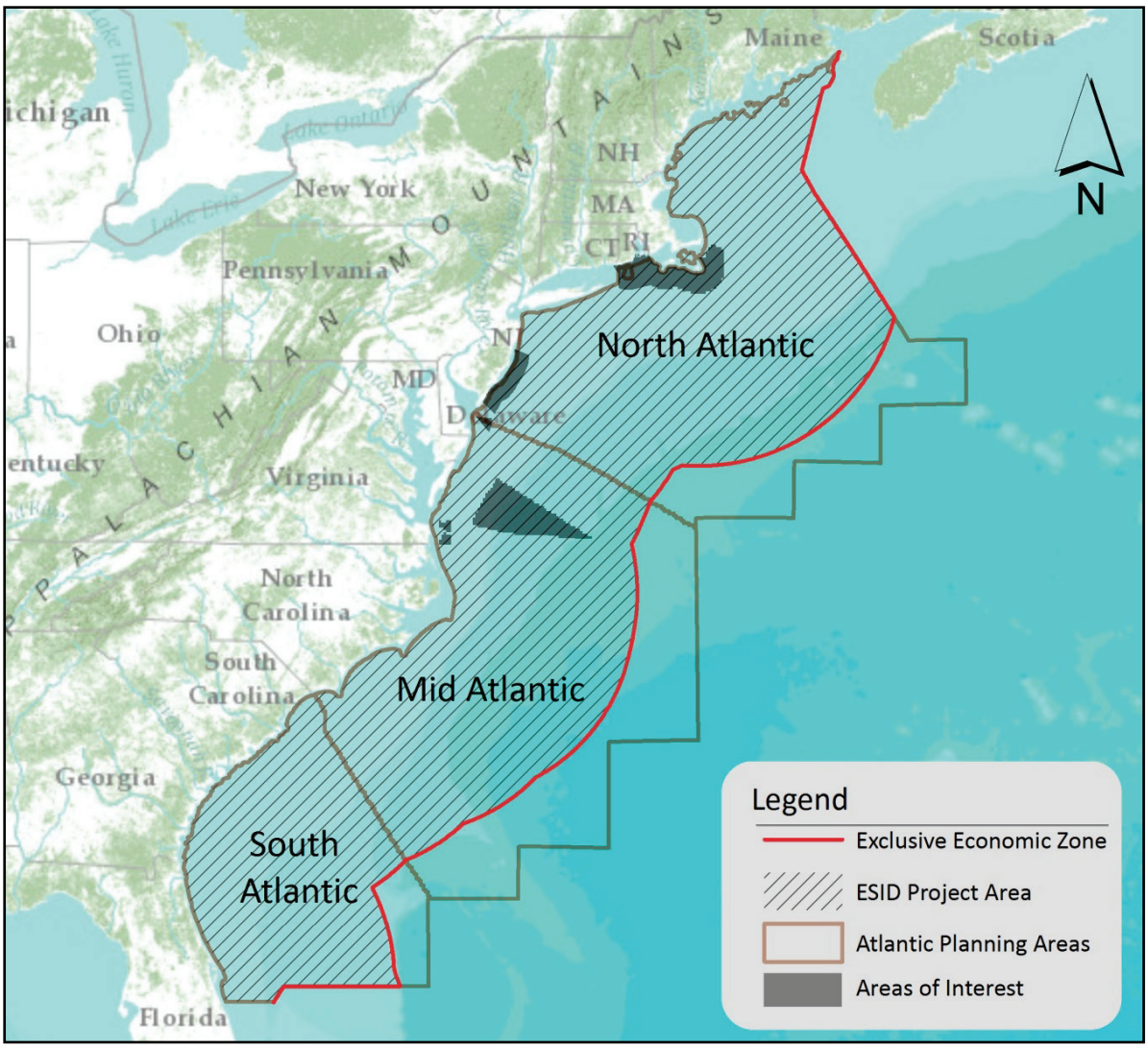


Figure 2. Map showing the ESID project area, and the Areas of Interest, which are potential lease areas described in BOEM's 5-year leasing plan.

The bibliographic search was constrained to the three BOEM Atlantic Planning Areas shown in Figure 2. The project requirements also included the extraction of additional information from those bibliographic resources that overlapped, or were contiguous with, "Areas of Interest" (AOI). The AOI are potential lease areas that were described in the draft 5-year (2010-2015) leasing plan (USDOI, MMS, 2009) and are shown in Figure 2.

1.3 TEAM PARTICIPANTS

The project was managed by the BOEM Gulf of Mexico Region (GOMR) and was funded by the Environmental Studies Branch (ESB) of BOEM in Herndon, Virginia. The contract team was led by AMEC out of their Nashville, Tennessee office.

- BOEM (GOMR) – Mr. James Sinclair and Dr. Rebecca Green
- BOEM (ESB) – Dr. Michael Rasser
- BOEM (Acquisition Operations Branch (AOB)) – Ms. Lisa A. Algarin

- AMEC – AMEC had overall responsibility for executing the ESID contract. Also, AMEC developed the database architecture and mapping and search application that was instantiated into the web user interface. A major part of AMEC's effort was determining the geographic area that each study resource addressed and creating GIS descriptions of these locations so that they could be located using a map interface.
    - Program Manager – Keld Madsen
    - Interim Program Manager – Lonnie Hearne
    - Quality Assurance Manager – Jeff Albee
    - ESID Implementation Manager – Brett Fritze
    - Interim Technical Project Manager – Brian Bugg
    - Data Collection/Management – Laura Benneyworth
    - Data Collection/Management – Jodi Lindsey
- Atkins (formerly PBS&J) – Atkins provided marine science expertise and had a key role in developing the scientific protocol for data and document collection and assessment. They also conducted a search for GIS datasets within the three Atlantic Planning Areas, formulated abstracts for ESID resources, assisted in developing the synthesis report, and co-presented at scientific and technical meetings.
    - Project Manager – Adam Gelber
    - Principal Investigator – Don Deis
    - Task Manager, Synthesis Report Preparation – Beth Zimmer
    - Technical Document Formatting – Leslie Manzello
    - Internal Science Review Team (ISRT) Members – Stuart Strum (Geology), Ralph Montgomery (Water Quality), Kristen Jenkins (Pelagic Ecology and Demersal Fishes), Don Deis (Seagrass)
- CSA – The bibliographic search was led by CSA of Stuart, Florida. CSA provided subject matter expertise for marine science disciplines and quality assurance oversight for the resource data collection.
    - Project Manager – Will Sloger
    - Project Librarian – Kristen Metzger
    - Quality Assurance/Process Oversight – Dr. Neal Phillips
    - ISRT Members – John Thompson (Geology), Luis Lagera (Water Quality), Dave Snyder (Pelagic Ecology and Demersal Fishes), Keith Spring (Seafloor Features, Coral, Hardbottom), Brian Balcom (Infauna/Meiofauna), Edward Hughes (Water Quality and Infauna/Meiofauna)
- Esri® – Esri® provided subject matter expertise in database design and implementation of the ArcMarine Database.
    - Project Manager – Doug Cribbs
    - Database Architecture – Eric Chiasson
- GISbiz Inc. – GISbiz Inc. of Nashville, Tennessee performed the data extraction tasks for the project.
    - Task Manager – Babu Krishnasamy
    - Team Leader – Srinivasin Karanukaran
    - Quality Manager – Senthil Kumar

2.0 REQUIRED SYSTEM ELEMENTS

The first requirement of the project was to conduct a bibliographic search of the scientific literature about the Atlantic Planning Areas and identify relevant ecological resources. The search was based on resource categories provided by BOEM. The identified resources were identified, acquired, and converted into a searchable format to be included in the database. As part of the database creation effort, an annotated bibliography was created to:

- Provide a full reference, for each source, that would allow access to the document itself or to a Microsoft® Access® portal for getting the source from its copyright owner;
- Include in each annotation a description of the results and any other pertinent information (e.g., new species, part of a time series, cooperative venture resulting in related studies, etc.); and
- Include geographic area, subjects addressed, methods/analyses, time span, seasonality, etc., either described directly in tabular fields or included in keyword or abstract fields, serving as search criteria to query the ESID.

The original contract scope called for the development of an ESID user interface using Esri® ArcMap®, which is a single user desktop application. Subsequently, it was determined that a desktop application would limit system utility because the amount of data required to be transferred from servers in New Orleans, Louisiana would significantly slow the system performance. Based on coordination with BOEM staff, it was determined that a web-based application could meet the requisite system performance requirements. A subsequent contract modification changed the system design specification to require that the system be web-based, using an enterprise geodatabase that would be accessed using a web-based map interface in Esri® ArcGIS Server® 10. A significant design goal for the ESID was to eventually provide public access capability. To provide this broad system access, a decision was made to host the ESID using a cloud system. Cloud computing refers to using software and computer infrastructure that is supplied over the Internet. In the case of the cloud-based ESID, software, computer storage, and processing were to be provided on the Amazon Elastic Compute Cloud® (EC2®) cloud system and accessed with a browser application developed using Adobe® Flex®. Adobe® Flex® is a software development kit (SDK) for the development and deployment of cross-platform rich internet applications based on the Adobe® Flash® platform. Table 1 lists the software used to develop the ESID.

System functionality would include the following.

- Provide access to all relevant ecological data by clicking on the applicable feature in the map interface.
- Provide public access to the ESID with restricted access to any copyright protected resources.
- Provide a geographic search capability (i.e., the user can select an area or a polygon to return all data associated with the area selected).
- Provide a textual search capability based on pre-defined and/or user-specified queries using keywords related to specific areas of scientific inquiry.

- Use existing base map services, which are already maintained by BOEM, to enhance the web application base map and to represent ecological data.
- Generate reports of bibliographic information associated with selected geographic areas with the option to choose fields.
- Provide the ability to search and browse the database tables directly.
- Provide instructions for using the ESID user interface, including a user's guide and help pages, and any other relevant documentation.
- Adhere to BOEM security standards.

Additional project requirements included the following.

- Develop a database able to accommodate "virtually unlimited growth" and address a very broad range of potential ecological and environmental data types. Although a relatively simple database structure would have sufficed for the initial ESID requirements, the growth requirement, together with the word and data search requirements, dictated that the database architecture needed to be designed to enable long-term sustainability for the system.
- Extract data tables from resource documents within or near the AOIs. The data tables were extracted into a Microsoft® Excel® format, stored in the ESID folder structure, and made accessible through the ESID application.
- Develop the ESID to complement ongoing agency efforts by providing compatible data for existing delivery systems, such as the Multipurpose Marine Cadastre (MMC) system under development by the National Oceanic and Atmospheric Administration (NOAA) and BOEM.
- Develop Federal Geographic Data Committee (FGDC) compatible metadata.
- Create polygons enclosing the geographic area or point location for all studies included in the ESID. Geographic coordinates could be used as search criteria to query the ESID.
- Use an Esri® Unified Modeling Language (UML) Data Modeling Diagram to map the data relationships within the database.
- Develop a formal quality management program to ensure the reproduction accuracy of the sources used. Formal training was recommended for the ISRT and other relevant personnel to promote that data was transferred with high fidelity. The ESID and its web interface were tested thoroughly to ensure proper operation and usability.
- Document the ESID in at least one peer-reviewed journal article and one professional scientific meeting to communicate results of the study.
- Review of the final report by three qualified reviewers outside of BOEM who would serve as a Scientific Review Committee (SRC).

Table 1.

Software used to develop the ESID.

Software	Version	Description
RefWorks®	1.0	Collect bibliographic data from libraries
Filezilla	3.5.3	Transfer files between offices and cloud servers
CVista® PDFCompressor	4	Automated Optical Character Recognition (OCR) software
Adobe® Acrobat®	9	Individual Optical Character Recognition (OCR) software
ABBYY® Fine Reader®	10 Professional	Data table extraction from PDF documents
Irfanview	3	Extracting maps from studies for digitization
Microsoft® Access®	2003	Internal review process tracking and data storage/management
Microsoft® Word	2007	Creating abstracts and project documentation
Microsoft® Excel®	2007	Quality control of data tables
Microsoft® Visio®	2007	Creating graphics for project documentation
Esri® ArcMap®	9.3	Digitizing resource boundaries and managing GIS data
Esri® ArcGIS Server®	10	Serving GIS data to the ESID web interface
Microsoft® Visual Studio®	2010 Professional	Develop the ESID web application
Adobe® Flash Builder®	4.0	Software development environment for Flex® framework
pgAdmin	1.12.3	PostgreSQL database management software for bibliographic database
Amazon Web Services	Not applicable	Host the ESID web application, database, and services.
Windows® Server®	2008 R2	Operating system for cloud servers
Internet Information Services	7	Serving the ESID web application
Microsoft® Internet Explorer®	8	Viewing the ESID web application and searching for publisher information
Reference Manager®	12	Storage of bibliographic exports
Apache™ Subversion®	1.7.9	Code repository for application development

Table 1 (continued). Software used to develop the ESID

Software	Version	Description
Microsoft® PowerPoint®	2007	Presentation development
Microsoft® Project®	2007	Project schedule management
Microsoft® Sharepoint®	2007	Document and schedule coordination with remote teams

3.0 APPROACH TO WORK

Based on the magnitude of the project and the number of people involved in its creation, developing a strategic and thorough project protocol was of the utmost importance to the success of the ESID. A science-based and step-wise approach was used to construct the protocol, which was developed by a project team that included a professional librarian, scientists, software developers, and database experts. The ESID protocol is comprehensive and addresses all elements of the project, including: 1) Data collection and documentation, identification and evaluation of resources; 2) Geospatial evaluation and documentation, geographic characterization of the collected resources; and 3) Database development, design and implementation of the geospatial database and associated applications (Figure 3). The ESID protocol defined a logical, documented approach to ensure that all ESID team members were implementing identical assumptions and processes while conducting their respective tasks.

Because of the complexity and extensive nature of the project, a rigorous QA/QC program was implemented on all levels to validate the process and the results. The primary goals of the QA/QC program were to ensure that the end product performed in a fully satisfactory manner for all users and that the database was populated with geospatially-referenced resources and structured in a way that was readily accessible. The two primary components of the QA/QC program were the development of specific methods for completing project tasks coupled with regular intermediate and final product reviews by a dedicated QA/QC program manager. Communication was the key of the QA/QC program, to be sure that a feedback loop existed to support review, information dissemination, acceptance, and revision.

3.1 RESOURCE COLLECTION

The resource data collection task consisted of seven steps, shown in Figure 4. These steps follow a specific repeatable process, and begin with defining the processes for team members to follow, assembling the team and identifying potential resources, acquiring the bibliographic data, and thorough quality control.

3.1.1 Protocol

The first task of the project was to develop a protocol for how to proceed with the resource data collection. The protocol was to be a logical, documented approach to ensure that all team members were aligned and using the same assumptions and processes in carrying out their respective tasks. This protocol was expanded to show the entire process from bibliographic research to incorporating the resources into the ESID database. The protocol and all intermediate protocol products were archived on a Microsoft® SharePoint® web site accessible by all team members.

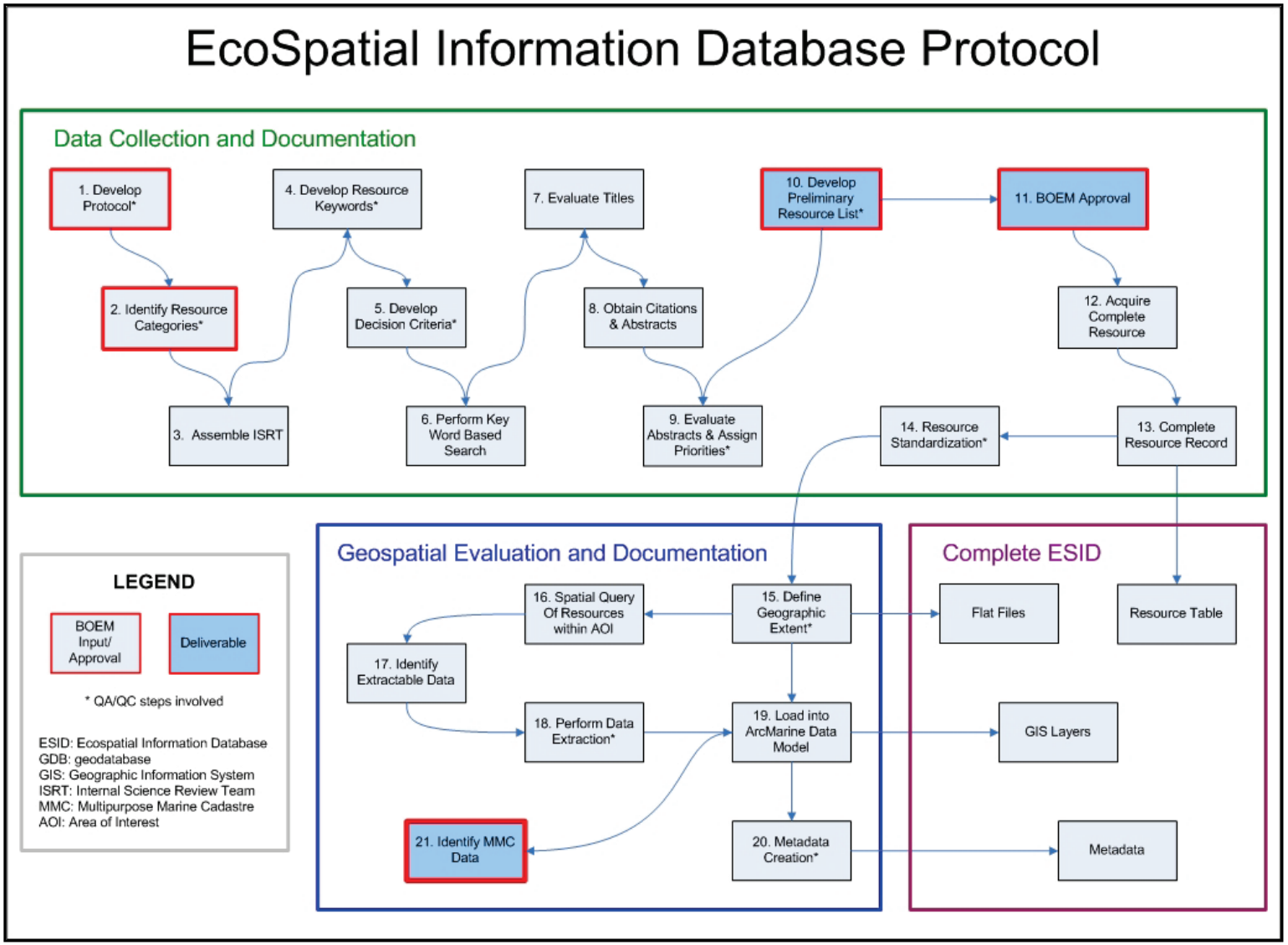


Figure 3. ESID project protocol.

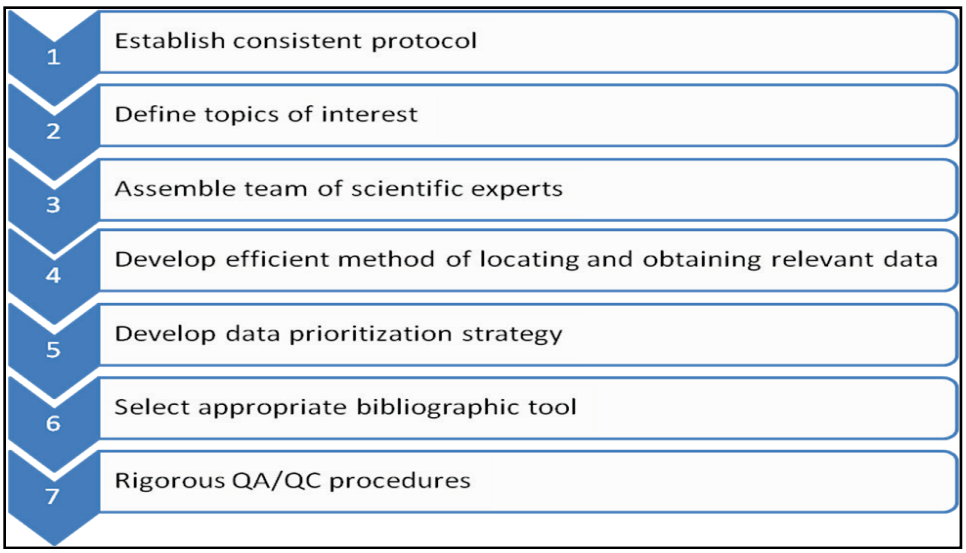


Figure 4. Resource data collection steps.

3.1.2 Resource Categories

Before initiating the search for relevant ESID resources, it was necessary to define the type of information to be included in the ESID. This was accomplished by defining the topics to be addressed in the ESID and the topics to be excluded. The ESID topics of interest, referred to as "Resource Categories," were the foundation of the resource data collection task. The Resource Categories were determined based on collaboration with BOEM staff and were directly related to information required for BOEM's NEPA process. The Resource Categories, for which literature and dataset searches were performed, consisted of the following topics:

- Geology
- Water quality
- Pelagic ecology
- Benthic ecology (four sub-categories)
    - Infauna/meiofauna
    - Demersal fishes
    - Coral and hardbottom communities
    - Seagrass

For the most efficient use of resources, it was also necessary to define topics that should be excluded from the ESID, based on input from BOEM staff. While the ESID is capable of housing comprehensive information, many relevant topics were excluded because of a reasonable limitation of funding. The expectation is that additional topics and information resources should be added in the future. The following topics were specifically excluded:

- Physical oceanography (currents, waves, tides, hydrography, etc.)
- Chemical oceanography other than contaminants (e.g., nutrients)
- Socioeconomic and cultural resource topics typically found in an EIS:
    - Commercial and recreational fisheries
    - Essential fish habitat (EFH)

    - Ocean disposal sites and activities
    - Marine sanctuaries
    - Military use
    - Marine transportation (shipping, boating)
    - Archaeological resources (shipwrecks, submerged prehistoric resources)
    - Artificial reefs
    - Cables and pipelines
    - Mineral resources (e.g., sand source areas)
    - Deepwater LNG ports
    - Alternative energy leasing/activities
- Coastal habitats, features, and ecology
- Bats and insects (e.g., migrating over water)
- Electromagnetic fields (EMFs)
- Marine mammals, sea turtles, migratory birds

At the request of BOEM staff, the ESID was limited to resources with ecological data and information. This was specifically addressed during the keyword development (Section 4.1.1) and relevance determination (Sections 4.1.3 and 4.2.4) portions of the process.

3.1.3 Formation of the Internal Science Review Team

The resource data collection process included evaluating resources for relevance and inclusion in the ESID. This task required scientific expertise in various marine science disciplines. An Internal Science Review Team (ISRT) of scientists knowledgeable in each Resource Category (Table 2) was assembled. The ISRT had the following project responsibilities.

1) Create keywords for the Resource Categories to be used during literature and data searches.
2) Develop criteria and relevance matrices for each of the Resource Categories to facilitate the evaluation of resources.
3) Review the resource abstracts for relevance to the ESID using the relevance matrices.
4) Review resources for potential GIS data extraction.

Table 2.

ESID Internal Science Review Team (ISRT).

Resource Category	Resource Sub-Category	Lead Resource Expert	Collaborative Keyword Team
Geology	N/A	Strum, Stuart (Atkins)	Strum, Stuart (Atkins)
			Thompson, John (CSA)
Water Quality	N/A	Montgomery, Ralph (Atkins)	Montgomery, Ralph (Atkins)
			Lagera, Luis (CSA)
Pelagic Ecology	N/A	Jenkins, Kristen (Atkins)	Jenkins, Kristin (Atkins)
Benthic Ecology	Seafloor Features	Spring, Keith (CSA)	Spring, Keith (CSA)
	Infauna, Meiofauna	Balcom, Brian (CSA)	Balcom, Brian (CSA)
	Demersal Fishes	Snyder, Dave (CSA)	Snyder, Dave (CSA)
			Jenkins, Kristin (Atkins)
	Coral and Hardbottom	Spring, Keith (CSA)	Spring, Keith (CSA)
			Deis, Don (Atkins)
	Seagrass	Deis, Don (Atkins)	Deis, Don (Atkins)

3.1.4 Obtaining Relevant Information

A vital key to the development of the ESID was to design an efficient method for locating and collecting relevant information. Two types of information were included in the data collection process: documents (peer-reviewed scientific literature, technical reports, government documents, etc.) and data (raw data and GIS data). The search protocols used during the literature and dataset searches were distinct and are discussed in more detail in Sections 4.1 and 4.2. The literature search involved a professional librarian with extensive experience in scientific research and expert knowledge in marine bibliographic databases. The dataset searches were based on website reviews and were performed by staff with backgrounds in marine science.

3.1.5 Prioritization – Relevance Matrices

Once potential resources had been located, it was imperative to quickly and efficiently determine the relevance of a particular resource to the ESID. The ISRT developed two decision criteria, which were applied to potential resources during the data collection process: 1) threshold criteria and 2) relevance criteria. The threshold criteria helped the ISRT determine if a resource was worthy of closer examination. The threshold criteria for all resource categories were: topic (clearly applies or may apply to the Resource Categories) and location (clearly applies or may

apply to the ESID project area). These threshold criteria essentially served as a "first cut" for potential resources because these two basic criteria must be satisfied for any resource to be relevant to the ESID.

A document or dataset met the "topic" criterion if the study had been conducted to address aspects of a specific Resource Category and was not substantially conducted to address excluded topics. A document met the "location" criterion if the study had been conducted substantially within Federal waters and within BOEM's three Atlantic Planning Areas within the EEZ. A study in State waters was included only if it overlapped with Federal waters and was relevant to the Resource Categories. (Work in State waters can be included in the ESID but was excluded for this effort due to budget limitations).

Relevance criteria specific to each Resource Category were developed by the ISRT to help in reviewing abstracts to determine if the document should be acquired and to prioritize the resources relative to one another for acquisition. These relevance criteria were combined into a "Relevance Matrix" which displayed all of the relevance criteria for each Resource Category. A detailed description explaining the application of the Relevance Matrix to the document and data search can be found in Sections 4.1.3 and 4.2.4, respectively.

3.1.6 Bibliographic Database (RefWorks®)

An appropriate bibliographic database framework was required as a repository for the document resources' bibliographic metadata. With the appropriate bibliographic database tool, users could perform a bibliographic search and house the data as they were collected. The original scope of work called for the use of Reference Manager® Version 12. However, several bibliographic database software tools were evaluated and the RefWorks® bibliographic database (RefWorks®) was chosen for use in the ESID project. RefWorks® offers a variety of advantages to the ESID, including the following.

- It is a web-based research management tool that provides simultaneous, centralized access to multiple users. The RefWorks® database is housed on an external network and users can access the database through the Internet. Thus, no specialized software is required on individual user machines and users can access the database from any location. Multiple users were able to upload and download information simultaneously to the RefWorks® database, making it an advanced and efficient bibliographic tool.

- RefWorks® provides the dual uses of a data management system and a bibliographic tool. In addition to simply housing bibliographic information, RefWorks® is used to manage data (i.e., add information regarding a resource, such as prioritization scores, tracking information, copyright restrictions and permissions, order status, cost to acquire, and QA/QC notes).

- It allowed easy interaction and feedback with BOEM. BOEM staff could review and approve bibliographic information remotely and monitor the data collection progress online.

- RefWorks® can directly import bibliographic information from Dialog® and WorldCat™, the two primary library sources used to identify resource documents for the ESID project.

- Users can generate a list of the ESID resources directly from the database (i.e., the Preliminary Data List discussed in Section 5.1).

All appropriate team members were provided access to the online RefWorks® database. The final ESID user interface provides the ability to export bibliographic information in Microsoft® Excel® format and in Reference Manager® format, as required by the original scope of work.

3.1.7 Quality Assurance/Quality Control

The seventh element of the resource data collection process was to make sure that proper quality procedures were applied to the project. Due to the complex and extensive nature of the data collection process, rigorous QA/QC processes had to be implemented to validate the process and results. Subject matter experts at all levels were associated with independent internal and external reviews with oversight from the Principal Investigator, who led the top level QA/QC program. The QA/QC process ensured consistency and completeness of the overall project, including the prioritization assignments across all Resource Categories.

3.2 USER STORY AND BUSINESS REQUIREMENTS

One of the ESID project goals was to provide a user-friendly system that would meet the needs of BOEM scientists. The initial requirements were collaboratively developed by BOEM scientists at a number of locations. The requirements, as set forth in the original statement of work, explained in broad terms what the ESID was to do; however, these requirements were not defined clearly enough to design a system without further understanding of the user requirements.

To develop the ESID, a process was needed to further define the requirements of the ESID so that everyone (potential users, management, developers, testers) had a common understanding of what the system was required to do. Conversations were held with users in various BOEM regions to determine how they might use the ESID. These requirements were reduced to a series of "user stories", by which all stakeholders could agree on the criteria and what the system was required to do (Figure 5). These user stories were translated into "business requirements" using a technique called "behavior-driven development," a feature of agile programming methods. These requirements were documented in the "User Story and Business Requirements" document (Appendix A).

BR Id	Business Requirement Description
Information Delivery	
BR-1a	View resource boundaries overlaid with Multipurpose Marine Cadastre base map features and BOEM planning areas and lease blocks.
BR-1b	Search for resources within a user defined geographic extent or the radius of a point as interactively defined by the user and display the results.
BR-1c	Search for resources within a user defined geographic extent as retrieved from a user supplied Shapefile, and display the results.
BR-1d	Search for resources based on selections of lease blocks or other predefined areas of interest, and display the results.
BR-1e	Search for resources matching a user defined text search to the bibliographic database, and display the results.
BR-1f	Search for resources (full document scan) matching a user defined text search, and display the results.
BR-1g	Refine the user's search results with sub-queries.
BR-1h	View references, citations, and documents associated with a map resource.
BR-1i	Download selected resource files (Documents and associated data)
BR-1j	Generate reports based on selected resources in the search results table.

Figure 5. An example of the user stories, as contained in the ESID User Story and Business Requirements document.

3.3 System Design

The initial ESID system design was somewhat simple in that it called for development of the resource document database and provision of access to the database through the use of an Esri® ArcMap® GIS based interface. The ESID database was to be hosted on servers at the BOEM site in New Orleans, Louisiana. The initial system design concept was based on the use of an Esri® Personal Geodatabase together with other database components to be developed as part of the project. The ESID was to be served to the Esri® ArcMap® desktop applications at remote sites throughout the U.S. using Citrix software. This original system design is shown in Figure 6.

The contract called for delivery of a prototype ESID database after six months. To demonstrate the prototype database, a prototype of the desktop map application was developed in Esri® ArcMap®. This prototype desktop map application gave potential remote users an opportunity to see how the system was going to perform. Early on, the remote users expressed concern that system performance might be seriously compromised due to the amount of data required to be transferred from the BOEM servers in New Orleans to the remote sites.

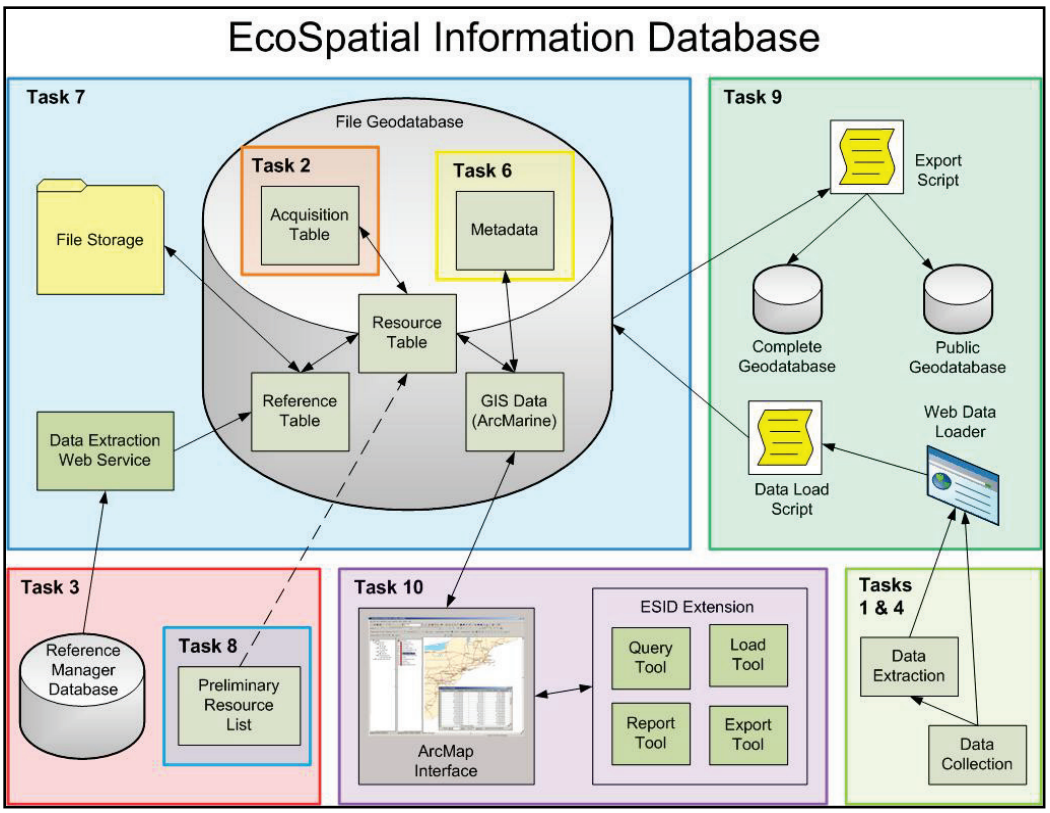


Figure 6. Original ESID design.

An alternate design was proposed that would use web-based technologies and would host the data on a web server using an enterprise geodatabase. The interface to the database was to be provided by an application using Esri® ArcGIS Server® 10. About this time, the Department of the Interior issued new Information Technology (IT) guidelines dictating a "cloud first" policy; that is, managers were to consider hosting new applications in a virtual environment using "cloud" implementations as a first option rather than expanding existing agency IT infrastructure. After reviewing the advantages and benefits of the web-based, cloud-based approach, BOEM requested that the team explore the implications of implementing the ESID using these technologies. A subsequent contract modification authorized a change such that the user interface would be implemented using a web-based map interface hosted on the Amazon EC2® cloud. Amazon EC2® was chosen because the Amazon EC2® cloud had already implemented Esri® ArcGIS Server®. This ensured ready migration of the ESID to a cloud-based system. This new system concept is illustrated in Figure 7.

One of the significant benefits of this approach is that the ESID could be readily deployed as both a "closed" system (i.e., accessible only by authorized users) and as an "open" system (i.e., accessible by the general public), subject to certain restrictions related to copyright restricted data. The ESID web interface was built using the Esri® Adobe Flex Application Programming Interface (API), which was chosen to leverage existing functionality already available within the API while focusing development efforts on components specific to the needs of the ESID. This approach permitted more functionality to be delivered within the project budget. Generic service oriented architecture (server) was developed so the ESID interface (client) could evolve into a variety of undetermined formats.

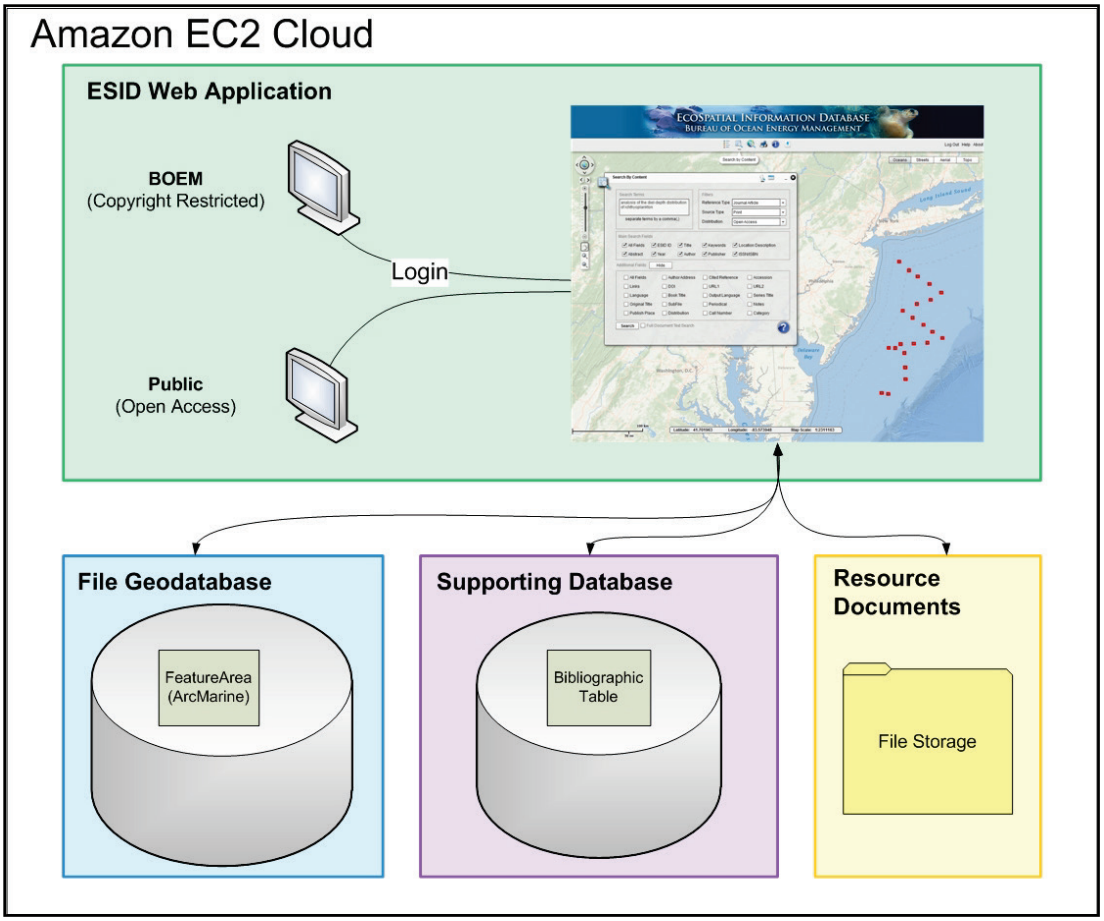


Figure 7. ESID cloud system concept.

3.4 ARCMARINE DATA MODEL

The ESID was required to accommodate "virtually unlimited growth" and address a very broad range of ecological and environmental data types. Although a relatively simple database structure would have sufficed for the initial ESID requirements, the growth requirement, together with the word and data search requirements, dictated that the database architecture needed to be designed to enable long-term sustainability. An Esri® project team member was specifically involved to provide guidance regarding the data model for the ESID. During the initial design phase, Esri® recommended the use of the geospatial data model, ArcMarine. ArcMarine, a complex data model based on Esri® ArcGIS, was developed collaboratively by marine scientists and researchers in many nations to provide a common framework for marine data exchange (Wright et al. 2007). While the ArcMarine data model is incorporated into the ESID, the ESID uses only a small portion of the ArcMarine model capabilities and is primarily used as a repository for all resource boundary layers.

3.5 USER INTERFACE

The user interface was required to provide the following capabilities.

- Perform geographic extent search – point and radius (point with a defined buffer distance).
- Perform geographic extent search – polygon extent (extent defined by a finite sequence of straight line segments).
- Perform geographic extent search – Lease Area.
- Perform geographic extent search – user uploaded shapefile.
- Refine geographic extent searches with additional textual search terms and search of bibliographies.
- Perform bibliographic search.
- Allow viewing of search results (citations, resource Portable Document Formats (PDF), and associated data).
- Provide downloading of resource documents.
- Provide Help documentation to assist in usability.
- Allow login and full bibliography view (BOEM Users).
- Perform full text search of searchable PDF documents.
- Allow uploading of resources (Data Loading).
- Maintain resources (Data Review).
- Provide an Administrative Component (User Management).
- Create reports of search results (Microsoft® Excel® list of full bibliographies).
- Export annotated bibliography to Reference Manager® Version 12.
- Create user guide to assist in system administration.

The user interface was originally intended to be created as a desktop application using Esri® ArcMap®. When it was determined that a web-based application would be implemented, the decision was made to deploy the system using the Esri® ArcGIS Server® and to develop the user interface using the Flex web application.

3.6 DOCUMENT WORD SEARCH DESIGN IMPLEMENTATION

The system was required to provide the capability to search the bibliography using word searches that were based on Boolean logic. To accomplish this, all resource documents in the system were to be converted to searchable PDF format. The system design incorporated two levels of word search capability. The first and simplest was a word search of the bibliographic records. Because the metadata for the bibliographic resources was based on the desired Resource Categories and keywords, this would provide a very rapid search capability.

For instances where a more thorough search is desired, the system was designed to accommodate searching for terms of interest within all text in every document located in the system. The design called for a multi-step process that would first "index" the documents in order to provide the matching search criteria for accessing the documents. A database index is a data structure that improves the speed of data retrieval operations on a database table. In this case, indexing was needed to improve the speed with which the ESID can search all of the documents in the system.

Advanced indexing would be performed using PDFBox, an open source PDF manipulation tool together with Lucene, an open source indexing tool capable of operating with a variety of document formats. Figure 8 illustrates the processing flow for preparing documents for the word search process.

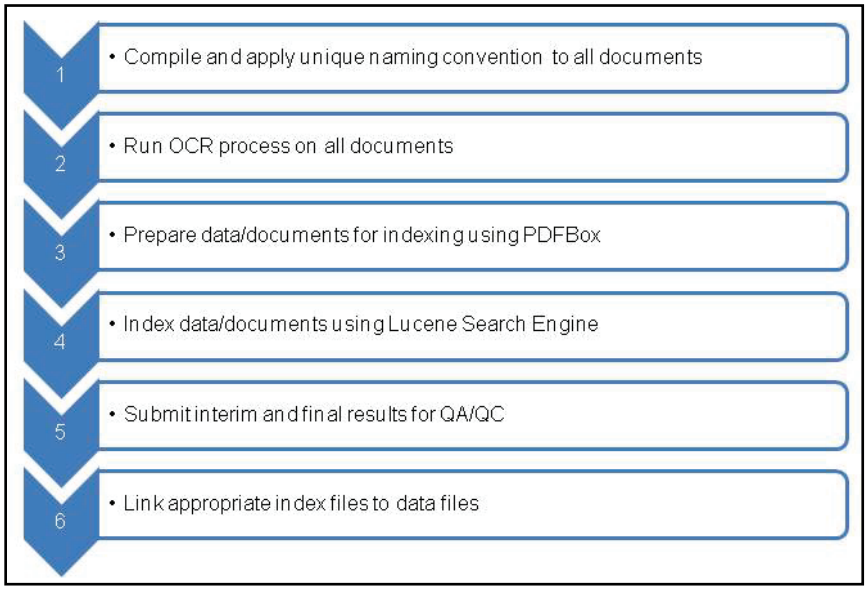


Figure 8. Word search process.

4.0 RESOURCE COLLECTION

The search for relevant resources to include in the ESID consisted of two distinct efforts. The first was to conduct a comprehensive search for literature relevant to the ESID project. The second was to conduct a comprehensive search for relevant datasets that might be available on existing websites.

4.1 LITERATURE SEARCH

The literature search team consisted of scientists and technicians from AMEC, Atkins, and CSA. As described in Section 3.1.1, the team followed a detailed protocol in executing their tasks. Weekly team meetings were held during the resource collection phase to report on and chart the progress.

4.1.1 Development of Keywords, Literature

Keywords were developed to capture as much information as possible that may be relevant to the ESID during the initial literature search and to efficiently target the search efforts to minimize gathering of extraneous information. Keyword list development began once the ISRT members had been assigned. Each ISRT lead resource expert generated a list of keywords that served as the basis for the initial document search. For those categories with a collaborative keyword team member (as in Table 2), the ISRT lead expert sought input from the keyword team member. For consistency, all ISRT members followed the *Guidelines for Preparing Key Words* (included in Appendix B).

The project librarian worked closely with each ISRT lead resource expert and the QA/QC manager to refine the keyword lists and the literature searches to arrive at a manageable number of results ("hits") before generating the final title lists. This collaboration included deleting words or phrases, placing terms in an order of emphasis, and adding or modifying the geographic limiters. If an unreasonable number of hits resulted from the initial keyword-based search, the keywords were adjusted and the search re-run. Likewise, the keyword searches were initiated with no publication date restrictions**.** The final keyword lists underwent QA/QC by the principal investigator. The QA/QC review focused on completeness and consistency of the keyword lists.

4.1.2 Literature Search Details

To locate relevant literature for inclusion in the ESID, the project librarian used the keyword lists and geographic limiters to search the following sources:

- Dialog® databank OCL WorldCat™ databank
- Aquatic Commons
- Targeted internet searches for EIS

The methodologies used to search each of these sources are described in the following sections.

4.1.2.1 Dialog® Searches

Dialog® is a collection of 600 databases covering science, technology, intellectual property, and business. Literature searches for the seven Resource Categories were run in selected Dialog®

databases. A list and description of the 12 Dialog® databases that were searched is provided in Appendix C. All listed databases (with the exception of Geoarchive® and GeoRef®) were used for each Resource Category search. Geoarchive® and GeoRef® were added to the other databases when searching only the Geology Resource Category. Dialog® allows very complex searches to be run across multiple databases at the same time, an option not allowed when one uses databases provided in a university library. The Dialog® databases are the most comprehensive versions of a database producer's product. For instance, the Dialog® database Biosis Previews contains citations from 5,000 journal titles. In comparison, the Basic Biosis database, which is offered in many university libraries, covers only the prime 350 journal titles of the 5,000 in Biosis Previews.

The literature searches were run using Dialog® Classic, the Dialog® platform for experienced Dialog® command language searchers. This is a fast and highly flexible interface for advanced searchers. Special features include secure web server access, a buffer that captures and displays search results, and a search log for easy reuse of search statements. Each of the seven Resource Categories was searched separately. The databases were selected and search terms and set combinations were entered. The search statements for each Resource Category are included in Appendix D. The "Remove Duplicates" (RD) command was generated on the final result prior to output. Because RD removes only exact duplications, numerous duplicates were still present in the results.

The Dialog® searches identified 27,118 potentially relevant resources (Table 3). To contain costs, final results of each search were output in the title only format (format 6) and saved in a word processing document file. An example of the Dialog® output title format is as follows.

> **64/6/1 (Item 1 from file: 5)**
> **DIALOG(R)File 5: Biosis Previews(R)**
> **(c) 2009 The Thomson Corporation. All rights reserved.**
>
> **0021265600 Biosis No.: 200900607037**
> **A simulation model to explore the response of the Gulf of Maine food web to large-scale environmental and ecological changes 2009**

The resulting titles were imported into a spreadsheet according to Resource Category and the spreadsheets were distributed to the appropriate ISRT member for evaluation and prioritization, as described in Section 4.1.3 below.

Table 3.

Number of titles identified and citations downloaded from the Dialog® and Worldcat™ databanks.

	No. of Titles Identified		No. of Citations Downloaded	
Resource Category	**Dialog®**	**Worldcat™**	**Dialog®**	**Worldcat™**
Geology	4,782	54	2,668	54
Water Quality	4,308	46	1,956	46
Pelagic Ecology	11,395	64	2,598	64
Infauna/Meiofauna	1,503	12	887	12
Demersal Fishes	2,669	51	820	51
Coral and Hardbottom	2,346	86	119	86
Seagrass	115	0	18	0
Total	**27,118**	**313**	**9,066**	**313**

4.1.2.2 Worldcat™ Searches

Upon completion of the Dialog® database searches for each Resource Category, keyword searches were run on Worldcat™, the largest online public access catalog (OPAC) in the world. Worldcat™ is produced and maintained by the Online Computer Library Center (OCLC™) and contains cataloging records of the collections of its 72,000 member libraries representing 170 countries. It is the world's largest, most complete, and most consulted library union catalog. While the Dialog® searches focused on journal articles and book chapters, searches of Worldcat™ located larger materials (e.g., books, theses, dissertations, government documents, technical reports, and other literature). A screen capture from the Worldcat™ search page is included in Appendix E. The Worldcat™ searches resulted in 313 potentially relevant resources (Table 3). A typical record resulting from the Worldcat™ search is shown in Table 4 below.

Table 4.

Representative Worldcat™ search record.

Table 4 (continued). Representative Worldcat™ search record.

More Like This:	Search for versions with same title and author | Advanced options ...
Find Items About:	United States. (5,257,957); Battelle Ocean Sciences (Organization) (1); Lamont-Doherty Geological Observatory. (11); Woods Hole Oceanographic Institution. (217)
Title:	**Study of biological processes on the U.S. Mid-Atlantic slope and rise /**
Author(s):	Maciolek, N.
Corp Author(s):	United States.; Minerals Management Service. ; Battelle Ocean Sciences (Organization) ; Lamont-Doherty Geological Observatory. ; Woods Hole Oceanographic Institution.
Publication:	Washington, D.C. : U.S. Dept. of the Interior, Minerals Management Service,
Year:	1987
Description:	2 v. : ill., maps ; 28 cm.
Language:	English
Series:	OCS study;
Contents:	v. 1. Executive summary -- v. 2. Final report.
Accession No:	**OCLC:** 17862869
	SUBJECT(S)
Descriptor:	Oil and gas leases -- Environmental aspects -- United States. Offshore oil well drilling -- Environmental aspects. Benthos -- Atlantic Coast (U.S.)
Note(s):	Performed by Battelle Ocean Sciences with Woods Hole Oceanographic Institution and Lamont-Doherty Geological Observatory./ "Contract no. 14-12-0001-30064."/ "December 15, 1987."/ "MMS 87-0050."/ Includes bibliographies.
Class Descriptors:	**LC:** TN871.3
Responsibility:	by N. Maciolek ... [et al.].
Material Type:	Government publication (gpb); National government publication (ngp)
Document Type:	Book
Entry:	19880428
Update:	20090516
Database:	WorldCat™

4.1.2.3 Aquatic Commons Searches

Aquatic Commons is a digital repository covering the natural marine, estuarine/brackish and fresh water environments. The Aquatic Commons search located only relevant documents that duplicated citations already located in our Dialog® and Worldcat™ searches. Plans to search the OAIster® digital repository were changed when the records were incorporated into Worldcat™. A screen capture from the Aquatic Commons search page is included in Appendix E.

4.1.2.4 Targeted Internet Searches

Targeted internet searches were conducted to identify EIS documents within the project area that might not have been identified in the Worldcat™ search. Using the keyword lists for the Dialog® searches, multiple searches using various combinations of keywords were run on both Worldcat™ and Aquatic Commons. These databanks do not allow for the very sophisticated search statements that can be entered all at one time on Dialog®. The citations were downloaded for a total of 28 EIS documents using both the Worldcat™ and targeted internet searches. It should be noted that a majority of the EIS documents identified by the Internet searches had previously been identified during the Worldcat™ search.

4.1.3 Prioritization of Literature

4.1.3.1 Prioritization of Literature Titles

The document titles identified during the Dialog® database searches were evaluated to determine whether the complete citation and abstract should be obtained for further evaluation. The spreadsheets containing the list of titles generated for each Research Category contained an easy-to-use macro enabled "yes/no" selection option for each title. The spreadsheets were distributed to the appropriate ISRT member for evaluation and prioritization. The ISRT members evaluated the titles on a yes/no basis using the two threshold criteria: 1) the study topic clearly applies or may apply to the Resource Categories and 2) the study location clearly applies or may apply to the ESID project area.

These two basic criteria must be satisfied in order for any resource to be relevant to the ESID. If the title was assigned a "no" by the ISRT lead resource expert, the title was rejected and retained for review by the BOEM, if desired. If the title was assigned a "yes", the project librarian obtained and imported the complete citation and abstract into RefWorks®. If the title did not provide enough information for a yes/no decision to be made, it was retained as a "yes." The ISRT's title review process resulted in eliminating 66.6% of the 27,118 titles identified in the original Dialog® searches.

4.1.3.2 Prioritization of Literature Citations/Abstracts

All of the 9,066 Dialog® literature titles assigned a "yes" by the ISRT were then downloaded as complete citations with abstracts, when available, in a tagged format (format 4). An example of the complete citation with abstract downloaded for a title that was assigned a "yes" is as follows.

140/4/2838 (Item 971 from file: 185)
DIALOG(R)File 185:Zoological Record Online(R)
(c) 2010 The Thomson Corp. All rights reserved.

FN- DIALOG(R) File 185:Zoological Record Online(R)|
CZ- (c) 2010 The Thomson Corp. All rights reserved.|
AZ- 05711875|
AA- 14211068717|
TI- Initial recruitment and growth of surfclams (Spisula solidissimaDillwyn) on the inner continental shelf of New Jersey.|
AU- Ma, Hongguang (a); Grassle, Judith P.; Rosario, Jeanine M.|
CS- (a) Rutgers State Univ, Inst Marine and Coastal Sci, 71 Dudley Rd, New Brunswick, NJ 08901; USA hgma@imcs.rutgers.edu|
SO- Journal of Shellfish Research 25(2), August 2006: 481-489. [Print]|
RT- Abstract|
DT- Article|
SN- 0730-8000|
LA- English|
SL- English|
PY- 2006|
AB- Surfclam (Spisula solidissima Dillwyn) larval settlement and the initial growth of recruits were studied on the inner shelf of New Jersey. Initial recruitment was measured by taking weekly benthic core samples during the summer settling season, and larval supply was characterized using meroplankton samples taken every four hours in July. The temporal variation in recruitment at two inshore stations (12-m depth) was linked to larval supply from the water column, and spatial differences (inshore vs. offshore) in recruitment also appeared to be related to larval supply. Spatial and temporal variation in larval concentrations was associated with wind-driven cross-shelf circulation. Contrasting recruitment patterns between the two inshore stations could not be explained by larval supply alone and were likely affected by near-bottom flows. Growth rates of initial surfclam recruits (with initial shell lengths 360 [mu]m) were estimated to be 10-20 ton d-1, and the growth rates of individuals >360 [mu]m shell length were 25-50 [mu]m d-1. This study provides realistic field estimates of early growth rates of surfclams and further evidence of the relationship between upwelling/downwelling events and surfclam larval supply and initial recruitment on the inner continental shelf.|
DE- Spisula solidissima--Growth rate, Postsettlement juveniles, Recruitment, Initial recruitment spatial & temporal patterns, cross shelf circulation relationships, Water movements, Upwelling & cross shelf circulation patterns, North Atlantic, USA, New Jersey|
BT- Life cycle and development; Development; Growth; Ecology; Population dynamics; Abiotic factors; Physical factors; Marine zones; Atlantic Ocean
|BC- Mollusca
***Bivalvia**
****Heterodonta**
*****Veneroida**
******Mactroidea|**
TS- Invertebrates; Molluscs|
BS- Spisula solidissima--(Mactroidea)||

An Electronic Redistribution and Archiving (ERA) command was added to the Dialog® command to output the citations. Adding an ARCHIVE 25 to the output command pays for the legal right to store the downloaded citations on one computer network and make the information available to fewer than 26 people.

The downloaded, tagged citations and abstracts from Dialog® were then imported into RefWorks® and placed in the appropriate folder. For the literature searches, RefWorks® was used as both a repository for citations and a vehicle through which the ISRT performed their reviews. Within RefWorks®, each ISRT lead resource expert evaluated the citations and abstracts within their assigned Resource Category using a resource-specific relevance matrix (Table 5). The ISRT members were then able to prioritize each citation directly in the RefWorks® database and place a number in the Priority field.

The number of Worldcat™ records requiring ISRT review (313 records) was much smaller than the results from the Dialog® search. Citations within Worldcat™ could easily be marked for export directly into an open RefWorks® database. Because the records were imported directly into RefWorks®, the yes/no title review step was unnecessary, because the ISRT members were able to prioritize and cull these records with Refshare. Refshare provided a link to a portion of the RefWorks® database for review, without jeopardizing the integrity of the RefWorks® database.

4.1.3.3 Priority Rankings

The ISRT team members used the relevance matrix to determine whether each resource should be recommended to BOEM for acquisition and to prioritize the resources relative to one another. The prioritization rankings were based on the citation and abstract. Some references, particularly those obtained from Worldcat™, lacked abstracts; thus, prioritization was based on the resource title, subject headings, and occasionally the table of contents in the document. All citations and abstracts within RefWorks® were categorized as Priority 0, 1, or 2. Only one priority ranking was assigned to each abstract by one ISRT member and this value was recorded in RefWorks® in the optional field entitled "priority." The priorities were defined as:

- Priority 0 (P0) – These resources were not obtained or included in the ESID. After the abstracts were reviewed by the ISRT, it was determined that they were not applicable to the criteria defined in the relevance matrix.

- Priority 1 (P1) – These resources were recommended to BOEM to be obtained and included in the ESID. Geographic boundaries ("footprints" that represent the limit of the study) were created. They were the highest priority based on the evaluation using the relevance matrix.

- Priority 2 (P2) – These resources were a lower priority (based on the evaluation using the relevance matrix) and were not obtained. However, the abstracts and citations were retained in RefWorks®.

The literature searches generated numerous duplicate citations across different Resource Categories. In these cases, the duplicate records were merged and the priority rankings from

each individual ISRT member were combined in the priority field in RefWorks® (e.g., 1 Demersal Fish, 2 Pelagic Ecology, 0 Seagrass).

The ISRT lead resource expert may have recorded a brief explanatory note in the "remarks" field of RefWorks® about why a resource had been retained or rejected, especially if it was a factor not captured within the criteria in the relevance matrix. As described in Section 4.1.4, the librarian acquired the complete document for P1 resources.

Table 5.

Relevance matrix for evaluating resource abstracts.

Resource Category (Category Code)	Relevance Criteria & Rank		
	High Priority (=1)	**Lower Priority (=2)**	**Not Important (=0)**
RELEVANT TO ALL CATEGORIES	• Studies that were conducted substantially within the geographically defined project area, focused primarily on the Resource Category, and include spatially explicit data • Appears to concern renewable energy • Has GIS in title or abstract or contains specific geographic information	• Studies that focus on one or more of the high priority topics but are geographically peripheral (e.g., a study in state waters that was included because it overlapped with one or more of the Atlantic Planning Areas) • Multidisciplinary studies that were conducted substantially in the geographically defined project area and include spatially explicit data, but where the Resource Category was not the primary focus • Is interim or incomplete • Not peer reviewed	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. After the abstracts were reviewed, it was determined that they were not relevant to the project because they were not in the area or on topic.
Geology (GEO)	• Studies that meet the threshold criteria and address one or more of the following topics: • Geospatial data on seafloor features, habitats, processes, or sediment characteristics (e.g., rock outcrops, canyons, shelf edge features, ridge-and-swale topography, sediment grain size, contaminants, etc.)	• Any other studies (other than High Priority topics) that meet the threshold criteria.	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. After the abstracts were reviewed, it was determined that they were not relevant to the project because they were not in the area or on topic.

Table 5 (continued). Relevance matrix for evaluating resource abstracts.

Resource Category (Category Code)	Relevance Criteria & Rank		
	High Priority (=1)	**Lower Priority (=2)**	**Not Important (=0)**
Geology (GEO) continued	• Studies dealing with critical geochemical processes with ecological ramifications, such as nutrient or contaminant transfer within sediments and across the sediment-water interface		
Water Quality (WQ)	• Studies that meet the threshold criteria and address one or more of the following topics: o Water quality conditions, processes, and changes that are relevant to understanding the marine ecology of the project area o Water quality conditions, processes, and changes that influence the health, reproduction and/or spatial distribution of marine biota o Water quality impacts of anthropogenic activities	• Any other studies (other than High Priority topics) that meet the threshold criteria	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. After the abstracts were reviewed, it was determined that they were not relevant to the project because they were not in the area or on topic.
Pelagic Ecology (PE)	• Studies that meet the threshold criteria and address one or more of the following topics: • Economically- or ecologically-important taxa whose entire life history is spent in pelagic zone (age, growth, population identification, feeding)	• Studies that meet the High Priority topics, except that taxa spend only a portion of life history in the pelagic zone • Any other studies (other than High Priority topics) that meet the threshold criteria	• Studies that do not meet threshold criteria as initially assumed based on title review alone. After the abstracts were reviewed, it was determined that they were not relevant to the project because they were not in area or on topic.

Table 5 (continued). Relevance matrix for evaluating resource abstracts.

Resource Category (Category Code)	Relevance Criteria & Rank		
	High Priority (=1)	**Lower Priority (=2)**	**Not Important (=0)**
Pelagic Ecology (PE) continued	• Relative abundance, densities, biomass, distribution and seasonality of pelagic taxa (zooplankton, fish, etc.) • Threatened or endangered pelagic taxa (unless included under another Resource Category such as marine mammals and sea turtles which have been excluded from the selected titles) • Pelagic Sargassum habitat • Effects of anthropogenic activities (waste dumping, oil spills, etc.) or other environmental stressors on pelagic taxa		
Benthic Ecology-Infauna, Meiofauna (IM)	• Studies or research conducted within the geographically-defined Planning Areas which focused primarily on benthic communities, and included spatially explicit data on one or more of the following topics: o Species composition, densities, relative abundance, richness, biomass, distribution, and/or seasonality of benthic communities;	• Any other studies (other than High Priority topics) that meet the threshold criteria.	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. Once the abstracts were reviewed, it is evident that they were not relevant to the project because they were not in the area or on topic.

Table 5 (continued). Relevance matrix for evaluating resource abstracts.

Resource Category (Category Code)	Relevance Criteria & Rank		
	High Priority (=1)	**Lower Priority (=2)**	**Not Important (=0)**
Benthic Ecology-Infauna, Meiofauna (IM) continued	○ Economically- or ecologically-important benthic species; ○ Listed or candidate threatened or endangered benthic species; ○ Benthic assemblages associated with geologic features or particular substrate types; or • Effects of anthropogenic activities or other environmental stressors on benthic communities.		
Benthic Ecology-Demersal Fishes (DM)	• Studies that meet the threshold criteria and address one or more of the following topics: • Species composition, densities, relative abundance, richness, biomass, distribution, or seasonality of demersal fishes • Economically- or ecologically-important demersal taxa (age, growth, reproduction, population identification, feeding ecology, etc.) • Threatened or endangered demersal species (Atlantic sturgeon; smalltooth sawfish); • Exotic species (e.g., lionfish);	• Any other studies (other than High Priority topics) that meet the threshold criteria	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. Once the abstracts were reviewed, it is evident that they were not relevant to the project because they were not in the area or on topic.

Table 5 (continued). Relevance matrix for evaluating resource abstracts.

	High Priority (=1)	Lower Priority (=2)	Not Important (=0)
Benthic Ecology-Demersal Fishes (DM) continued	• Demersal fish assemblages associated with geologic features or particular substrate types • Effects of anthropogenic activities or other environmental stressors on demersal fishes		
Benthic Ecology-Coral & Hardbottom (CH)	• Studies that were conducted substantially within the geographically-defined project area, focused primarily on coral and hardbottom communities, and include spatially explicit data on one or more of the following topics: o Species composition, densities, relative abundance, or distribution of "non-fish" component species of coral reef or hard bottom communities; o Ecologically important coral reef or hardbottom community taxa; Threatened or endangered coral reef or hardbottom community taxa; or	• Any other studies (other than High Priority topics) that meet the threshold criteria	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. Once the abstracts were reviewed, it is evident that they were not relevant to the project because they were not in the area or on topic.

Table 5 (continued). Relevance matrix for evaluating resource abstracts.

Resource Category (Category Code)	Relevance Criteria & Rank		
	High Priority (=1)	**Lower Priority (=2)**	**Not Important (=0)**
Benthic Ecology-Coral & Hardbottom (CH) continued	• Effects of anthropogenic activities (such as commercial fishing gear) or other environmental stressors on coral reef or hardbottom communities		
Benthic Ecology-Seagrass (S)	• Studies that meet the threshold criteria and address one or more of the following topics: • Studies that focus on the ecology of seagrass or attached macroalgal communities in the project area or adjacent state waters, excluding estuaries • Studies that may have included sampling of seagrasses or attached macroalgae within the project area or adjacent state waters, excluding estuaries • Studies that describe the use of seagrasses or attached macroalgae in the project area or adjacent state waters, excluding estuaries • Seagrass associated species that may have a portion of their life history in the project area.	• Any other studies (other than High Priority topics) that meet the threshold criteria	• Studies that do not meet the threshold criteria as initially assumed based on the title review alone. Once the abstracts were reviewed, it is evident that they were not relevant to the project because they were not in the area or on topic.

[a] Threshold criteria for seagrasses were broader than for the other topics. Geographically, the search included studies in the project area and adjacent state waters, but typically excluding estuaries. Topically, studies on attached macroalgae (e.g., kelp) were of interest if they were found, although these topics were not included in the search terms.

4.1.4 Acquisition of Literature

A total of 2,717 resources were assigned a P1 ranking and an attempt was made to acquire all of these P1 resources. The project librarian used numerous sources for document acquisition, in the following order:

- The Internet;
- The library of CSA;
- The library of Harbor Branch Oceanographic Institution (HBOI) at Florida Atlantic University;
- The library of the Rosenstiel School of Marine and Atmospheric Science (RSMAS) at University of Miami;
- The library of Florida International University (FIU);
- The interlibrary loan system through Firstsearch/OCLC membership;
- Personal e-mail communications with Marine Librarians from the U.S., Denmark, Germany, and the United Kingdom; and
- Personal e-mail communications with authors of individual resources.

The project librarian first attempted to locate full text documents using a standard Internet search and the internal library collection at CSA. For documents not available from these sources, the project librarian made arrangements to use the resources of the HBOI and RSMAS libraries. The HBOI library is a marine science library that is part of the Florida State University system and, consequently, has access to large collection of scientific journals. The RSMAS library has a much larger collection than HBOI and is arguably the finest marine library in the southeastern U.S. A search of the FIU library's Electronic Journals access was also conducted to obtain resource documents. Documents acquired from these libraries came in a variety of formats, including downloaded PDF documents, digital scans of paper documents, and photocopies.

The P1 resources that were not available on the Internet or from the CSA, HBOI, or RSMAS libraries were ordered through the interlibrary loan system or personal e-mail communications. The Firstsearch/OCLC database shows the holding libraries for all materials in the database. On an online form, the borrower specifies five possible libraries to fill the request. Florida libraries were always requested first because CSA has reciprocal arrangements with nearly all Florida libraries to provide loans and copies free of charge. An example of an interlibrary loan request form is included in Appendix F and an example of an interlibrary loan invoice is included in Appendix G. In addition, the project librarian e-mailed the authors of individual resources, and marine librarians from the U.S., Denmark, Germany, and the United Kingdom to obtain resources.

A total of 173 P1 documents were not acquired because the documents could not be acquired, were in foreign languages, were available in only microfiche or microfilm format, or were associated with an acquisition cost. The resource documents that could not be acquired were simply unattainable because the holding library prohibited photocopying or would not lend the item, or the resource document was not available anywhere. In many cases, contact was initiated with authors but no response was received. Per an agreement with BOEM, resource documents available only in foreign languages or in microfiche or microfilm format were not acquired. A few documents had English summaries but, based on conversations with the contracting officer's technical representative (COTR), these summaries were not included in the ESID.

4.2 DATASET SEARCH

4.2.1 Website List and Prioritization

Based on the web perusals and recommendations from the ISRT and the BOEM, a total of 109 websites were suggested for evaluation. The websites were affiliated mostly with government agencies, universities, and private research laboratories. Due to time and budget restrictions, the team could not evaluate all 109 websites. Thus, the websites were compiled and prioritized into a search order.

First, the ISRT were asked to "vote" for those websites that would likely contain data for their resource topic. BOEM also provided their input and listed the websites they believed to have the most relevant information and data for the ESID. The total number of "votes" for each website was tallied and the websites were prioritized based on the number of votes received. The website receiving the highest number of votes was ranked number one. If several websites received the same number of votes, they were subjectively ordered based on their potential relevancy to the ESID project. Based on time and budget, it was determined that the first 34 websites (i.e., websites ranked one through 34) would be searched for data and information applicable to the ESID. The websites were searched in chronological order, starting with the website receiving the largest number of votes.

4.2.2 Website Search Strategy

A total of 34 websites was thoroughly searched for data relevant to the ESID . Each website fell into one of the following categories: 1) websites without a query feature (excluding a generalized "search" field), 2) queryable websites, and 3) websites with a list of external web links. A majority of the websites searched did not have a query feature. In these instances, the website's links were followed until datasets were located. Links obviously leading to websites that did not contain data (e.g., meeting summaries and agendas, stakeholder letters, public hearings, press releases, scoping hearings) were not searched exhaustively because their purpose was informational or public relations oriented. Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. All links potentially applicable to the ESID were documented in a Microsoft® Excel® spreadsheet and evaluated for eligibility (example of spreadsheet provided in Appendix H).

Table 6.

List of the 34 websites searched for data relevant to the ESID.

Website Priority	Website Name	Web Address
1	National Oceanographic Data Center (NODC)	http://www.nodc.noaa.gov/General/getdata.html
2	National Centers for Coastal Ocean Science (NCCOS)	http://coastalscience.noaa.gov/data/welcome.html
3	National Ocean Service (NOS)	http://oceanservice.noaa.gov/
4	National Undersea Research Center (NURC)	http://www.uncw.edu/nurc/index.htm#
5	Coastal Services Center (CSC)	http://www.csc.noaa.gov/
6	Coral Reef Information System (CoRIS)	http://coris.noaa.gov/
7	VIMS Center for Coastal Resources Management GIS Data and Maps	http://ccrm.vims.edu/gis_data_maps/data/index.html
8	Rosenstiel School of Marine and Atmospheric Sciences (RSMAS)	http://www.rsmas.miami.edu/research/
9	WHOI Data Center	http://www.whoi.edu/page.do?pid=7140
10	National Geographic Data Center (NGDC)	http://www.ngdc.noaa.gov/
11	Coastal Services Center Digital Library	http://www.csc.noaa.gov/digitalcoast/data/index.html
12	usSEABED - sediment and rock distributions	http://walrus.wr.usgs.gov/usseabed/
13	National Undersea Research Program (NURP)	http://www.nurp.noaa.gov/Library.htm
14	NURC North Atlantic and Great Lakes	http://www.nurc.uconn.edu/research/mis/rexplorer.asp
15	WHOI Additional Resources	http://www.whoi.edu/page.do?pid=11535
16	NMFS Fishery Management Councils - New England FMC	http://www.nefmc.org/
17	NMFS Fishery Management Councils - Mid Atlantic FMC	http://www.mafmc.org/
18	NMFS Fishery Management Councils - South Atlantic FMC	http://www.safmc.net/
19	FWC GIS Data	http://ocean.floridamarine.org/efh_coral/ims/Description_Layers.htm
20	USGS Coastal and Marine Geology Internet Map Server and GIS Data	http://coastalmap.marine.usgs.gov/
21	USGS Marine Realms Information Bank	http://mrib.usgs.gov/

Table 6 (continued). List of the 34 websites searched for data relevant to the ESID.

Website Priority	Website Name	Web Address
22	Census of Marine Life's Ocean Biogeographic Information System	http://www.coml.org/projects/ocean-biogeographic-information-system-obis
23	American Fisheries Society	http://www.fisheries.org/afs/publications.html
24	National Biological Information Infrastructure (NBII)	http://www.nbii.gov/portal/community/Communities/NBII_Home/
25	U. New Hampshire Online Data Center for Coastal and Ocean Mapping (CCOM)	http://ccom.unh.edu/
26	NOAA Fisheries GIS Data	http://www.nmfs.noaa.gov/gis/data/index.htm
27	Global Ecosystems Database	http://www.ngdc.noaa.gov/ecosys/cdroms/ged_iia/go.htm#top
28	Lamont-Doherty Earth Observatory	http://www.ldeo.columbia.edu/research/databases-repositories
29	U. North Carolina Chapel Hill	http://marine.unc.edu/
30	U. South Carolina Baruch Institute for Marine and Coastal Sciences	http://www.baruch.sc.edu/
31	SCRIPPS Institution of Oceanography Library	http://libraries.ucsd.edu/locations/sio/
32	SCRIPPS Institution of Oceanography Databases	http://libraries.ucsd.edu/locations/sio/resources/key-databases-for-oceanography-earth-sciences.html
33	NOVA Southeastern Univ. Oceanographic Center	http://www.nova.edu/ocean/
34	NOAA Website	http://www.noaa.gov/

Four of the 34 websites had a query feature including the Coral Reef Information System – (CoRIS), U.S. Geological Survey's (USGS) Marine Realms Information Bank (MRIB), National Oceanographic Data Center (NODC), and National Undersea Research Center - North Atlantic and Great Lakes (NURC-NAGL). Search criteria selected within the query field included geographic region or environmental categories potentially within the ESID project area.

One website, the National Centers for Coastal Ocean Science (NCCOS), contained a list of external web links leading to other websites. Each of the external web links was searched for datasets. Four of the six external web links were not searched because data were either outside of the project area, not applicable to the ESID Resource Categories, or had their own Microsoft® Excel® tracking spreadsheet.

4.2.3 Website Written Protocol and Tracking Spreadsheet

A Microsoft® Excel® tracking spreadsheet and written protocol were created to document and track the progress through each website searched. The spreadsheet provided the following information for web links searched on each website: web address, description or title, unique ID number (if available), if data were available (yes or no), the priority assignment (assigned by ISRT leader – see Section 4.2.4), the reason for ESID ineligibility (if applicable), the data type (e.g., interactive mapping tool, graphs, raw tabular data, GIS data, etc), location where data were

collected, year of data collection, ISRT leader associated with the data type, abstract, and miscellaneous notes (Appendix H). The web links on the spreadsheet were organized and presented in the order in which the search was performed. Header rows were also added to provide additional direction to the dataset from the home web page. Only unique pages were recorded in the spreadsheet. If available datasets were found under more than one web link, they were included in the spreadsheet only under the web link where they were first identified. Web links with access to publications were noted in the spreadsheet. All web links with data potentially applicable to the ESID were flagged for prioritization by the appropriate ISRT leader (see Section 4.2.4).

Written protocols were also created for all 34 websites searched (Appendix I). Each protocol provided the website address, dates of the website search, the name of the person performing the search, and a detailed description of the search strategy performed. The protocol also listed datasets not applicable to the ESID as well as those datasets that were relevant to the ESID. Priority assignments were provided by the ISRT for all datasets applicable to the ESID (see Section 4.2.4).

4.2.4 Prioritization of Resulting Datasets

Each web link accessed during the website searches was documented in the Microsoft® Excel® tracking spreadsheet and prioritized. Several different codes were used in the priority column of the spreadsheet. The website searcher applied a P0 to those web links that did not have data or to those datasets that did not meet the threshold criteria. In order to satisfy the threshold criteria, the dataset must be applicable to the Resource Categories and collected within the project area. Datasets consisting solely of photo or video data were also assigned a P0. All datasets potentially meeting the threshold criteria were highlighted in the spreadsheet for prioritization by the appropriate ISRT leader. Priority 1 (P1) and Priority 2 (P2) categories were applied to datasets according to their relevancy to the ESID project. An “M” was added as a suffix to P1 or P2 codes if the row in the spreadsheet represented project metadata. Table 7 summarizes the criteria used to prioritize datasets that were identified. At times it was possible to acquire the data associated with metadata files (see Section 4.2.5).

Table 7.

Prioritization of datasets identified during the website searches.

Priority Ranking	Resource Category	Prioritization Criteria
Priority 0 (P0)	**Benthic & Pelagic Ecol**	- Datasets solely containing fisheries landings/catch data
		- Results of tagging surveys on monkfish (including mortality data)
	Geology	- Data from deep-coring projects including studies of plate tectonics, earth's crustal structure and composition, conditions in ancient oceans, and paleoclimatology
Priority 0 (P0)	**Geology**	- Paleoclimatological data
		- Carbon 14 dating data
		- Igneous rock data which is not representative of seafloor environmental conditions for the OCS
		- Interactive mapping servers or viewers of data (the datasets populating each interactive server/viewer were evaluated separately)
		- Physical catalogs of sediment samples (i.e., sample type, sample coordinates, water depth, core length, information about sample archival)
		- Geochemical data of ocean floor igneous and metamorphic rocks including major oxides, trace elements, stable and radiogenic isotope ratios, and analytical ages
	Water Quality	- Datasets that only contain meteorological data and/or physical oceanographic data (e.g., current, wave, temperature, salinity, conductivity)
		- Bacterial abundance, biomass, and productivity data
Priority 1 (P1)	**Benthic & Pelagic Ecol**	- Environmental/ecological data and mapped distribution of habitats
		- Spatially explicit data on coral reef or hardbottom community taxa
		- GIS data showing distribution of endangered/threatened species
		- Benthic habitat data
		- Lobster distribution and abundance data
		- Zooplankton species abundance data
		- Abundance, size, and fecundity of *Salpa aspera*
		- Exotic/invasive species information
	Geology	- Sediment texture and contaminant data
		- GIS data for bottom sediment sampling and sidescan sonar
		- GIS data for seafloor geology and surficial sediment data
		- Map displaying bottom geologic interpretation of sidescan sonar
		- Geological and seafloor data
	Water Quality	- Water quality data that include pollutants (e.g., hydrocarbons, PCBs)

Table 7 (continued). Prioritization of datasets identified during the website searches.

Priority Ranking	Resource Category	Prioritization Criteria
		- Water quality data with biological components
	Other	- GIS data and maps of anthropogenic impacts
Priority 2 (P2)	**Benthic and Pelagic Ecology**	- Fish sighting frequency and density scores (count data)
		- Bottom type maps for Oculina Bank (limited data)
		- Spatially explicit tag/recapture datasets
		- Juvenile lobster abundance and distribution data using tag/recapture techniques
Priority 2 (P2)	**Benthic & Pelagic Ecol**	- Fisheries dependent catch data with some biological data (e.g., size, age, health of fish) or life history information on priority fish species
		- Status of fishery resources including distribution data, biology, management, fishery data, research vessel survey indices, and assessment results
		- Species distribution maps
		- Mollusk occurrence tabulation data in the Atlantic Ocean
	Geology	- Data for ferromanganese nodules only
		- Dataset containing total sediment thickness data
		- Sediment stratigraphy data
		- Deep-sea sediment core sample data
		- Sediment data with mineral deposit data
		- Maps of core and grab sampling locations with links to technical documents presenting sampling results
		- Datasets containing mostly geophysical data but some geological components (i.e., vibrating core and grab samples)
		- Seafloor topography data of a very limited study area within the OCS
		- Marine sediment geochemistry data
	Water Quality	- Datasets containing water quality data (e.g., dissolved oxygen, secchi depth, transmissivity, chlorophyll, phaeopigment, fluorescence, PAR, backscatter, nutrients, phytoplankton biomass) or a combination of water quality and physical oceanography data
		- Study area locations, ship tracks, sampling station locations, plus routine meteorological and oceanographic data collected along the ship tracks. While the oceanographic data are mainly temperature and salinity readings, some chlorophyll measurements were included.
		- Water quality data with suspended matter/sediment concentrations
	Other	- Location information for human-designated management areas (MPAs, EFH, critical habitat) with no ecological data.
		- Global-scale mapping and anthropogenic impacts based on modeling data

A "B" code was inserted into the priority column of the spreadsheet for those web links with baseline data. Baseline data included, but was not limited to, bathymetry data, sub-bottom profiles, acoustic backscatter maps, side-scan sonar, Geological Long-Range Inclined Asdic (GLORIA) sidescan sonar or multibeam imagery, Light Detection and Ranging (LIDAR) data, and GIS shape files depicting boundaries of marine sanctuaries and protected areas. A "99" code was used in the priority column of the spreadsheet if the web link had its own spreadsheet. For example, while searching the NCCOS website, there was a link to the National Ocean Service (NOS) Data Explorer. The NOS Data Explorer website was identified as a separate website search and therefore had its own Microsoft® Excel® tracking spreadsheet. As a result, a "99" code was inserted into the priority column for the NOS Data Explorer row in the NCCOS spreadsheet.

After all prioritization was complete, the spreadsheet and written protocols were submitted for QA/QC (see Section 6.0).

4.2.5 Acquisition of Datasets

A total of 391 datasets were identified as P1 resources; however, not all datasets were readily available. If a project was applicable to the Resource Categories, within the project area, and assigned a P1 by the ISRT leader, the appropriate agency was contacted by phone, e-mail or written letter to obtain the data. All correspondence regarding data acquisition was recorded in a Microsoft® Excel® spreadsheet or contact log. For each website with applicable projects, a contact log was generated that included the dataset name to be acquired, the contact's name, the agency possessing the data, and details (i.e., notes, dates, etc.) regarding the data acquisition. If data were obtained, the corresponding row was highlighted within that website's spreadsheet and a note was added including the agency name and date of acquisition. The data received were then evaluated for inclusion in the ESID. Attempts to obtain all 391 P1 datasets resulted in acquisition of 109 datasets (the remaining 285 datasets could not be acquired).

The web links for all 391 datasets were added into the bibliographic entries in the ESID, similar to entries for the documents. The datasets themselves were not incorporated into the ESID to avoid redundancy, as the ESID provides direct hyperlinks to access and download the data.

4.3 Acquisition Documentation

The project required purchase receipts for documents in the ESID, showing documentation that all materials acquired had been legitimately purchased. The majority of ecological resource documents were acquired through inter-library loan. Per the standard established process, various libraries would either scan hard copies and provide the digital copy or directly provide the hard copy. Appendix J contains an example of an inter-library loan receipt acquired during the ESID project. These receipts had no impact on copyright permissions and were used solely for documentation of the transactions with the libraries.

4.4 Copyright Permissions

Requests for documents from libraries and direct purchases from copyright holders came with restrictions. The acquired documents were for single-use only and could not be stored or released to another entity or could not be shared in a custom database or directory. Several

solutions were investigated to accommodate the storing of resource documents in the ESID and the release of the database to BOEM. The Copyright Clearance Center provided guidance throughout the process but no resolution was found that would directly resolve the issue. As a result, copyright permission letters (requesting internal use in BOEM) were created and provided to all copyright permission holders for resource documents with copyright restrictions (example provided in Appendix K). These letters are the documentation that gives BOEM permission to use and store the acquired resources associated with copyright restrictions. Each letter contained a brief overview and history of the project and a list of titles, consolidated for each publisher or author (copyright permission holder). The letters specifically requested permission for 25 BOEM scientists to be able to access the documents and for permission to store the document in the secure ESID. Correspondence was subsequently established with the publishers or authors requesting additional information about the project. A project narrative was provided and contained additional background information, history, project execution, and list the deliverables of the project. This approach provided approval to use and store 881 of the copyright restricted documents in the ESID. Copyright restrictions still remain for 1,406 acquired documents due to a lack of response to the copyright exemption letters or the publisher or author not granting exemptions from copyright. These documents can be provided only to BOEM separately and not stored in the ESID.

A total of 431 resource documents did not have copyright restrictions (either due to being open access, open file reports, or available through a webpage for public download) and documentation was not needed to legitimize the use of these documents in the ESID. IBOEM will have direct access to a total of 1,312 resource documents through the ESID database.

5.0 RESOURCE PROCESSING

5.1 RESOURCE ANNOTATION

All resources and references selected for inclusion in the ESID were exported to a Microsoft® access database for final clean up, quality assurance, and corrections. The literature resources were stored in a bibliographic style format in RefWorks®. The bibliographic data resources were stored in a Resource Table, consisting of many different data fields in a bibliographic style format. This format was selected to easily cite and create bibliographies for the resources. Table 8 shows all fields included in the Resource Table and a description for each field. Not all fields were annotated for each resource because some fields were applicable only for journal documents, book sections, or web pages. However, every entry was annotated for the following fields: ESID, Distribution, Reference Type, Resource Year, Author, Abstract, Location Description, Publisher, Language, Output Language, Source Type, and Acquired (Table 8). The Resource Table was the basis for all queries and was also submitted as a project deliverable, the Preliminary Data List.

Per the contract requirements in Section F.4.E, a Preliminary Data List was prepared and submitted to BOEM on September 22, 2010 (Appendix L). This list contained all resources to be incorporated into the ESID and included resource documents (literature or printed references) and web pages (electronic references) that had been reviewed by the ISRT and identified as a P1. All resources had bibliographic entries and were accessible through a Microsoft® Access® database (version 2002; Table 8). A Microsoft® Access® database was selected for delivery of the Preliminary Data List because it allowed the user to query database tables and create customized outputs. The database permitted the user to view a tabular list of all 3,108 resources to be included in the ESID (Table 9) and to filter the list using the following query features:

- The "Reference Type" filter included all types of resources (e.g., abstract, book section, conference proceedings, dissertation/thesis, journal article, etc.).
- The "Source Type" filter included the formats of resources (i.e., print or electronic).
- The "Category" filter included all ISRT resource categories (i.e., demersal fish, coral and hardbottom, pelagic ecology, infauna/meiofauna, water quality, geology, and seagrass).
- The "Distribution" filter included all copyright categories, such as open access, copyright restricted, and online. Open access allows the document to be stored and viewed in the ESID database; however, general use restrictions still apply. Copyright restricted documents are prohibited from being stored in the ESID database. Although the user can search and view the citation, the actual resource document is not available. However, a link is provided that directs the user to a purchasing location, should the user choose to purchase the document. "Online" refers to resources that are accessible for viewing online and are not restricted by copyright. Table 9 presents the number of resources in each distribution category.
- The "Cost" filter returned resources with cost information or blank.
- The "Acquired" filter returned resources that have been acquired.

Table 8.

All fields included in the Resource Table within the Microsoft® Access® database.

Database Field	Description
ESID	Unique ID for the resource
Year	Year resource was produced
Author	Resource author name
Title	Title of resource
Abstract	Abstract of publication
Descriptor	Keywords found within the resource
Notes	Additional information about the resource
Reference Type	Type of resource (e.g., journal, conference proceeding, etc)
Source Type	Format of resource (i.e., print or electronic)
Periodical	Full description of source periodical
Conference Date	Date of conference, if applicable
Volume	Volume of document
Issue	Issue of document
Start Page	Starting page of resource within publication
ISSN-ISBN	Unique identifier for periodicals
Author Address	Author contact information
Accession Number	Sequential number given to new publications
Digital Object Identifier (DOI)	Unique document identifier
Language	Language in which the document was written
Subfile	Additional associated files
Other Pages	Other relevant pages within the publication
Series Title	Title of the publication series
Publisher	Publisher of the resource
Publication Place	Place of resource publication
Links	Hyperlink to documentation
URL 1	Primary web link to the resource
Cited Reference	References the document cites
Category	Search category in which the resource was located
Distribution	Copyright category of the resource
Acquired	Date the resource was acquired
Location Description	Description of the resource location extracted from document
Extracted Data	Attributed if there are tables of extracted data associated with the resource

After the filters are applied, the user can choose one of three output options to activate table and report views of the resource list in an easy-to-read format. The "View Table" option shows a Microsoft® Access® table fitting the criteria specified in the search or filter controls. The "View Abstract" and "View Location" options show reports with full abstracts and study location descriptions, respectively.

Table 9.

Total number of resources in the Final Data List by category.

Category	Count
Geology	699
Water Quality	433
Pelagic Ecology	662
Infauna/Meiofauna (Benthic Ecology)	397
Demersal Fish (Benthic Ecology)	438
Coral/Hardbottom (Benthic Ecology)	87
Seagrass (Benthic Ecology)	1
Web Links	391
Total Resources	**3,108**

Table 10.

Distribution summary table presenting the number of resources within each distribution category.

Distribution	Count
Open Access	430
Copyright Restricted	1406
Online	391
Use Permission Granted	881

A total of 2,717 documents and 391 datasets were assigned a P1 ranking. An attempt was made to acquire all of these P1 resources as provided in the Preliminary Data List. However, 173 of the P1 documents were not acquired for various reasons (i.e., unable to acquire, in a foreign language, only available in microfiche or microfilm format, or associated with an excessive acquisition cost). Of the 391 datasets, 285 could not be acquired. In total, 2,717 documents and 391 web links were included in the ESID.

5.2 GEOGRAPHIC CHARACTERIZATION

A GIS base map and detailed protocol were developed at the start of the geographic characterization task. The geographic characterization protocol provided guidance about how to judge what to digitize, and gives a hierarchy of preferred methods, depending on available information (Appendix M). The base map and protocol were shared with the GIS team so that a consistent approach was used by all staff involved in the extraction of location information and digitization of resource boundaries for P1 resources. Because of the volume of P1 resources and because a number of different GIS staff members were working on the resource boundaries, it was important that the geographic extents be drawn quickly, accurately, and consistently. Once the P1 resources were acquired by the project librarian, the resources were processed to record geographic extents. After the extraction team studied the location, a decision was made whether the resource was actually in the project area. If not, no further processing was conducted on that resource. For study sites that are both inside and outside the project area, all locations were attempted to be digitized. For study areas that are well-known locations or geographic features

(e.g., Georges Bank, South Atlantic Bight), spatial templates were developed to estimate the extents of the studies performed in those areas. Resource locations that extend toward the coast were clipped to the coastline. If the geographic description was vague, an assumption was made as to the limit of the boundary, but, in these cases, the limit was assumed to not extend beyond the coastline or the EEZ. Occasionally, a resource appeared to be within the project area based on the description, but the location was so vague that it could not be determined. In this case an unknown Atlantic Ocean location template was used.

For each acquired P1 resource, the Document Control Coordinator recorded the available description of the geographic location from the resource and identified the most appropriate figure to use to digitize a boundary for a given resource. After the description and figures (if present) were recorded, the GIS digitization team used that information to create a spatial extent for a given resource. The geographic characterization guidance provided a checklist for the GIS digitization team to check the boundaries that they created. After the boundaries had been checked, they were loaded into a Spatial Database Engine (SDE). All of the resource boundaries were located in one feature dataset.

A series of Microsoft® Access® forms and tables were developed and used to facilitate the documentation of geographic locations. These forms served as a vehicle for communications between team members, and also provided a means to track and record QA/QC checks, and document any issues. The Technical Project or Task Managers preformed a weekly QA/QC on the descriptions and geographic extents by randomly selecting 10 % of the completed resource boundaries for that week. Weekly QA/QC meetings were held with the GIS digitization team to discuss any issues that arose.

5.3 BIBLIOGRAPHY

An annotated bibliography was created for each resource document collected during the literature acquisition process. The bibliography also included a link to an online data source location (if available), a list of keywords, and abstracts containing summary information and results of the studies. Abstracts were not readily available for all resources collected. In these instances, abstracts were written by qualified personnel with backgrounds and experience in environmental and marine science. Documents (e.g., relevant book chapters, proceedings, technical reports, gray literature, and maps) with missing abstracts were thoroughly searched for key terms that identified the purpose, scope, methods, and results of the work. This information was often readily available in the introduction and conclusion. Sentences or phrases that appeared to be central to the work were highlighted and incorporated into the abstract in a concise manner. After the abstract was completed, a list of keywords was generated. The keywords were specific and identified the major topics (e.g., geography, subject matter, methodology, resource, etc.) and underlying theme of the study.

5.4 DATA EXTRACTION

The ESID contract required that resource data extraction be conducted for the Virginia Lease Sale 220 and for other AOIs, as described in the *Draft Proposed OCS Oil and Gas Leasing Program 2010-2015* (USDOI, MMS 2009). This data extraction was to be accomplished by a Data Extraction Team that included database, GIS, and scientific expertise in the areas of marine benthic ecology, ichthyology, marine botany, water quality, toxicology, and geology. During

discussions in June 2010, it was determined that a more cost-effective solution was to extract and store the data tables for the documents in question.

GISbiz, Inc. was subcontracted to extract data tables from 1,155 PDF documents that intersected with AOI polygons. Tables were extracted from 767 PDF documents and converted into document-specific Microsoft® Excel® workbooks. These workbooks had multiple tabs for each table extracted from each document. Appendix N contains examples of the workbooks created. A well-defined quality assurance process was in place to review the documents internally prior to submittal to AMEC for final approval. During the QA/QC of the output of this process, AMEC discovered a number of PDFs with unreadable sections. AMEC rescanned the sections of these unreadable PDFs and resubmitted the PDFs to GISbiz, Inc. for extraction.

AMEC reviewed each batch of tables based on a calculated sample size. The sample size was calculated such that 75 documents were inspected for every 340 document tables. The formula used for determining sample size (SS) subject to QA/QC was:

$$SS = \frac{Z^2 \times (p) \times (1 - p)}{c^2}$$

Where:
Z = Z value (e.g., 1.96 for 95% confidence level)
p = percentage picking a choice, expressed as decimal (0.5 used for sample size needed)
c = confidence interval, expressed as decimal (e.g., .04 = ±4)

The error margin was approximately 10%, meaning that if seven or more documents failed, then AMEC sent the entire batch of tables back to GISbiz, Inc. to be reevaluated and corrected. The corrected batches were resubmitted and reinspected using the same process. If fewer than seven documents failed from the 75 sampled, then only the failing documents and tables were sent back for correction. Upon resubmission, the failed documents underwent evaluation by AMEC to ensure all errors were corrected.

Errors were differentiated between numeric errors and formatting errors. Numeric errors were considered only in the QA/QC process described above. Formatting errors were reported, corrected as noted, and adjustments to the process were made in order to improve product quality. Any errors reported (numeric or formatting) were considered iteratively. Special attention was paid to consistent errors as the process moved forward.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

6.1 OBJECTIVES

The quality assurance and quality control (QA/QC) program was designed to ensure that: 1) ESID resources were collected in a scientifically defensible manner, 2) the ESID would perform in a fully satisfactory manner, and 3) errors would be minimized during the development of the database. For the resource collection and evaluation portion of the project, the QA/QC process was critical to ensure that searches were conducted consistently and comprehensively and that they accurately targeted relevant literature and datasets.

Jeff Albee, the Professional Practice Lead for Information Management Systems at AMEC, was responsible for the overall QA/QC elements of the project. The QA/QC program for scientific aspects of the project was led by Dr. Neal Phillips of CSA. Dr. Phillips was responsible for developing the QA/QC program, and the intermediate and final product reviews. The program involved close coordination with the project's research librarian, web/database search specialists, and individual ISRT members. The following sections describe the QA/QC process executed for the resource collection portion of the project.

6.2 RESOURCE IDENTIFICATION

Each ISRT lead resource expert, in consultation with the research librarian, developed a list of keywords for literature searches (see Section 4.1.1). The draft keyword lists were reviewed by the QA/QC manager to ensure they were consistent, comprehensive, and accurately targeted the resource(s) of interest both topically and geographically. The result of this iterative process, which included the search logic, was tested in a preliminary search for each resource. If the search output was found unsatisfactory (e.g., an excessive number of search results, or irrelevant citations picked up because of a particular search term), the keyword list and search logic were revised by the research librarian and ISRT member and approved by the QA/QC manager before the actual search was conducted.

6.3 RESOURCE PRIORITIZATION

6.3.1 Prioritization of Literature Titles

The document title results from the initial literature search were screened by ISRT members using threshold criteria (see Section 4.1.3). The QA/QC manager reviewed the title screening process of each ISRT member to ensure that the threshold criteria were accurately and consistently applied.

6.3.2 Prioritization of Citations and Abstracts

For literature titles that met the threshold criteria, the full citations and abstracts were downloaded and imported into RefWorks® for further evaluation. As described in Sections 3.1.5, 4.1.3, and 4.2.4, the ISRT members developed a relevance matrix specific to each Resource Category to determine whether the document should be acquired and to prioritize the resources relative to one another for acquisition. The ISRT members assigned a priority value to each reference using the guidance provided by the appropriate relevance matrix. The relevance

matrices (and embedded relevance criteria) for each Resource Category were reviewed by the QA/QC manager to ensure that they consistently, comprehensively, and accurately prioritized the topics of interest for the particular resource.

The QA/QC manager also reviewed the ISRT priority value assignments for the citations/ abstracts. This review was conducted to verify that the ISRT members were correctly and consistently applying the relevance criteria in the prioritization process. Even with the most conscientious reviewer, there is a chance of making an error when rating hundreds (or thousands) of citations.

Because of the large number of citations and abstracts reviewed and prioritized by each ISRT member, it was not practicable for the QA/QC manager to reexamine each one. For each Resource Category, the QA/QC manager typically reviewed 10% of the citations/abstracts within each priority value category (P0, P1, and P2). If no errors were noted, the QA/QC review ended there. If one or more possible misclassifications were noted, another 10% were reviewed. If no additional errors were noted, the QA/QC review was complete. However, if additional errors were discovered in the second 10%, the prioritized list of citations/abstracts was returned to the ISRT expert for review. This QA/QC process was repeated as necessary until the results were satisfactory. The following is an example of the QA/QC review results that occurred for the Demersal Fishes Resource Category:

Priority P0 (187 total citations)

- Reviewed 10% (n = 19) and found one potential misclassification
- Reviewed all remaining citations and found two more possible misclassifications

Priority P1 (396 total citations)

- Reviewed 10% (n = 40) and found no errors

Priority P2 (235 total citations)

- Reviewed 10% (n = 24), found one potential misclassification
- Reviewed 10% (n = 24) additional citations and found no errors (concluded QA/QC review at this point).

In this example, the QA/QC manager contacted the ISRT lead resource expert to discuss the misclassifications. The ISRT lead resource expert agreed with suggested reclassification of the four prioritization errors.

6.3.3 Prioritization of Datasets

As discussed in Section 4.2.4, each web link accessed during the website searching was documented by the data search coordinator and prioritized (P0, P1, or P2) by the ISRT. Because of the large number of web links and datasets identified, it was not practicable for the QA/QC manager to reexamine each one. For each website, the QA/QC manager typically reviewed 10% of the web link priorities assignments within each priority value category (P0, P1, P2, B, and 99). If no errors were noted, the QA/QC review ended there. If one or more possible misclassifications were noted, another 10% were reviewed. If no additional errors were noted, the QA/QC review was complete. However, if additional errors were discovered in the second

10%, the prioritized list of web links was returned to the ISRT lead reviewer. This QA/QC process was repeated as necessary until the results were satisfactory. The QA/QC process also included a QA/QC review of individual web links; generally, 10% of the links were checked to ensure they were working and corresponded to the entry in the Microsoft® Excel® spreadsheet.

6.4 RESOURCE ACQUISITION

After priorities were assigned to all identified resources, the project librarian developed a resource acquisition list and, with BOEM approval, attempted to obtain all resources with a P1 priority value (refer to Section 4.1.4 for details). A QA/QC review of the acquisition process was conducted to ensure that the correct resources were fully and accurately transferred into the database. Each acquired document was examined and cross-checked against the list of P1 resources to ensure that: (1) the correct document had been obtained, (2) the document was complete, and (3) the document was suitable for optical character recognition (OCR) scanning.

7.0 GEODATABASE DESIGN

The ESID Geodatabase integrates elements of multiple databases that were used throughout the project for data management. In the ESID, portions of datasets or entire previous datasets were built upon through each step of data development. This section outlines the component databases used during geodatabase development and describes how each database contributed to the final version of the ESID Geodatabase.

7.1 REFWORKS®

As noted in Section 3.1.6, RefWorks® was used to develop the bibliographic database for all document resources incorporated into the ESID. The first step in the data design process was to review the RefWorks® data structure and assess its sufficiency as a structure on which the final database structure could be built. A RefWorks® website was established as the central location to house the bibliographic data collected for each document resource (Figure 9). While the bibliographic data were pulled from multiple sources, they were consolidated into a consistent format within RefWorks®.

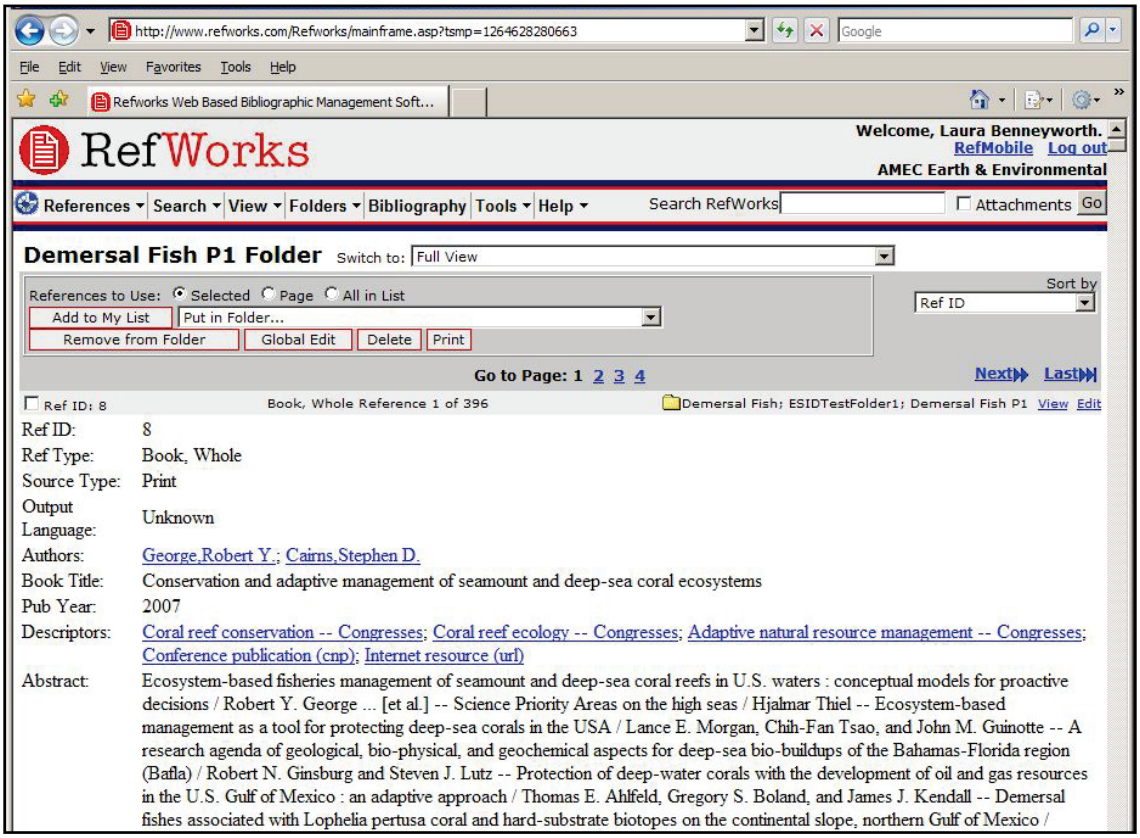
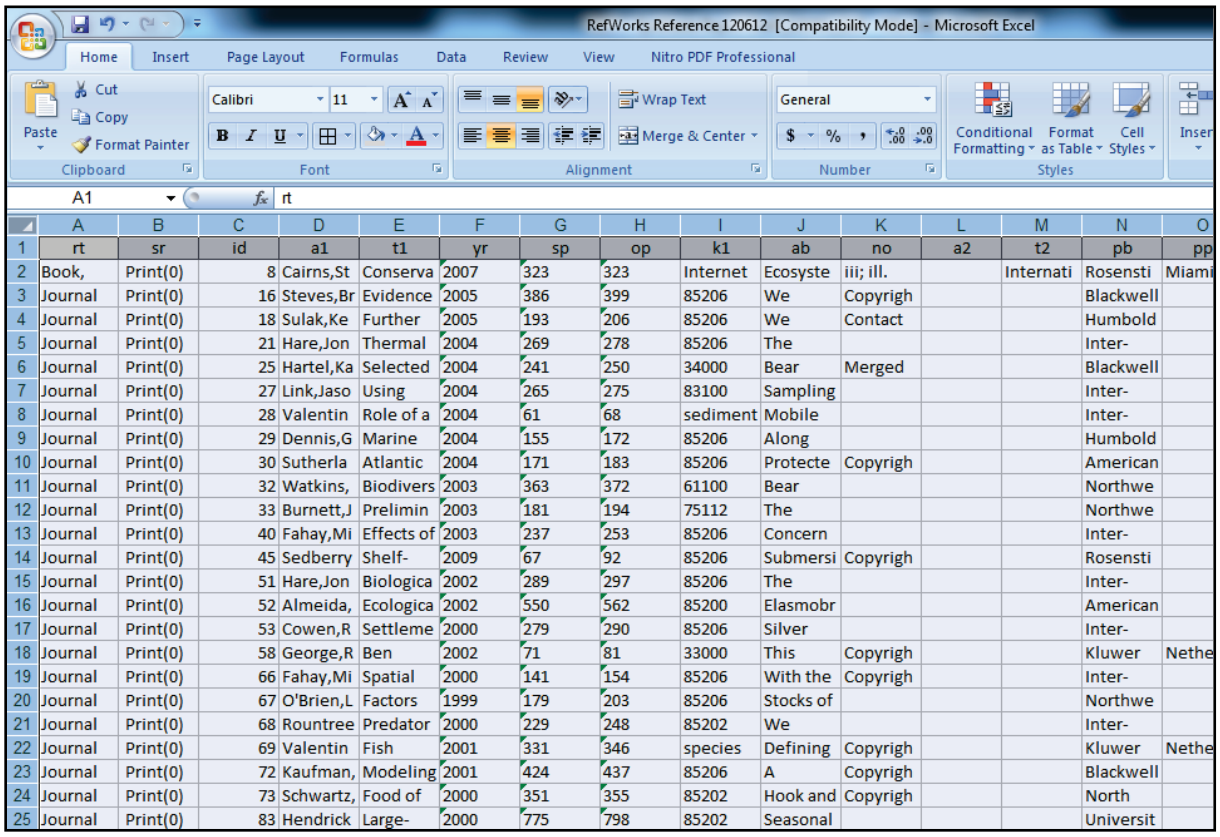


Figure 9. Screenshot from the RefWorks® website showing the bibliographic data for a relevant document.

RefWorks® offers multiple export formats for downloading the bibliographic data from the website. However, not all available formats were useful for the ESID project, because some formats are specific to other commercial bibliographic software and others do not contain all the data fields deemed necessary for this project. Also, the "Ref ID" field is the only unique identifier for each record in the RefWorks® database and not all export formats preserved this ID. The "RefWorks® Extensible Markup Language (XML) Format" export was selected for the ESID export format as it offered the most appropriate and complete dataset output for the ESID project (Figure 10).



rt	sr	id	a1	t1	yr	sp	op	k1	ab	no	a2	t2	pb	pp
Book,	Print(0)	8	Cairns,St	Conserva	2007	323	323	Internet	Ecosyste	iii; ill.		Internati	Rosensti	Miami
Journal	Print(0)	16	Steves,Br	Evidence	2005	386	399	85206	We	Copyrigh			Blackwell	
Journal	Print(0)	18	Sulak,Ke	Further	2005	193	206	85206	We	Contact			Humbold	
Journal	Print(0)	21	Hare,Jon	Thermal	2004	269	278	85206	The				Inter-	
Journal	Print(0)	25	Hartel,Ka	Selected	2004	241	250	34000	Bear	Merged			Blackwell	
Journal	Print(0)	27	Link,Jaso	Using	2004	265	275	83100	Sampling				Inter-	
Journal	Print(0)	28	Valentin	Role of a	2004	61	68	sediment	Mobile				Inter-	
Journal	Print(0)	29	Dennis,G	Marine	2004	155	172	85206	Along				Humbold	
Journal	Print(0)	30	Sutherla	Atlantic	2004	171	183	85206	Protecte	Copyrigh			American	
Journal	Print(0)	32	Watkins,	Biodivers	2003	363	372	61100	Bear				Northwe	
Journal	Print(0)	33	Burnett,J	Prelimin	2003	181	194	75112	The				Northwe	
Journal	Print(0)	40	Fahay,Mi	Effects of	2003	237	253	85206	Concern				Inter-	
Journal	Print(0)	45	Sedberry	Shelf-	2009	67	92	85206	Submersi	Copyrigh			Rosensti	
Journal	Print(0)	51	Hare,Jon	Biologica	2002	289	297	85206	The				Inter-	
Journal	Print(0)	52	Almeida,	Ecologica	2002	550	562	85200	Elasmobr				American	
Journal	Print(0)	53	Cowen,R	Settleme	2000	279	290	85206	Silver				Inter-	
Journal	Print(0)	58	George,R	Ben	2002	71	81	33000	This	Copyrigh			Kluwer	Nethe
Journal	Print(0)	66	Fahay,Mi	Spatial	2000	141	154	85206	With the	Copyrigh			Inter-	
Journal	Print(0)	67	O'Brien,L	Factors	1999	179	203	85206	Stocks of				Northwe	
Journal	Print(0)	68	Rountree	Predator	2000	229	248	85202	We				Inter-	
Journal	Print(0)	69	Valentin	Fish	2001	331	346	species	Defining	Copyrigh			Kluwer	Nethe
Journal	Print(0)	72	Kaufman,	Modeling	2001	424	437	85206	A	Copyrigh			Blackwell	
Journal	Print(0)	73	Schwartz,	Food of	2000	351	355	85202	Hook and	Copyrigh			North	
Journal	Print(0)	83	Hendrick	Large-	2000	775	798	85202	Seasonal				Universit	

Figure 10. An example of the RefWorks® XML format output viewed in Microsoft® Excel®.

Figure 10 shows the standard database export structure; however, the field names have a coded value. Aliases were developed for the coded field names to make them more meaningful to the user (Table 11). The Alias field names were used in place of the RefWorks® field names moving forward into the database design.

Table 11.

The RefWorks® field name codes and associated alias field names.

REFWORKS® FIELD	ALIAS	REFWORKS® FIELD	ALIAS
a1	Authors, Primary	sf	SubFile
a2	Authors, Secondary	sn	ISSN/ISBN
ab	Abstract	sp	Start Page
ad	Author Address	sr	Source Type
an	Accession Number	t1	Title, Primary
av	Availability	t2	Title, Secondary
cn	Call Number	t3	Title, Tertiary
cr	Cited References	u1	Category
do	DOI	u10	Planning Area
ed	URL 2	u11	Date Searched
fd	Pub Date Free Form	u12	Inter Library Loan
id	ESID	u13	Paper Needed
is	Issue	u14	Location
jf	Periodical, Full	u15	Data Types
jo	Periodical, Abbrev	u2	Resource Type
k1	Descriptors	u3	Distribution
la	Language	u4	Cost
lk	Main Website	u5	Remarks
no	Notes	u6	ISRT Review
ol	Other Language	u7	Priority
op	Other Pages	u8	QA-QC
ot	Original/Translated	u9	Receipt
pb	Publisher	ul	URL 1
pp	Place of Publication	vo	Volume
rd	Retrieved Date	yr	Year
rt	Reference Type		

7.2 RESOURCE DOCUMENTS

As discussed in Section 3.6, all acquired resource documents were converted to a searchable PDF format for inclusion in the ESID. These documents were initially intended to be stored in the ESID geodatabase; however, for performance reasons, it was determined that these documents should be stored in a separate folder structure which is accessible via the ESID application. This arrangement also promotes the ability to manage the documents with an Electronic Documents Management System (EDMS).

7.3 GEOGRAPHIC CHARACTERIZATION

As document resources were acquired, scanned, and converted to a searchable PDF format, the RefWorks® "Ref ID" was applied to the filename of the corresponding PDF document produced. The PDF documents were then reviewed in order to develop a "Location Description"

that represents the geographic location of the resource within the ESID project area. This Location Description was added to the RefWorks® bibliographic data for each resource.

A Microsoft® Access® database, named "Geographic Characterization," was developed to manage the Location Description information developed for each resource document. The Microsoft® Access® database served as a tool for tracking location maps that were extracted from the PDF documents. These location maps were used by GIS staff who were simultaneously digitizing the study boundaries as shapefiles to be incorporated into the ESID. The database served additional functions, including delegating workload among project members and tracking issues related to the digitization process. It also served as a quality control tool to check accuracy of the study boundary shapefiles. Several Microsoft® Access® database forms were developed to allow novice users to review and update data within the database.

The Microsoft® Access® database contains a simple table structure, including the "GeoExtentTracking" table (Figure 11 and Table 12) that stores the data used in the next phase of geodatabase design. The EcoSpatial ID or "ESID" (unique identifier for ESID database) and "Location Description" fields were the only fields used in later stages of the geodatabase process. All other fields were used strictly for work tracking purposes. The file name abbreviation represents the ESID number and the category. The category abbreviation was later dropped and only the ESID number used. In the location figure box, "NF" means no figure available for digitization. Alternatively "F" means a figure is available. The other abbreviations used (SH, DH, IS, LB) are initials of staff working on various aspects of data extraction.

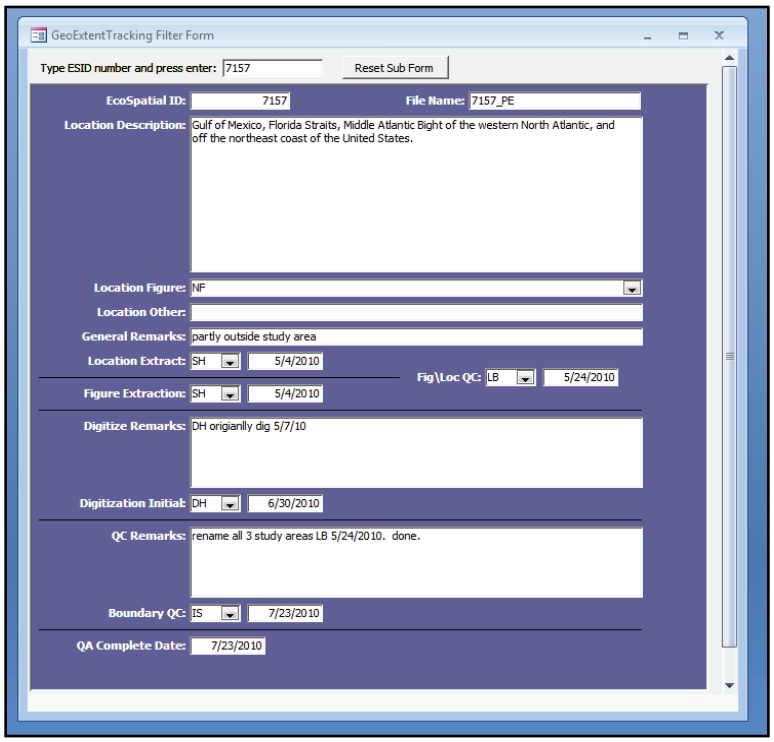


Figure 11. Screenshot of a data form from the Geographic Characterization Microsoft® Access® database.

Table 12.

Fields in the GeoExtentTracking table.

Field	Description
Record:	Unique identifier for geographic characterization database
EcoSpatial ID:	Also called "ESID", unique identifier for ESID database
File Name:	PDF document name
Location Description:	Location information extracted from PDF document
Location Figure:	Code for type of location figure
Location Other:	Other location information
General Remarks:	Remarks about resource
Location Extract Initial:	User Initials for location extraction
Location Extract Date:	Date for location extraction
Figure Extraction Initial:	User Initials for figure extraction
Figure Extraction Date:	Date for figure extraction
QC Fig\Loc Initial:	User Initials for quality control of extracted information
QC Fig\Loc Date:	Date for quality control of extracted information
Digitization Initial:	User Initials for study area digitization
Digitization Date:	Date for study area digitization
Digitize Remarks:	Digitization remarks
Boundary QC Initial:	User Initials for quality control of digitized boundary
Boundary QC Date:	Date for quality control of digitized boundary
QC Remarks:	Quality control remarks
QA Date:	Date for quality assurance

7.4 ARCMARINE

The ArcMarine data model is a Personal Geodatabase containing marine feature classes, tables, and relationship classes (Figure 12). ArcMarine was developed by Esri® with input from the marine community, which Esri® defines as users that apply GIS to the coasts, estuaries, marginal seas, and the deep ocean, including academic, government or military oceanographers, coastal resource managers and consultants, marine technologists, nautical archaeologists, marine conservationists, marine and coastal geographers, fisheries managers and scientists, ocean explorers and mariners, etc. This data model was selected for use in the ESID for several reasons, including its applicability to the types of data being stored in the ESID, its potential for expansion for future BOEM efforts, and the significant effort previously spent developing the model.

"The ESID" refers to the system that incorporates both the database and the applications that display and query the database. The ESID database is a geodatabase design that merges the RefWorks® bibliographic database, the geographic characterization Microsoft® Access® database, and the ArcMarine data model. During the desktop application prototype phase, the ArcMarine feature datasets, tables, and relationship classes were loaded into the AMEC Nashville ArcSDE Enterprise Geodatabase. At this point, the ESID geodatabase did not contain any data, only the ArcMarine structure.

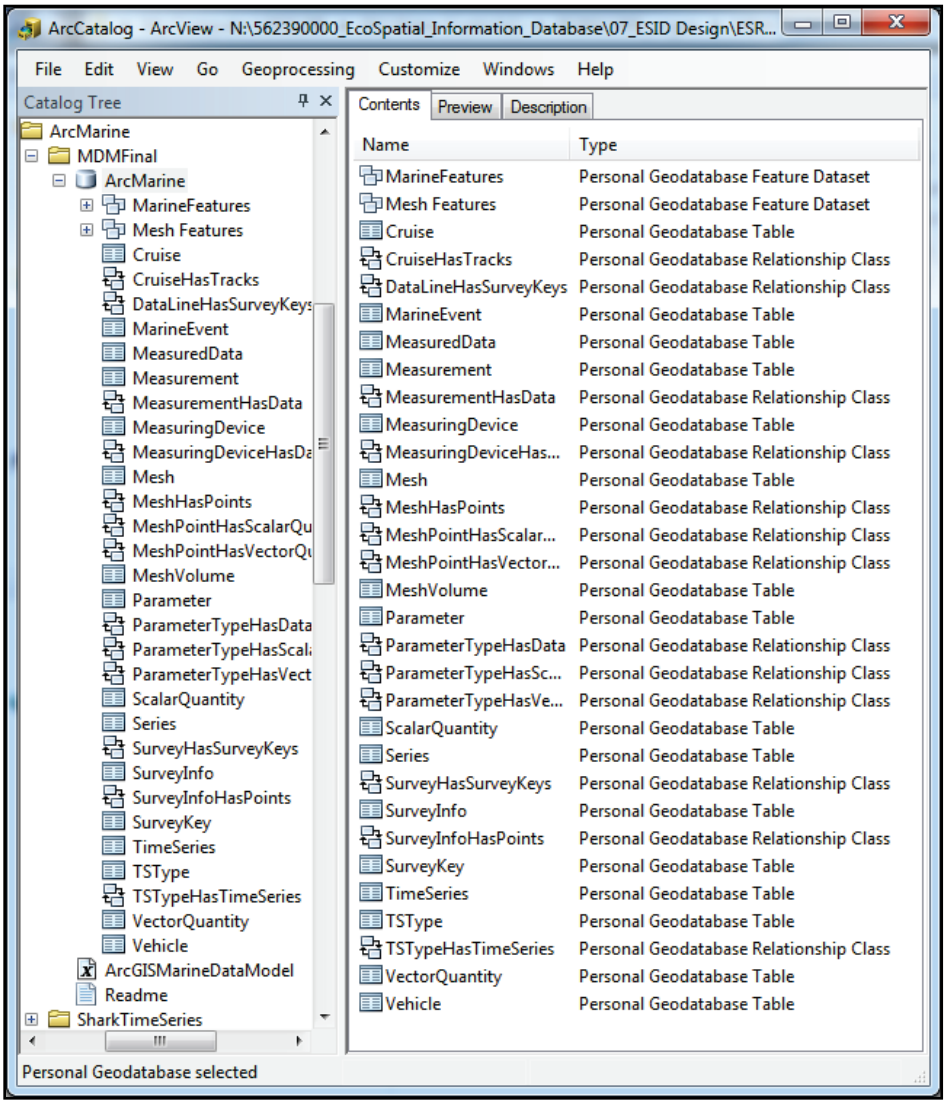


Figure 12. Feature datasets, tables, and relationship classes within the ArcMarine data model.

The entire ArcMarine schema served as the base structure for the ESID; however, only one feature class, FeatureArea, was used for this project. The FeatureArea layer was one of the MarineFeatures layers, as shown in Figure 13. Because the ESID was intended for future expansion, and some of the resources include studies in other parts of the world, the World Geodetic System (WGS84) projection is used in the ESID geodatabase. The digitized resource boundaries were loaded into the FeatureArea layer after they passed quality control (Figure 14). This began the process of creating the spatial component for all resources included in the ESID. The FeatureArea layer also includes ArcMarine attributes (Table 13), additional attributes created specifically for the ESID, and feature level metadata. The feature level metadata consisted of revision date (REV_DATE) and data source (DATA SOURCE) fields added to the attribute table of the FeatureArea feature class. The REV_DATE field is the date the feature was created and the DATA SOURCE field has a value of "Digitized Other" as all features were digitized.

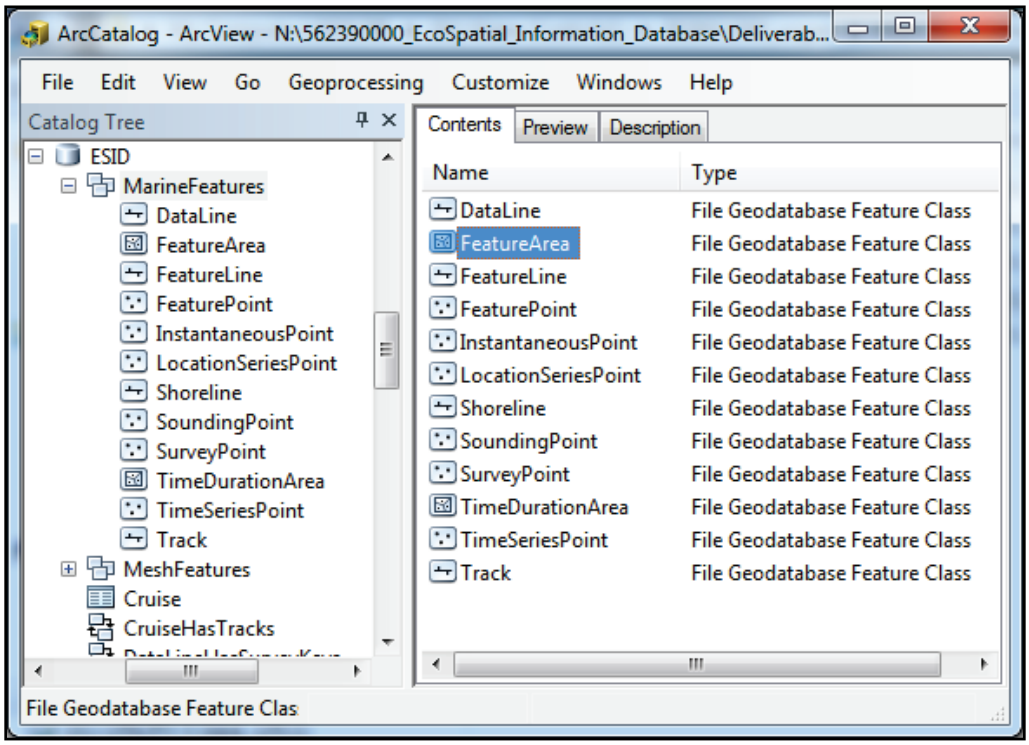


Figure 13. The FeatureArea feature class within the MarineFeatures feature dataset (as viewed in ArcCatalog).

The ESID was required to provide metadata for all resources in the system. Metadata conforming to the FGDC requirements were created for each feature class within the geodatabase and described the geographic extents/location of each resource. The bibliographic data that were downloaded as a part of the bibliographic search were reformatted into a database table called the Resource Table. The Resource Table serves as metadata and contains all data exported from RefWorks® merged with the location description from the geographic characterization table. Table 14 shows the fields included in the Resource Table. Some of the RefWorks® fields were excluded from the final Resource Table because they were not useful in the ESID application. The excluded fields were used primarily during the data acquisition process, or were not populated by RefWorks®. The location of the Resource Table is shown in

Figure 15. Additionally, a lookup table, named ResourceFieldMap, was created in the database. The purpose of the table is to include Reference Manager® 12 field name aliases on exported reports of bibliographies. The ultimate goal is to load the bibliographic exports into Reference Manager® 12 bibliographic software.

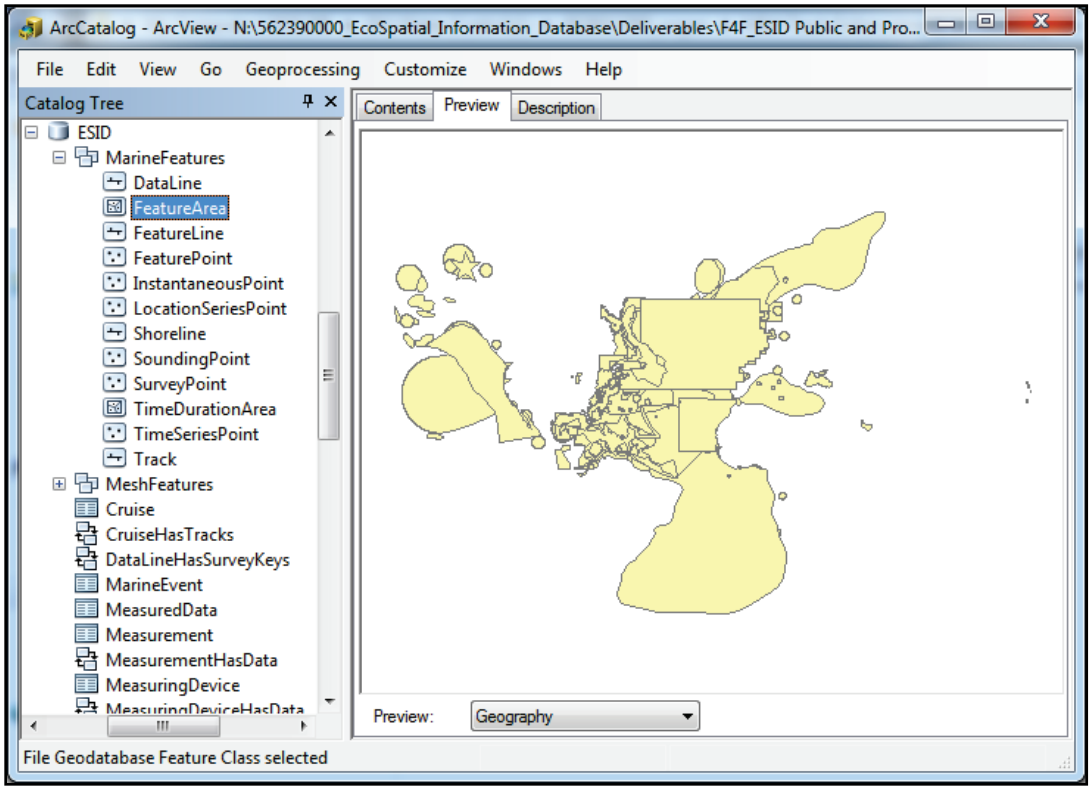


Figure 14. Geographic view of the FeatureArea layer, including the digitized resource boundaries.

Table 13.

The attributes contained within the FeatureArea layer.

Attribute	Description
FeatureID	Unique identifier for table (ArcMarine)
FeatureCode	Not used (ArcMarine)
Study_Site	Name of study area derived from resource paper
ESID	Unique identifier for resources
Rev_Date	Date feature was created/updated (feature level metadata)
Data_Source	Description of data source (feature level metadata)

Table 14.

The fields included in the Resource Table.

Bibliography Field	Description
ESID	Unique ID for the resource
Category	Search category in which the resource was located
Distribution	Copyright category of the resource
ReferenceType	Type of resource (i.e. journal or conference proceeding)
ResourceYear	Year resource was produced
Title	Title of resource
Author	Resource author name
Abstract	Abstract of publication
LocationDescription	Description of the resource location extracted from the document
ExtractedData	Description of data extracted from a document
Descriptor	Keywords found within the resource
Notes	Additional information about the resource
Publisher	Publisher of the resource
PublishPlace	Place of resource publication
Periodical	Description of source periodical
BookTitle	Tile of Book
SeriesTitle	Title of the publication series.
Conference	Date of conference if applicable
Volume	Volume of document
Issue	Issue of document
StartPage	Starting page of resource within publication
OtherPages	Other relevant pages within the publication
ISSNISBN	Unique identifier for periodicals
AuthorAddress	Author contact information
Accession	Sequential number given to new publications
DOI	Digital Object identifier: unique document identifier
CallNumber	Library identifier for the resource
Language	Language document was written in
OutputLanguage	Current language of the document

Table 14 (continued). The fields included in the Resource Table.

Bibliography Field	Description
OriginalTitle	Original title of the resource
SubFile	Additional associated files.
CitedReference	References the document cites
Links	Hyperlink to documentation
URL1	Primary web link to the resource
URL2	Secondary web link to the resource
SourceType	Format of resource (i.e., hard copy or electronic)
Acquired	Date the resource was acquired

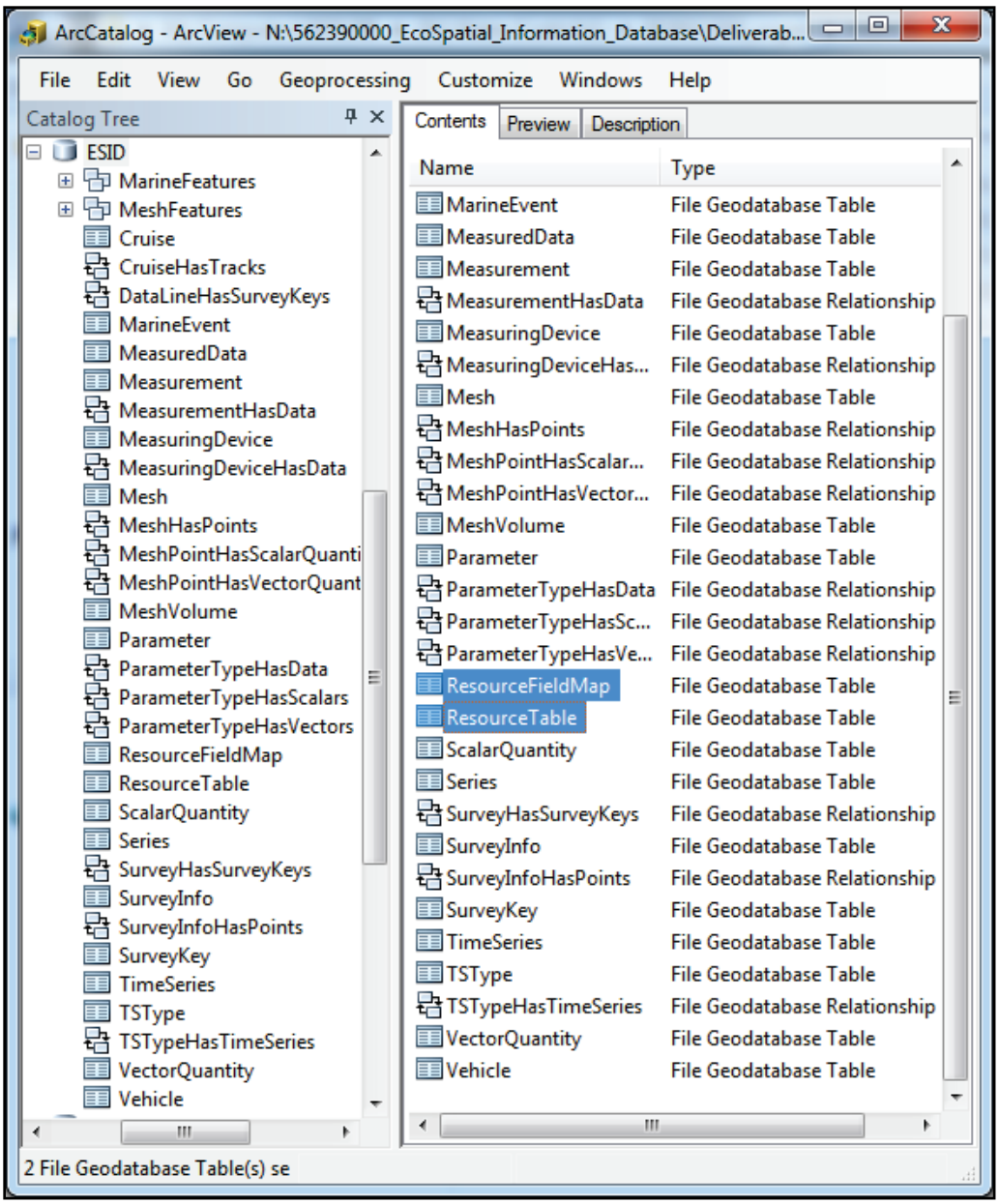


Figure 15. Added Tables location viewed in ArcCatalog, showing the location of the Resource Table.

7.5 WORD SEARCH CAPABILITIES

The utility of the ESID is greatly enhanced by the ability to perform word searches of the database in addition to geographic searches. The ESID provides two basic types of word searches, both of which rely on the use of a database index table. The first type is a word search of the metadata contained in the Resource Table. This search can be conducted fairly rapidly because the Resource Table is relatively small in comparison to the size of the documents in the File Storage Folders. The speed of the Resource Table word search is also enhanced because the keywords used to locate and obtain the resources provide a defacto database index table. The second type of word search is a word search conducted on an advanced index of all searchable documents, allowing for rapid querying. Indexing resource documents is performed using

PDFBox and Lucene. These open source products provide the ability to extract content from PDF documents (PDFBox) and to create and search a full-text index of the resource document library (Lucene). This is a several step process and begins by using PDFBox to extract document content for each ESID resource document. This document content is related with the ESID resource ID into a document object class which is then indexed using Lucene. Lucene is used to index all ESID resource documents and retrieve all ESID resource IDs related to user provided search parameters.

8.0 USER INTERFACE

8.1 DESKTOP APPLICATION

The ESID was initially envisioned as a desktop application designed to run as an extension to Esri® ArcGIS Version 9.3.1. This initial design approach was selected because the application was expected to reside on the BOEM network and GIS users would use Esri® ArcMap® to interact with the ESID. A prototype desktop application was built and delivered as part of contract deliverable F.4.D "ESID Design and Prototype Test Database" to demonstrate the core functions required by BOEM. The prototype desktop application was provided to on March 22, 2010 and a follow up webinar was conducted to walk all stakeholders through the application and database. The prototype did not contain all functionality of the final ESID, because it was designed to elicit a response for potential design changes early in the development process. This section describes the components and functionality of the prototype.

The desktop ESID system was based on the following components (Figure 16):

1. **File Geodatabase** – The geodatabase would be built on the ArcMarine data model and would contain data developed from the obtained resources. Bibliographic and acquisition information were to be stored in the Resource Table. The digitized resource boundaries would be stored in the FeatureArea polygon layer. The Resource Table was to be linked to the FeatureArea layer by unique ID codes. The two components would be linked to the acquired files and spatial data.

2. **Esri® ArcGIS Map Document** – This map document was designed to contain links to and display the resource footprints and other base map services. The map document was a Map Exchange Document (MXD), which is a map file format used by Esri® mapping software. These layers would contain scale-dependent rendering, which would turn data on and off at different scales. The layers would be symbolized in a logical way to enable the user to easily navigate to areas of interest in the map.

3. **ESID Extension** – The application was to be bundled for deployment as an Esri® ArcGIS Version 9.3.1 Extension. The application itself would permit the BOEM users to query and manage the ESID Geodatabase and associated files from a toolbar within Esri® ArcMap®. From the toolbar, the users would be able to conduct text-based and spatial queries of the ESID Geodatabase. Both the text-based and spatial query results would be displayed in a Results Form. The user would be able to produce a report of the results, view resource documents, or view spatial data. An administrative function to import data into the ESID would also be provided. The ESID Extension Toolbar is described in more detail in Section 8.1.1.

4. **Resource Folder** – This Microsoft® Windows® file structure contains all resource documents. Within the Resources folder, each numbered folder corresponds to a resource in the Resource Table. The folders contain the resource documents in PDF format and/or extracted tables associated with the resource.

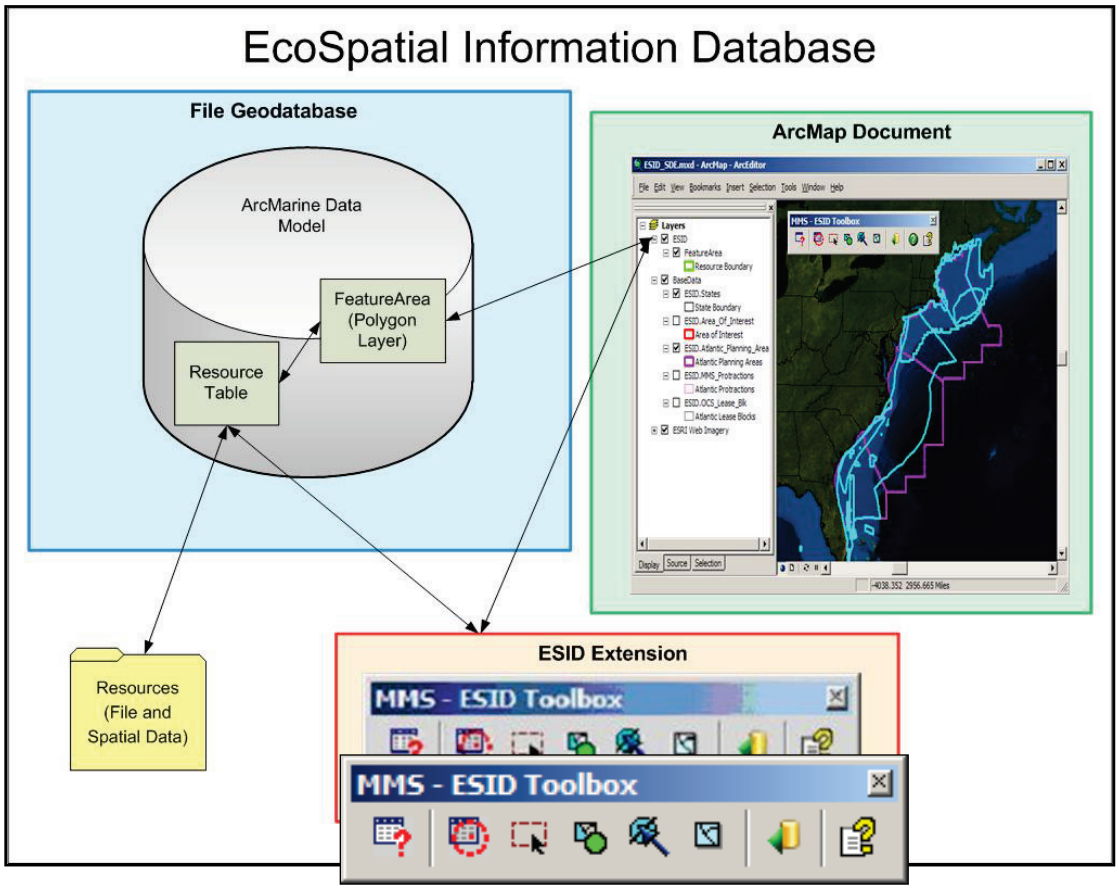


Figure 16. ESID desktop application showing file geodatabase, ArcMap® document, ESID extension, and Resources folder.

8.1.1 ESID Extension Toolbar

The ESID Extension Toolbar was designed with eight buttons (Figure 17) to interact with the ESID geodatabase, Esri® ArcMap® document, and the Resource Folder. The functions of the buttons are described in the sections below.

Figure 17. ESID Extension Toolbar.

8.1.1.1 Search Functions

The ESID desktop application was designed with the following search functions.

<u>Search Text</u>

The Search Text function (Figure 18) enabled the user to perform a text-based query of the ESID resource information. For the prototype, this function only searched the bibliographic table. When the user entered a keyword(s), the function generated a list of all resources containing the search term(s).

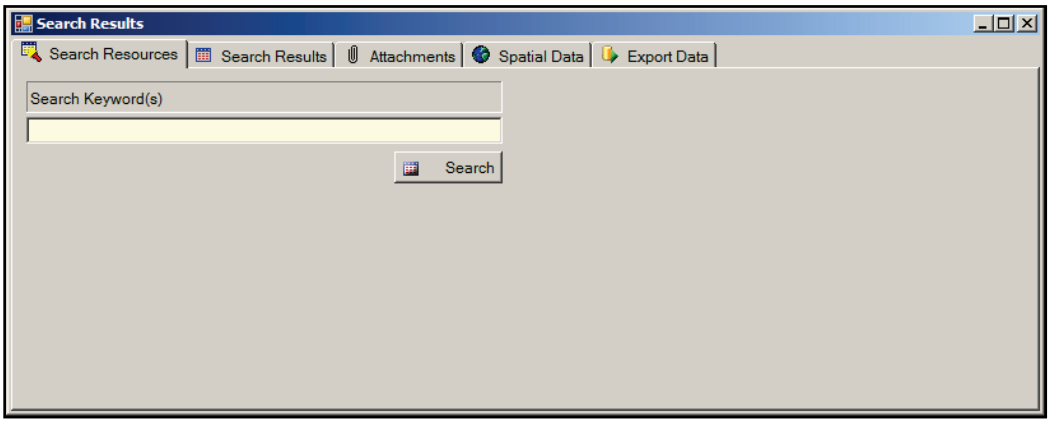


Figure 18. The Search Text function of the ESID desktop application.

Select by Radius

The Select by Radius function (Figure 19) permitted the user to identify resources within a specified radius by entering point coordinates or by clicking a point in the map window. Resources intersecting the defined radius were displayed as Search Results.

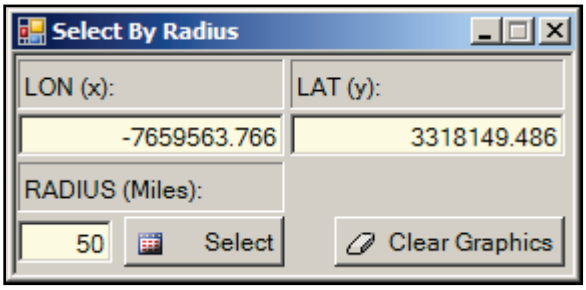


Figure 19. The Select by Radius function of the ESID desktop application.

Search by Polygon

The Search by Polygon function permitted the user to draw a box in the map window to identify resources. Resources intersecting the defined polygon were displayed as Search Results.

Select by Feature

The Select by Feature function enabled users to select a feature layer in the table of contents within the Esri® ArcMap® map document. Resources intersecting the specified feature were returned. An example of the Select by Feature function is shown in Figure 20.

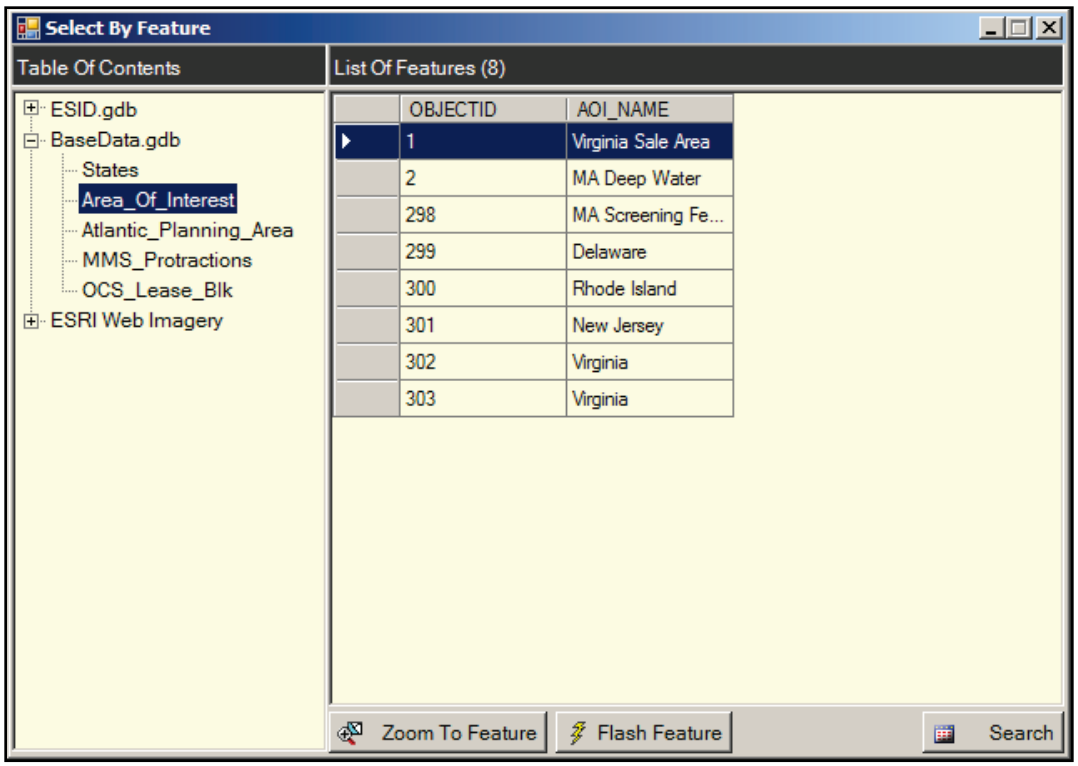


Figure 20. The Select by Feature function of the ESID desktop application.

8.1.1.2 Search Results

A Search Results window appeared on the user's desktop whenever any of the search functions on the ESID Extension Toolbar were selected. This Search Results window contained five individual tabs, which are described below.

Search Results Tab

Once a search function was performed, the list of matching or intersecting resources would be displayed in the Search Results Tab (Figure 21).

Resource Details Window

Selection of a resource in the Search Results Tab allowed the user to view all the data fields for the selected resource in the Resource Details Window (Figure 22). The Resource Details Window allowed the user to view long character strings (e.g., abstract field) more easily. In addition, if the user double clicked the Links, URL 1, or URL 2, the fields opened the associated web page in a new browser window.

Search Results

Search Resources | Search Results | Attachments | Spatial Data | Export Data

List Of Records (83)

ESID	Year	Author	Title	Category
5223	2009	Auster P. J.	Compensation and recovery of feeding guilds in a nort...	Pelagic ecology
977	2009	Ruzicka,Rob	Sponge community structure and anti-predator defens...	Coral and Hardbottom
976	2009	Moore,Jon A.	Commensalism Between Juvenile Cusk Eels and Pan...	Coral and Hardbottom
198	2009	Auster,P. J.	Compensation and recovery of feeding guilds in a nort...	Demersal Fish
1244	2008	Asch,R. G.	Changes in a benthic megafaunal community due to d...	Coral and Hardbottom
1236	2008	Henry,L. A.	Occurrence and biogeography of hydroids (Cnidaria: ...	Coral and Hardbottom
1189	2008	Holmes,C. W.	Archive in the deep: A 2000-year history of oceanograp...	Coral and Hardbottom
1094	2008	Henry,Lea-Anne	Occurrence and biogeography of hydroids (Cnidaria: ...	Coral and Hardbottom
1090	2008	Wolfe,Douglas A.	Mollusks taken by beam trawl in the vicinity of Gray&#...	Coral and Hardbottom
993	2008	Fraser,Sarah B.	Reef morphology and invertebrate distribution at conti...	Coral and Hardbottom
990	2008	Morrison,Cheryl L.	Characterization of 13 microsatellite loci for the deep-...	Coral and Hardbottom
191	2008	Ruzicka,Rob	Latitudinal variation in spongivorous fishes and the eff...	Demersal Fish
1246	2007	Bullard,S. G.	The colonial ascidian Didemnum sp A: Current distrib...	Coral and Hardbottom
1101	2007	Kendall,Matthew S.	Characterization of the benthos, marine debris and bo...	Coral and Hardbottom
1097	2007	Freeman,Christoph...	A biogeographic comparison of sponge fauna from Gr...	Coral and Hardbottom
997	2007	Brooks,R. Allen	Frequency of sublethal injury in a deepwater ophiuroid...	Coral and Hardbottom
972	2007	Williams,B.	Stable isotope data from deep-water antipatharians: 4...	Coral and Hardbottom
638	2007	Ross,S. W.	The fish fauna associated with deep coral banks off th...	Demersal Fish
429	2007	Reed,John K.	Impacts of bottom trawling on a deep-water Oculina c...	Demersal Fish
415	2007	Ruzicka,Rob	Latitudinal variation in spongivorous fishes and the eff...	Demersal Fish

Zoom To Selected Features | Flash Selected Features

Figure 21. Example of the Search Results Tab displaying the list of matching or intersecting resources.

Resource Details

Details (Select item to view details)

NAME	VALUE
Series Title	
Publisher	
Publication Place	
Links	
Call Number	
URL 1	http://www.st.nmfs.noaa.gov/tm/nec_image/n...
URL 2	
Cited Reference	
Original Title	

URL 1

http://www.st.nmfs.noaa.gov/tm/nec_image/nec030image.pdf

Figure 22. List of data fields for selected resource in the Resource Details Window.

Attachments Tab

The Attachments Tab allowed the user to locate the document folder for a specific resource and view a list of files related to the resource (Figure 23). From the Attachments Tab, the user was able to open and review all available documents.

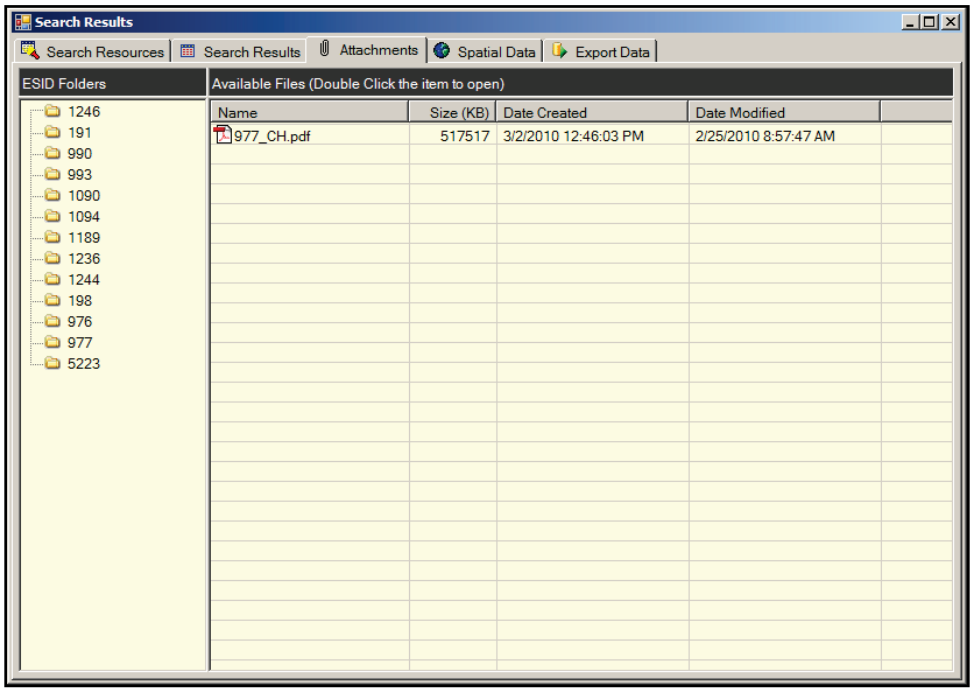


Figure 23. Example of Attachments Tab showing a list of files related to a given resource.

Spatial Data Tab

The Spatial Data Tab was not functioning at the time of the prototype deliverable; however, this tab was envisioned as a location to view related spatial data (Figure 24).

Export Tab

The Export Tab allowed the user to generate a report of the search results in either Microsoft® Excel® or Reference Manager® format for selected resources (Figure 25). The user could check or uncheck individual data fields to be included in the report.

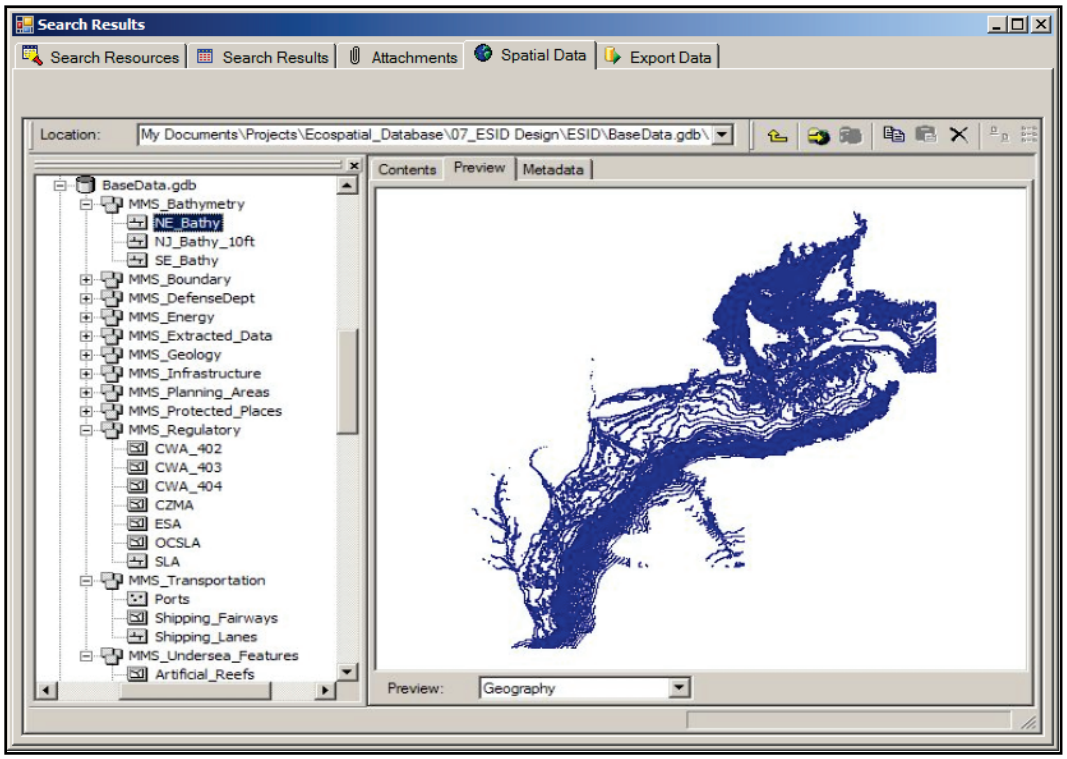


Figure 24. Conceptual example of the Spatial Data Tab showing spatial data.

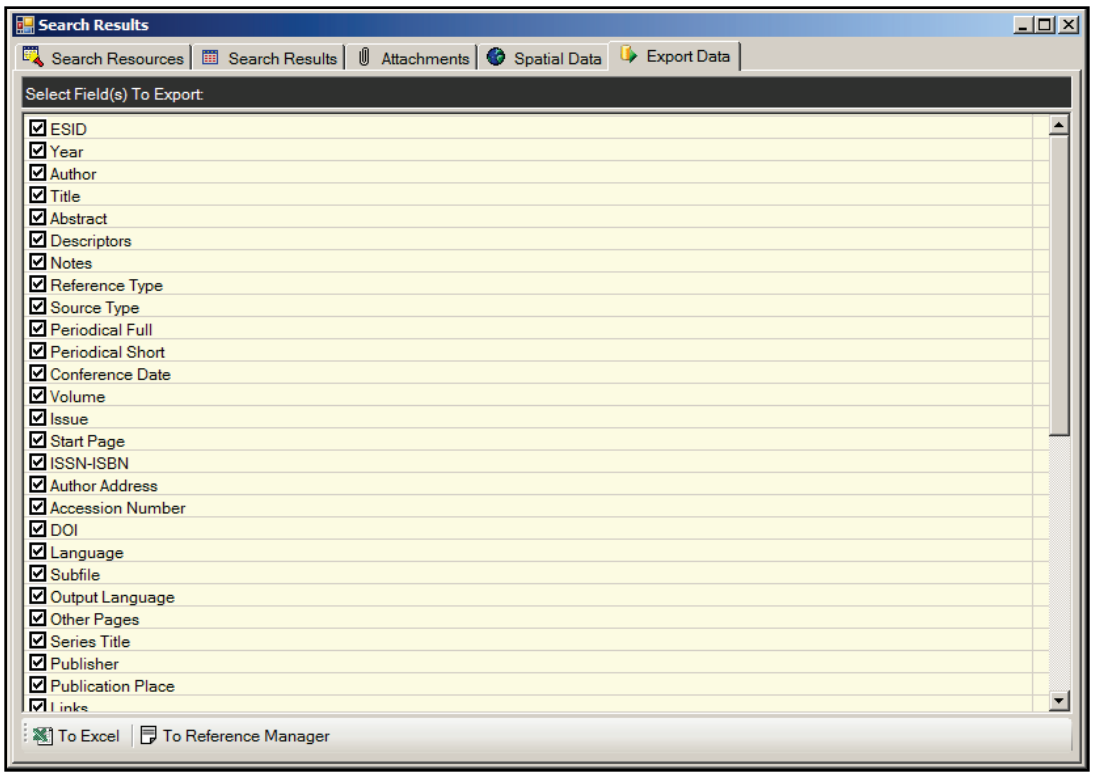


Figure 25. Example of Export Data Tab.

8.1.1.3 Import Data Function

The Import Data form on the ESID Extension Toolbar allowed users to upload and append new bibliographies in the ESID (Figure 26). The form required data to be in a RefWorks.XML format.

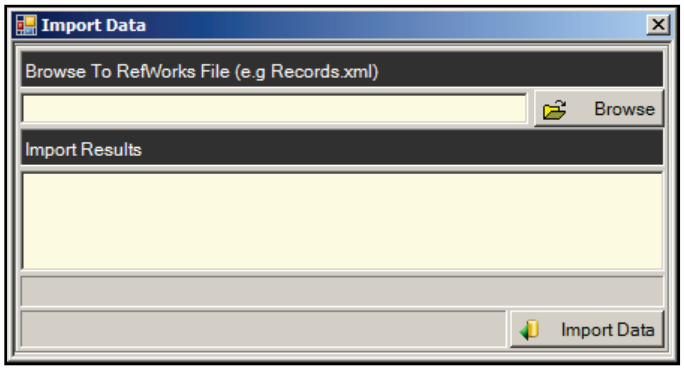


Figure 26. Import Data Form on the ESID Extension Toolbar.

8.1.1.4 Help Button

The ESID Extension Toolbar also contained a Help function. The Help function directed the user to general help documentation related to functions of the ESID Extension Toolbar.

8.1.2 Esri® ArcGIS Map Document

The Esri® ArcGIS map document displayed the resource footprints and other base map services for the user (Figure 27). The ESID resource boundary layers and additional base data layers were added to the document and appropriate symbology and scale-dependant rendering was applied. The ESID Extension could be loaded by each user and was available as a toolbar that could be turned on or off. Text-based searches conducted by a user displayed the list of corresponding resources, along with their spatial boundaries in the map document.

Alternatively, a user could spatially search the ESID by selecting a polygon, applying a buffer, or specifying a feature (Figure 28). In this case, the intersecting boundaries would be selected and the corresponding bibliographies would be displayed in the Search Results window.

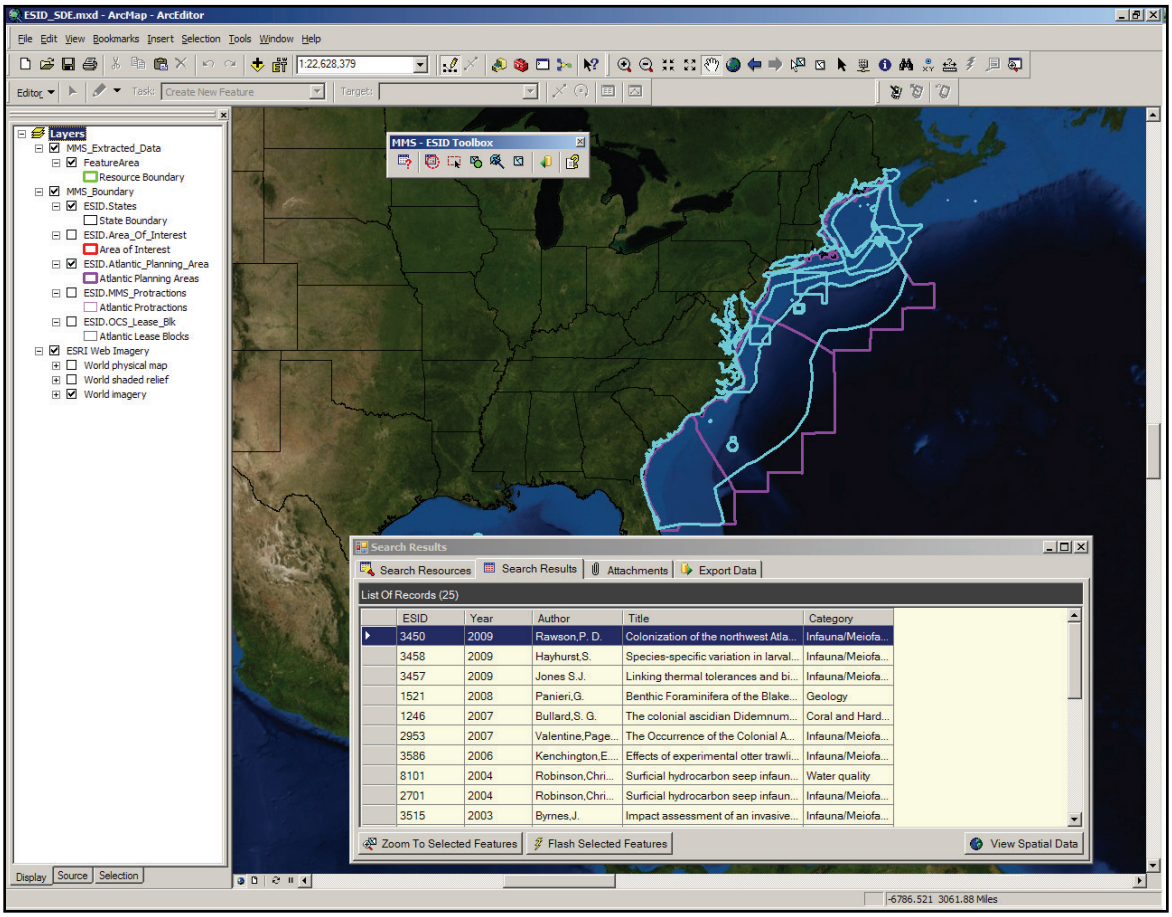


Figure 27. The Esri® ArcGIS map document showing results of text-based searches and spatial boundaries of those search results.

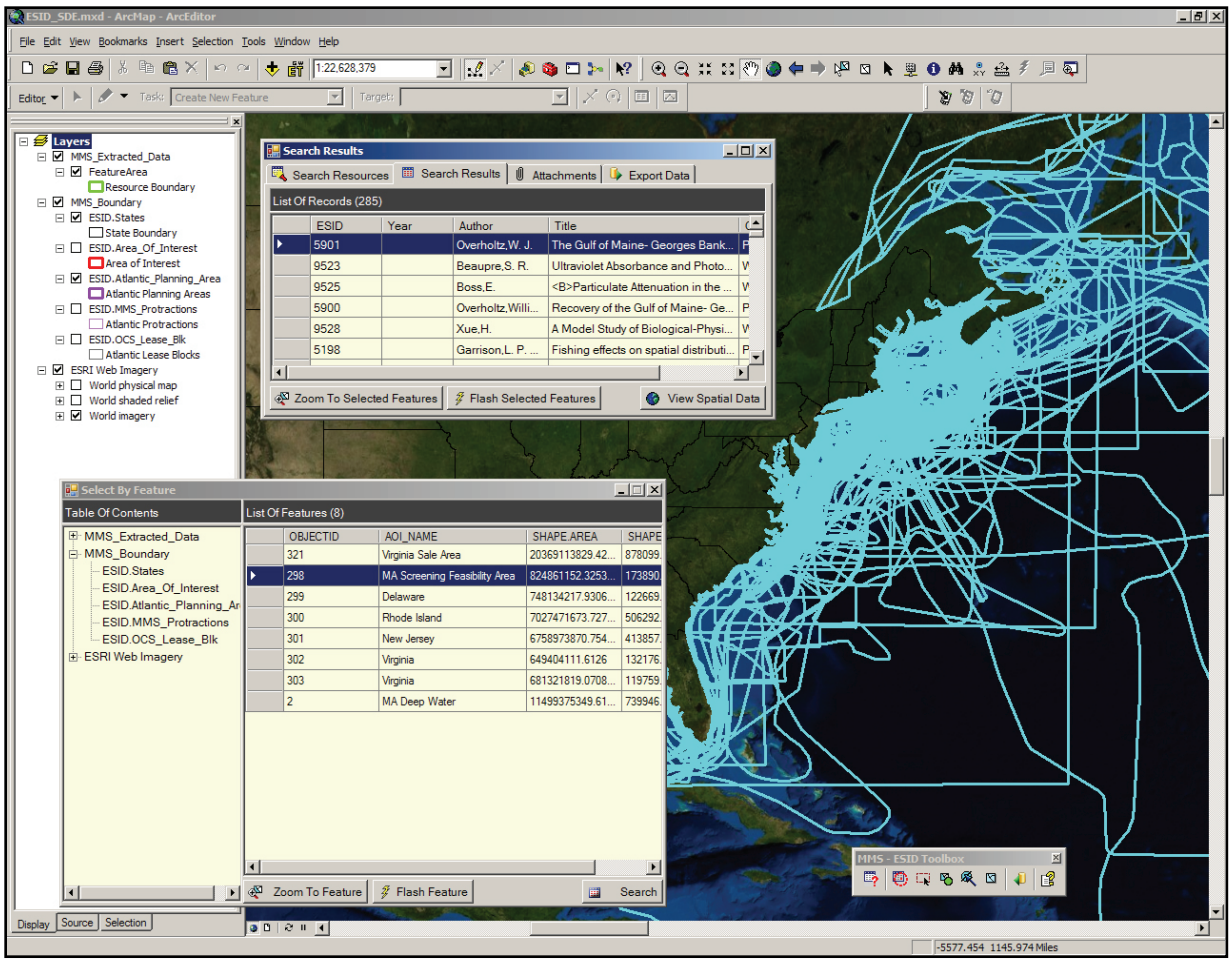


Figure 28. ESID desktop application spatial selection option.

8.2 ESID Web Application

Shortly after developing the prototype desktop application, the ESID project team and the BOEM determined that the ESID would better serve its intended purpose by being accessible to users through the Internet. Internet accessibility would allow the ESID to be more readily available to the BOEM regional offices and would also facilitate public access to the ESID. The general user, both BOEM and public, was assumed to have novice GIS skills. The web application was developed so that a novice GIS user could perform searches and produce reports. Higher level GIS skills are needed for some searches and uploading of resources; however, these skills are not required for general use of the ESID web application. A modification to the initial contract was issued and the design of the ESID desktop application was revised for the development of a web application. This section outlines the components and functionality of the ESID Web Application.

8.2.1 ESID Web Application Components

An ASP.NET website was implemented to control access to the ESID and to provide a framework for querying the database. The website is currently hosted in the Amazon EC2® Cloud hosting environment. The website will permit an administrator to manage user credentials and provide quality control on newly added resources. The website provides general background

information about the project as well as access to the ESID Web Map Interface which is described in more detail in Section 8.2.2. The ESID Web Application (Figure 29) is built upon the following components:

1. **ESID Geodatabase** – Spatial data are stored in an Esri® (version 10) file geodatabase built on the ArcMarine data model. The geodatabase contains the entire ArcMarine data model for potential future use; however, only the FeatureArea polygon layer is populated. The FeatureArea layer contains the digitized boundaries from the loaded resources and has layer-level and feature-level metadata in accordance with the FGDC standards. The FeatureArea layer was customized for the specific needs of the ESID. Additional fields were added to the attribute table to relate other components of the ESID and to provide more description information.

2. **Supporting Database** – The supporting database is PostgreSQL 8.3 and contains resource bibliographic information and administrative data used to manage access to the website. The main function of the database is to store the Resource Table, which contains bibliographic information for all ESID resources.

3. **Resource Document Storage** – File-based documents are stored on a server-based file system. Full text, searchable documents are available and are indexed to allow for more rapid querying. The documents are queried and accessed via the ESID Web Application and can be downloaded by the user.

The ESID Web Application links the digitized resource boundaries from the ESID Geodatabase, bibliographic information from the Supporting Database, and resource documents from Resource Document Storage using a unique ID.

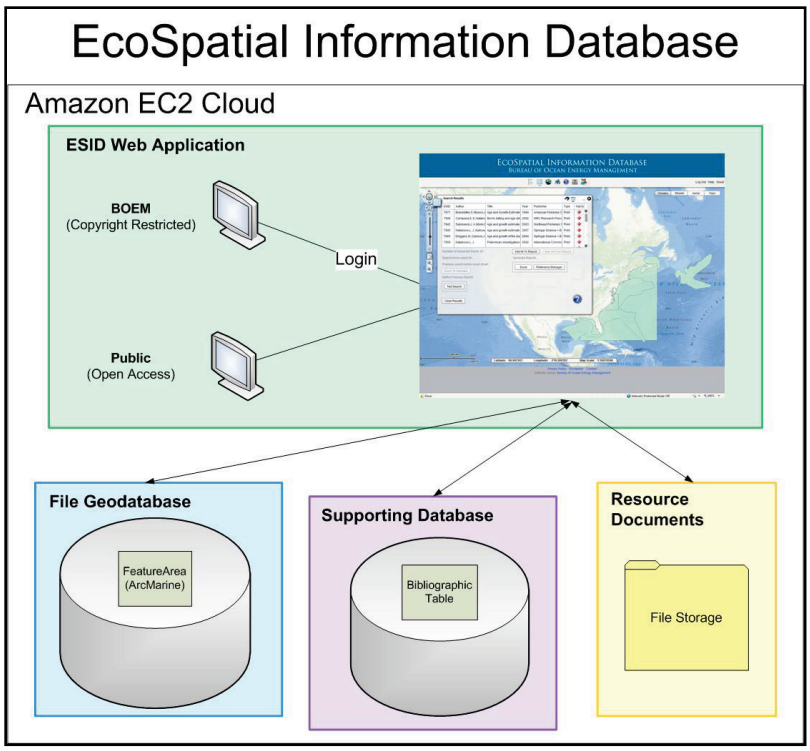


Figure 29. Components of the ESID Web Application.

8.2.2 ESID Web Application Functions

8.2.2.1 Home Page

The ESID Web Application Home Page (Figure 30) provides users with a general description of the ESID, the site requirements, and login options for authenticated and public users. It also provides links to a description of the ESID and to help documents.

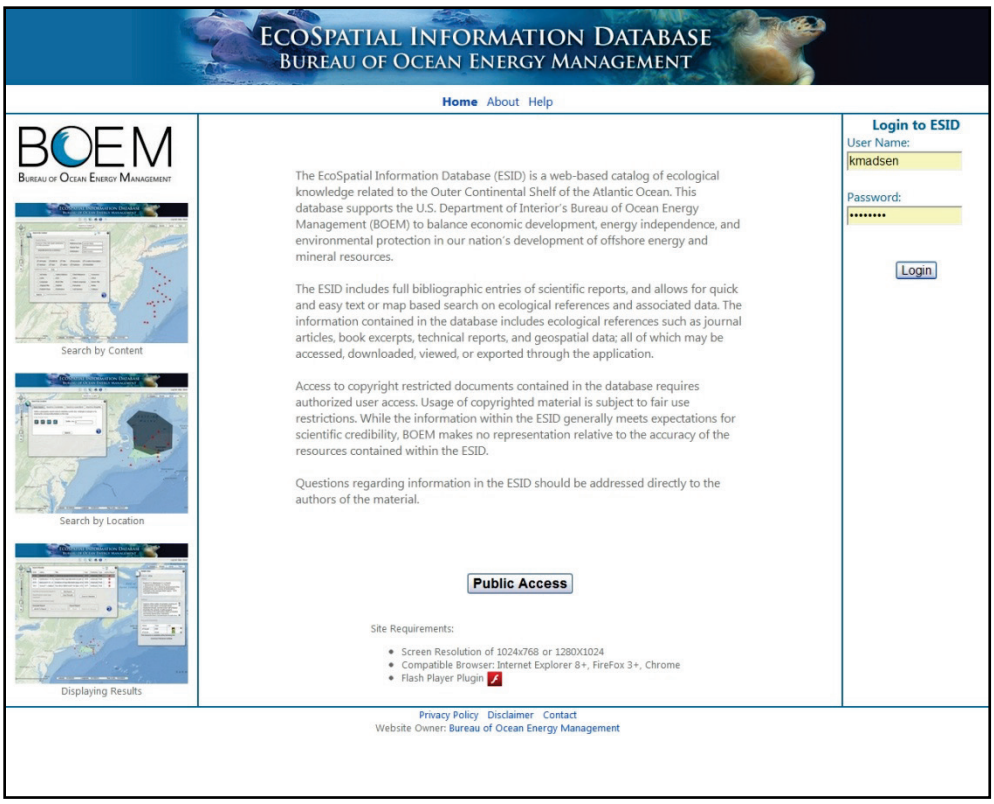


Figure 30. ESID Web Application Home Page showing the Public User Login.

The Public User Login allows users to access the ESID Web Map Interface without authentication credentials. The Public User Login limits user access to documents according to copyright restrictions. In addition, this login restricts data loading functions for adding or changing data in the ESID.

Public User Permissions

- No account required
- Log in through "Public Access" button
- No log out required
- User can view all citations
- User can view abstracts, bibliographies, and full-text documents only for Open Access® and Online Resources.

The Authenticated User Login allows authorized BOEM and BSEE users to access the ESID Web Map Interface by providing issued credentials for authentication. Users can perform text searches on all ESID documents, regardless of copyright restrictions. Authenticated Users can also load new data resources into the system, subject to Administrator review.

When an authorized user is logged in, the Authenticated Login Tracking stores data in the Supporting Database for the duration of that user's session. The Authenticated Login Tracking allows the ESID to limit the number of authenticated users who are logged in at a given time to 25 users. User logout removes the entry from the database, allowing another user to access the

system. Additionally, this will remove the cookie from the user's system, forcing that user to repeat the login procedure should they require further access.

Authenticated (BOEM and BSEE) User Permissions

- Any authorized BOEM and BSEE personnel
- Limit of 25 users logged into the website at one time
- Upon logout of a user, a new BOEM and BSEE user can login
- User can view all bibliographies and documents, except for those that are copyright restricted
- Resource Upload button can be accessed
- User can add resources to the ESID

Finally, a system Administrator can log in through the Home Page with additional data and user management capabilities.

Administrator User Permissions

- Capacity for multiple Administrator accounts
- Only one system Administrator can login at a given time
- Upon logout of an Administrator, a new Administrator can login
- Administrator can view all bibliographies and documents
- Resource Upload button can be accessed
- Administrator can add resources to the ESID
- Resource Management (for editing existing resources and approving new resources) can be accessed
- User Management button (to Add, Edit, and Delete users) can be accessed

8.2.2.2 ESID Web Map Interface

The ESID Web Map Interface provides the displaying, searching, loading, and editing functionalities for the ESID. It is customized to query the supporting components and provide access to the contents of the ESID. The specific functionalities of the ESID Web Map Interfaceinclude searching and managing resources, generating reports, viewing resource documents and details, managing users, navigating and changing base maps, accessing additional map services, and accessing help documentation.

After a user has logged in, a Disclaimer window will appear in the ESID Web Map Interface. To continue, the user is required verify agreement to the Disclaimer content by clicking on the button at the bottom of the Disclaimer window. The ESID Web Map Interface has standard panning and zooming map controls. The Coordinates/Scale Bar at the bottom of the screen (Figure 31) displays: (1) the map coordinates based on the location of the mouse pointer on the screen within the ESID Web Map Interface, and (2) the map scale based on the current map extent. The Base Map control at the top right of the screen is a set of buttons that allow the user to toggle between various Esri® base map services displayed in the ESID Web Map Interface. The base map selections include Oceans, Aerial, Streets, and Topo.

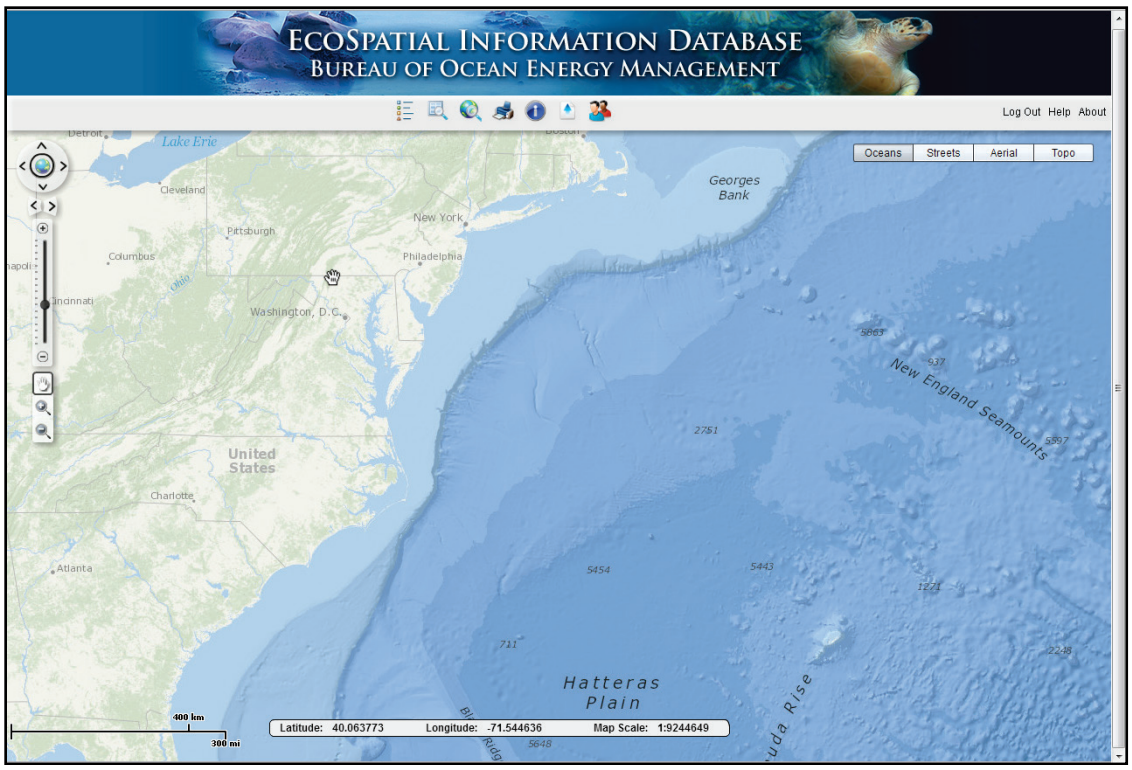


Figure 31. ESID Web Map Interface showing standard panning and zooming map controls (upper left), Base Map controls (upper right), Scale Bar (lower left), and the Coordinates Bar (lower middle).

8.2.3 ESID System Functionality (Widgets)

Widgets are the extensively developed components of the system that provide the ability to query and report on the resource data, as well as to view related spatial boundaries and resource documents. The widgets are accessed through six individual icons located just below the banner in the ESID Web Map Interface (Figure 32). The following sections outline the functionality of the widgets in more detail.

Figure 32. The seven widget icons (shown left to right): “Map Layers,” “Search by Content,” “Search by Location,” “Print Map Display,” “Identify,” and “Upload Resources.

8.2.3.1 Map Layers

The Map Layers widget provides the user the ability to view features supplied by the Multipurpose Marine Cadastre (MMC) map services. The MMC is an integrated marine information system providing updated ocean information, including offshore boundaries, infrastructure, human use, energy potential, and other datasets. The MMC map services are provided by BOEM and NOAA and are publicly available. The MMC data layers become visible in the ESID Web Map Interface when they are selected (checked) by the user from the list of available data layers (Figure 33).

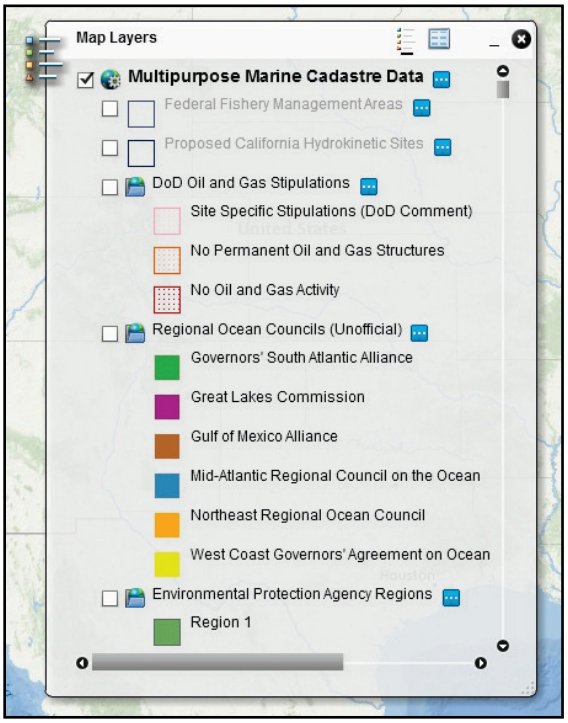


Figure 33. MMC data layers available using the Map Layer widget.

8.2.3.2 Search by Content

The Search by Content widget provides the user the ability to perform a text-based search of the bibliographic information and full text documents contained in the ESID.

<u>Search by Content</u>

Selecting the Search by Content widget opens a window where the user can enter search information (Figure 34). The Search by Content window contains a search terms text box where the user can enter a term, or string of terms, to search for in the bibliographic data. The user can narrow the search by applying filters and field limiters. When a filter is applied, only those ecological references in the specified category will be searched. The Reference Type filter includes all types of resources (e.g., abstract, book section, conference proceedings, dissertation/thesis, journal article, etc.). The Source Type filter includes the formats of resources (i.e., print or electronic). The Distribution filter includes all copyright categories such as open access, copyright restricted, online, or permission granted. The search can be narrowed further by selecting individual Search Fields that correspond to data fields in the bibliographic database.

The user can search all fields or individual fields (e.g., title, abstract, keywords, etc.). The Search by Content window allows the user to perform a full text search of all resource document PDF files.

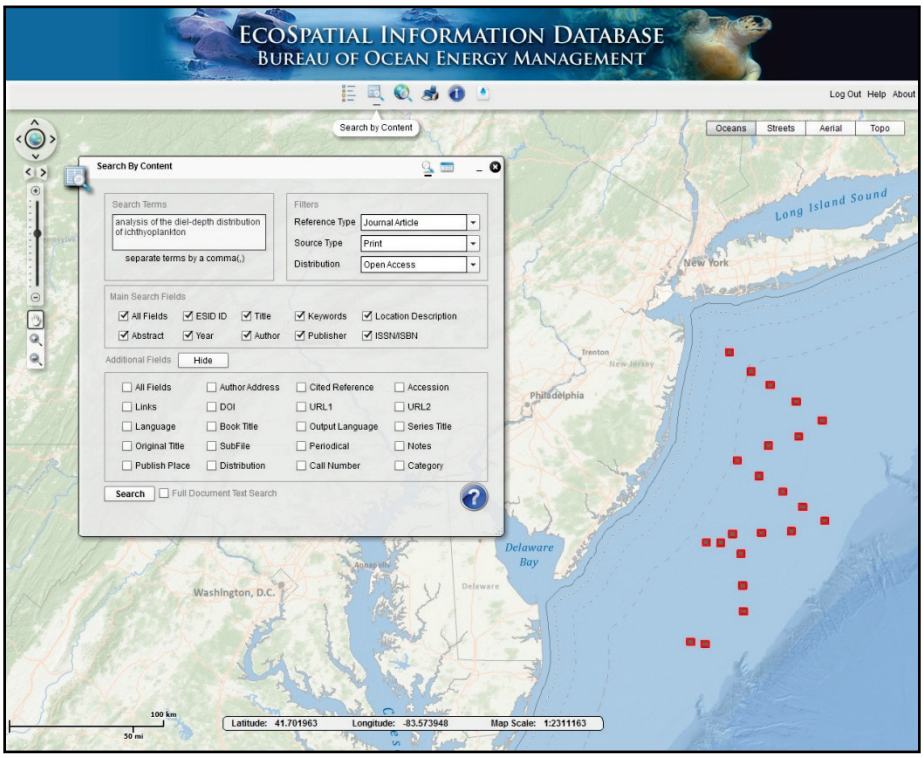


Figure 34. The Search by Content window accessed via the Search by Content Widget.

Search Results Window

After the Search by Content widget is used to conduct a content search, the resulting resources are displayed in the Search Results window (Figure 35). This window displays the search results (the list of resources that match the search request parameters). The search results are also displayed on the map so that the user can visually relate the spatial boundaries of the resulting resources. If the user determines that the initial search parameters resulted in excessive resources, the user can refine the search by entering additional search terms using the "Refine Search" button. Furthermore, the user can generate a report of the results and export the report to Microsoft® Excel® or Reference Manager® for future use.

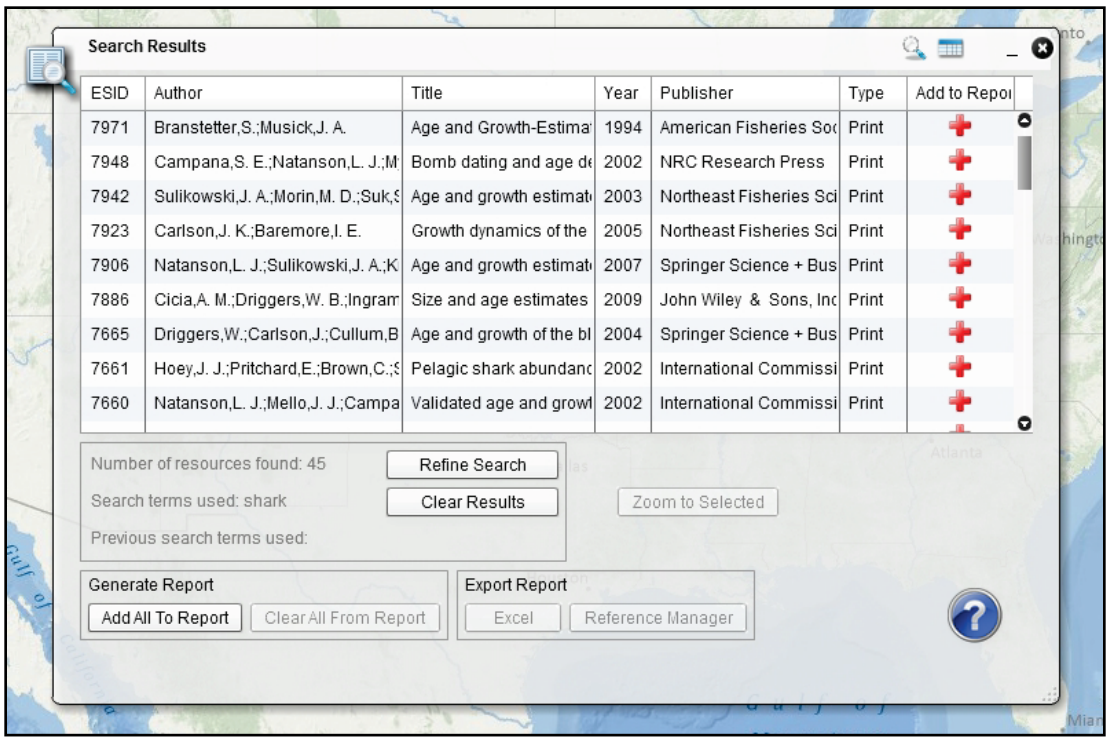


Figure 35. The Search Results window accessed through the Search by Content Widget.

View Selected Features

When a record in the results list is selected, the corresponding resource footprint will be outlined in red on the map. The user can also zoom in to a closer view of the resource footprint on the map by selecting the resource in the results list and clicking the "Zoom to Selected" button in the Search Results window (Figure 36).

Details View

The user can view the corresponding resource documents using the Details View Form. When the user double clicks on a record in the Search Results window, the Details View Form is displayed (Figure 37). The Details View Form presents the full citation and abstract for the resource, along with the ability to open the associated PDF document (copyright restrictions will prevent viewing and downloading of some abstracts and documents). The user can also open the publisher's website through the link provided at the bottom of the form.

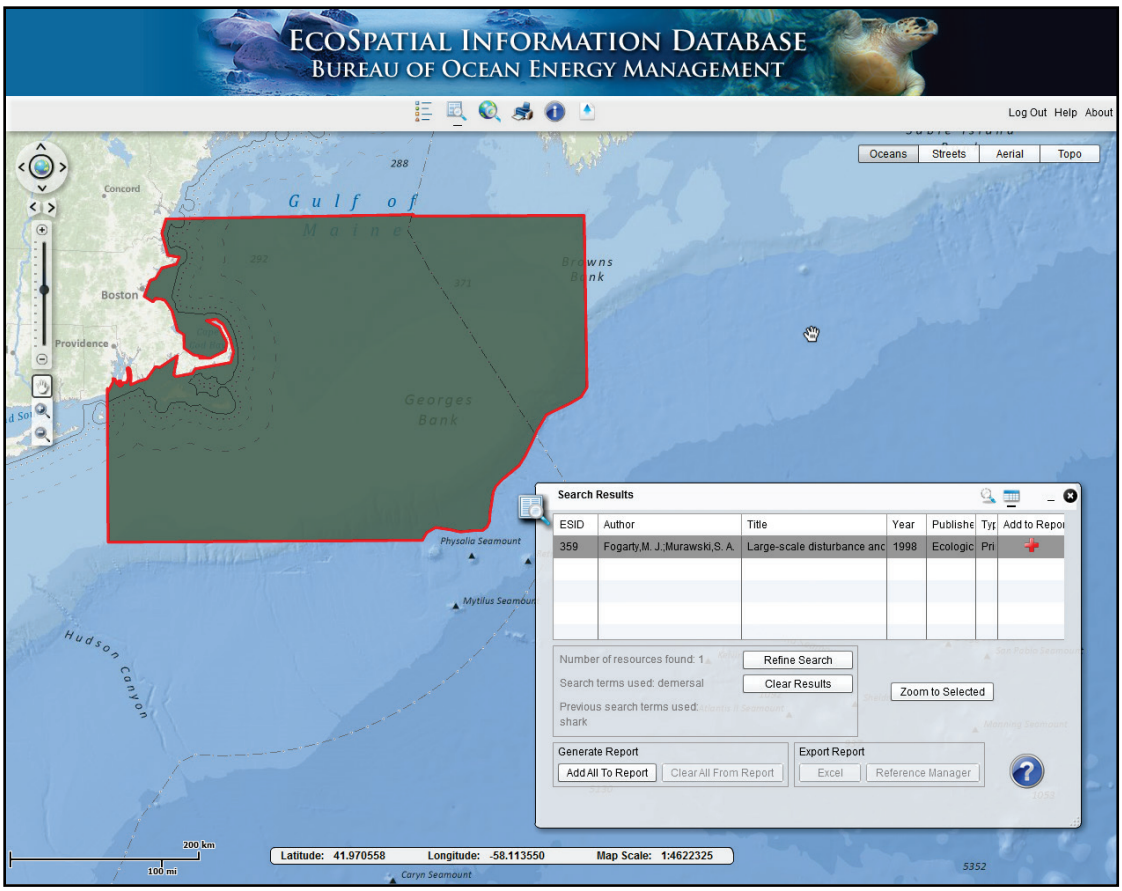


Figure 36. The "Zoom to Selected" button available in the Search Results window.

Report Generation

The user is able to generate a report showing the search results and associated information. The resources listed in the Search Results window can be individually added to a queue of items to be included in a report by clicking on the "red plus" icon visible in the Search Results window (Figure 35). The "red plus" icon changes to a "green checkmark," indicating that the result has been added to the report. Individual resources can be removed from the report by clicking on a "green checkmark." The user can add all listed resources displayed in the results table to the report queue by selecting the "Add All to Report" button (Figure 35). If more than 250 results are added at one time, the user will be prompted to select report format and bypassing the report queue. The user can then export the report in either Microsoft® Excel® or in Reference Manager® format using the appropriate buttons in the Search Results window. Selection of the "Excel" button will generate an .xlsx document (Figure 38) and selection of the "Reference Manager" button will generate a .txt report (Figure 39) compatible with Reference Manager® Version 12, which can be loaded into a Reference Manager® database for further use. The user can clear all resources from the report queue by selecting the "Clear All from Report" button (Figure 35).

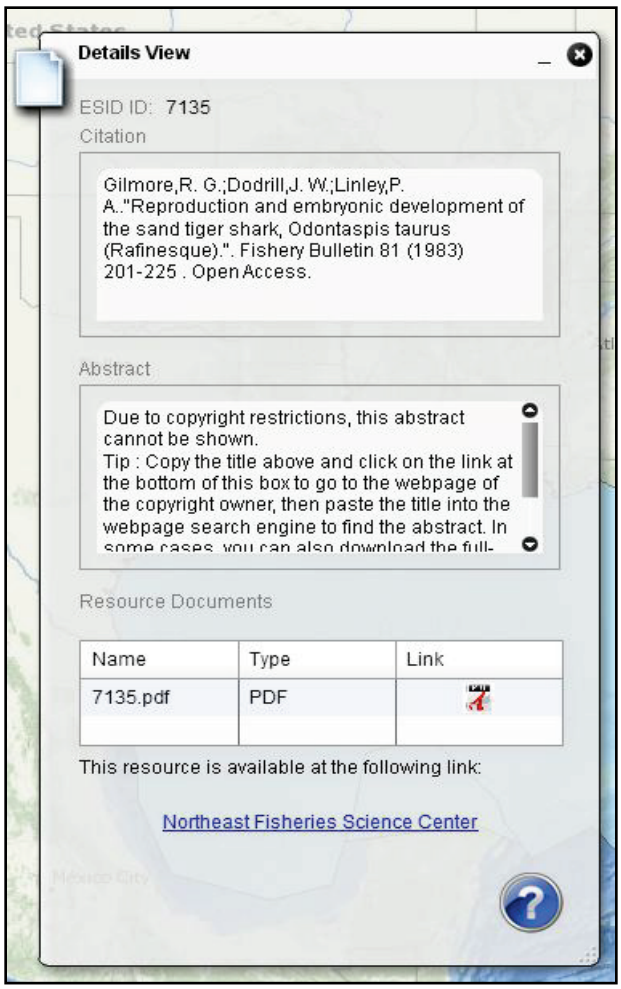


Figure 37. Details View Form accessed through the Search Results window.

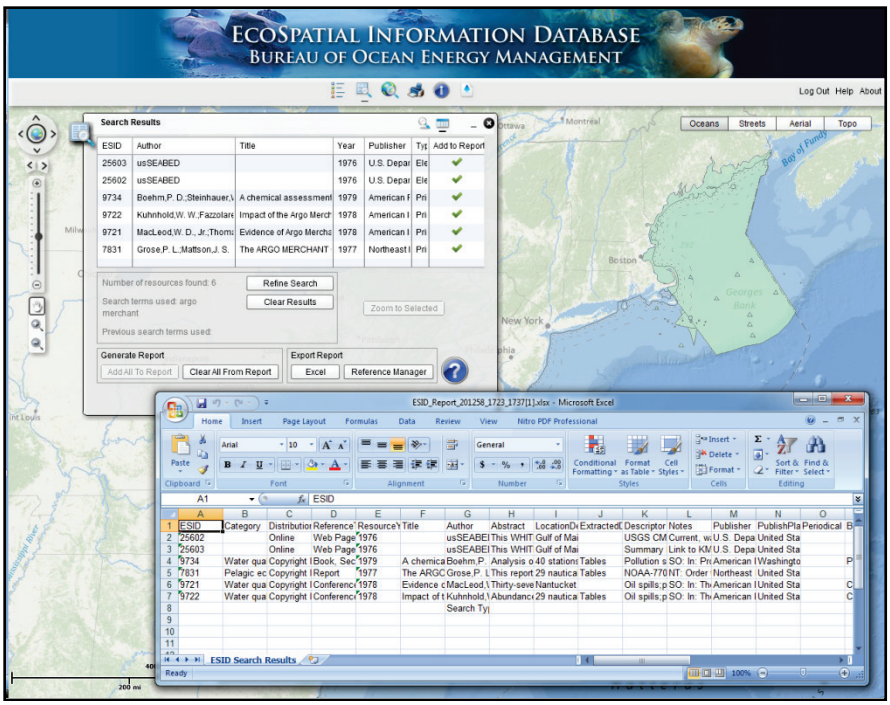


Figure 38. Example Microsoft® Excel® report generated using the Search Results window.

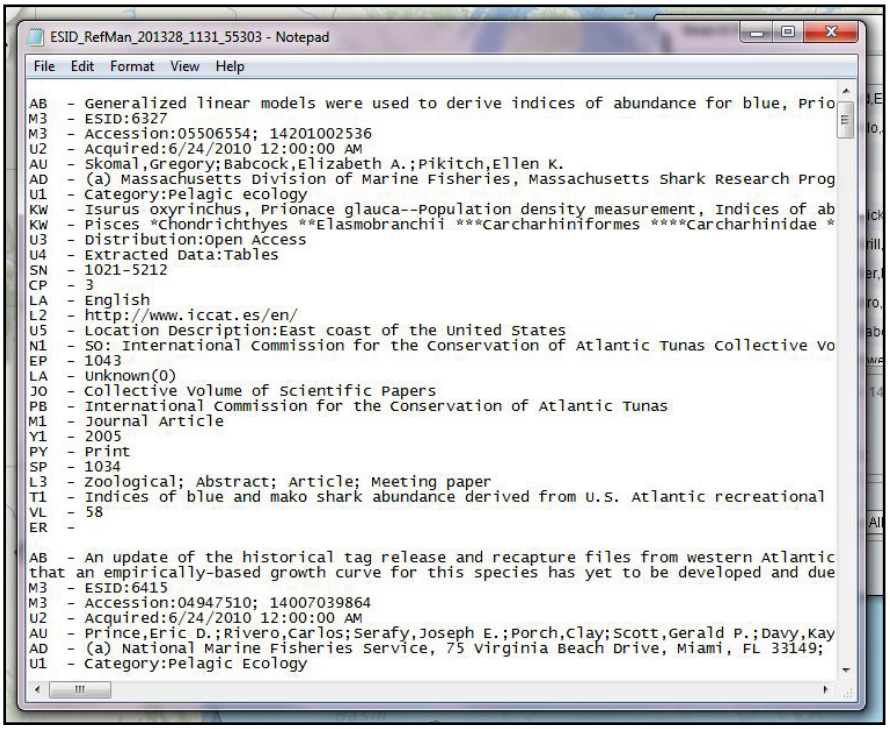


Figure 39. Example Reference Manager® report generated using the Search Results window.

8.2.3.3 Search by Location

The Search by Location widget allows the user to identify resources that intersect a user-created geometry on the map. The Search by Location window has four tabs, each providing a different search option for the user: Basic Search, Search by Coordinates, Search by Lease Block, and Search by Shapefile.

<u>Basic Search</u>

The Basic Search tab allows the user to draw a geometric shape on the map to identify intersecting ESID resources. The first selects the type of shape to draw (i.e., point, line, square, or polygon), depending on the area of interest. The user can then specify a buffer distance (in miles) that will expand the boundaries of the user-submitted geometry. After the user creates a shape in the map window, a Search Results window opens, displaying a list of intersecting ESID resources (Figure 40). In addition, the coordinates matching the shape created by the user are displayed on the Search by Coordinates tab (of the Search by Location box).

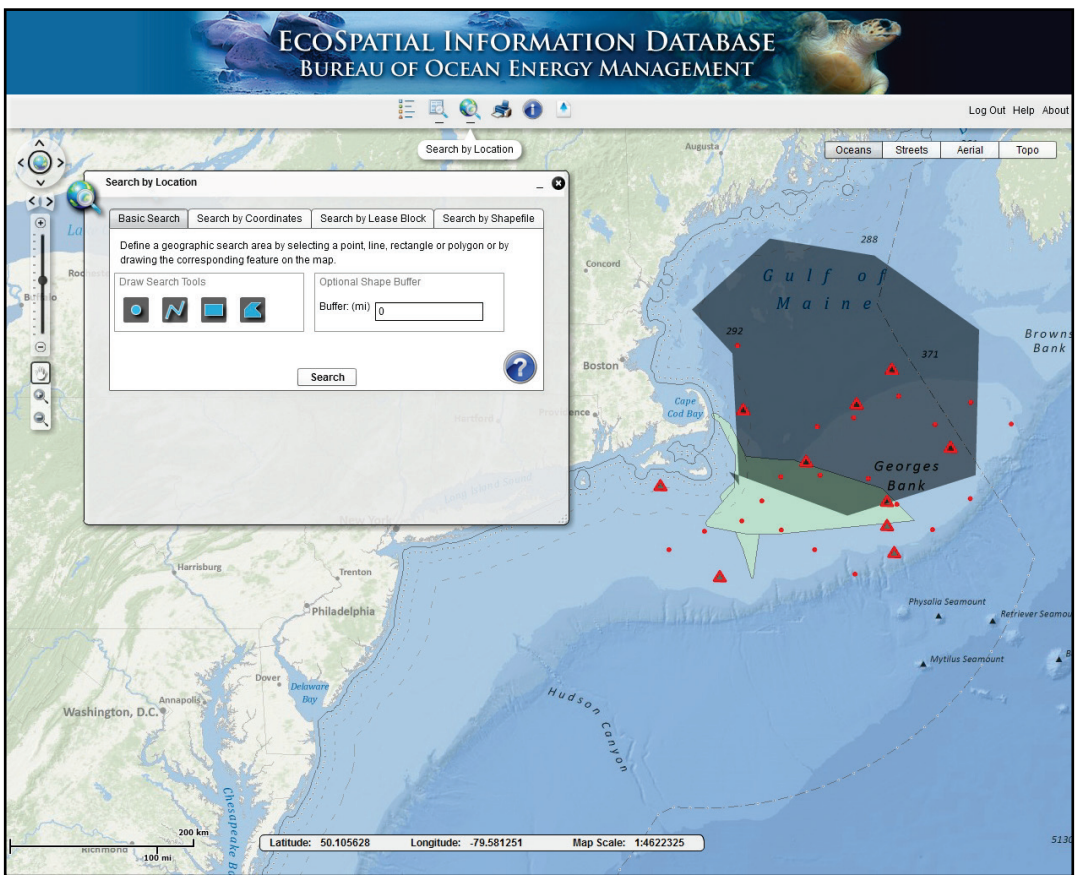


Figure 40. Basic Search Tab window in the Search by Location widget.

Search by Coordinates

The Search by Coordinates tab allows the user to specify a geographic search area by entering spatial coordinates (latitude/longitude) to identify intersecting ESID resources. The user can enter a string of coordinates to describe the vertices of a polygon or individual coordinate pairs to identify a point, line, or rectangle in space (Figure 41). In addition, the user can specify a buffer distance (in miles) that will expand the boundaries of the user-submitted geometry. Once the user specifies the coordinates, a Search Results window opens displaying a list of intersecting ESID resources.

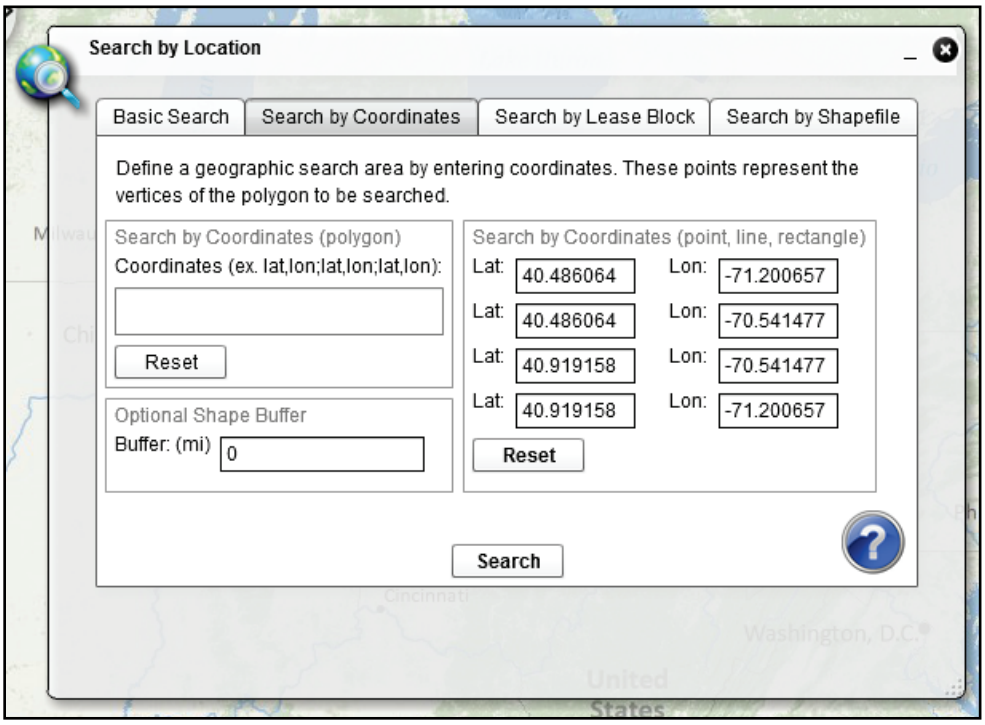


Figure 41. Search by Coordinates in the Search by Location widget.

Search by Lease Block

The Search by Lease Block tab can be used to identify ESID resources within a particular BOEM lease block. In this tab, the user selects the appropriate BOEM planning area, protraction number, and block number using the drop-down field sets (Figure 42). After the user selects the Search button, a Search Results window opens displaying a list of intersecting ESID resources.

Search by Shapefile

The Search by Shapefile tab can be used to identify ESID resources within a pre-defined geometry contained in a shapefile (with a single point, line, or polygon). The Search by Shapefile tab contains an Upload and Search button that allows the user to input a shapefile with a user-created boundary (Figure 43). The geometry included in the shapefile is used to perform the search. The shapefile must have a projected coordinate system, which will be reprojected and used to intersect resources in the map interface. After a shapefile has been uploaded, a Search Results window opens, displaying a list of intersecting ESID resources.

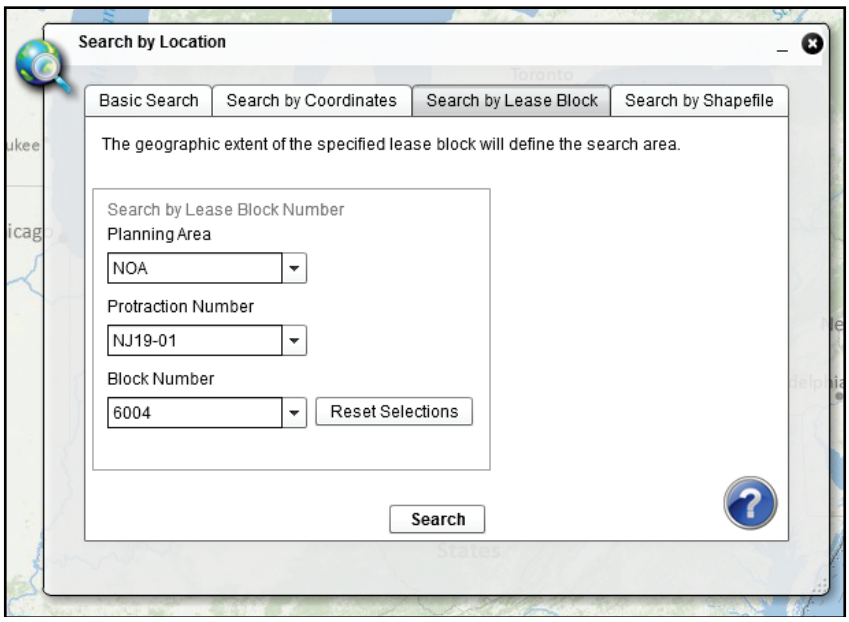


Figure 42. The Search by Lease Block tab in the Search by Location widget.

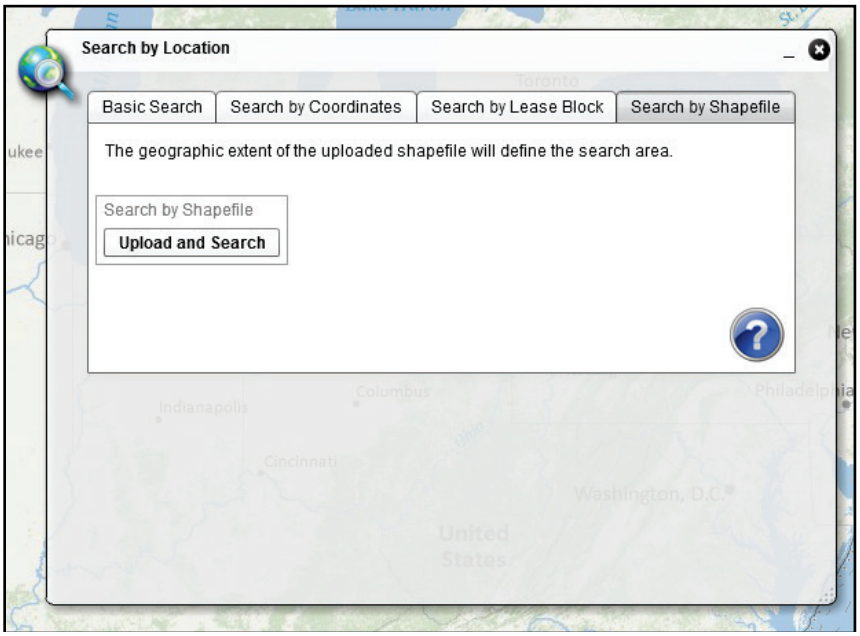


Figure 43. The Search by Shapefile tab in the Search by Location widget.

8.2.3.4 Print Map Display

The Print Map Display widget allows the user to print the current map view. In the Print Map Display window, the user is provided with text boxes to enter a map title and subtitle for the resulting map printout (Figure 44). After the print button is selected, the user will see a dialog box allowing a choice of printer options.

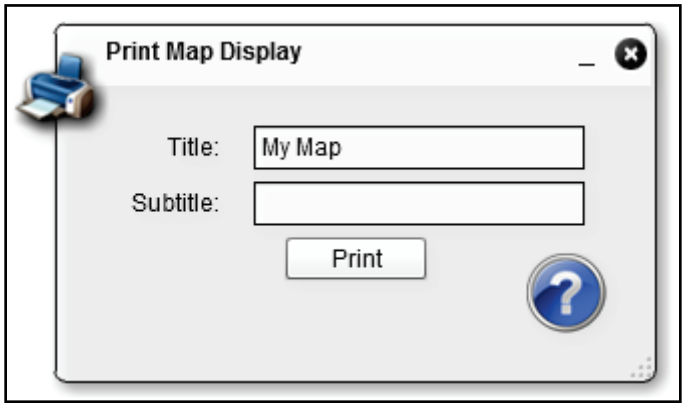


Figure 44. The Print Map Display window accessed using the Print Map Display widget.

8.2.3.5 Identify Features

The Identify Features widget allows the user to view information about features included in the ESID Web Map Interface. After the Identify widget is selected, the user selects the type of shape to draw (i.e., point, line, square, or polygon), then draws in a specific location on the map. An Identify window appears, displaying study boundaries of the intersected ESID resources. If the mouse is pointed at a result in the Identify window, it will be highlighted on the map and a separate callout window displaying the attributes (e.g., area, name, etc.) of the specified resource polygon will appear (Figure 45). If the user selects a result, the map will zoom to the selection.

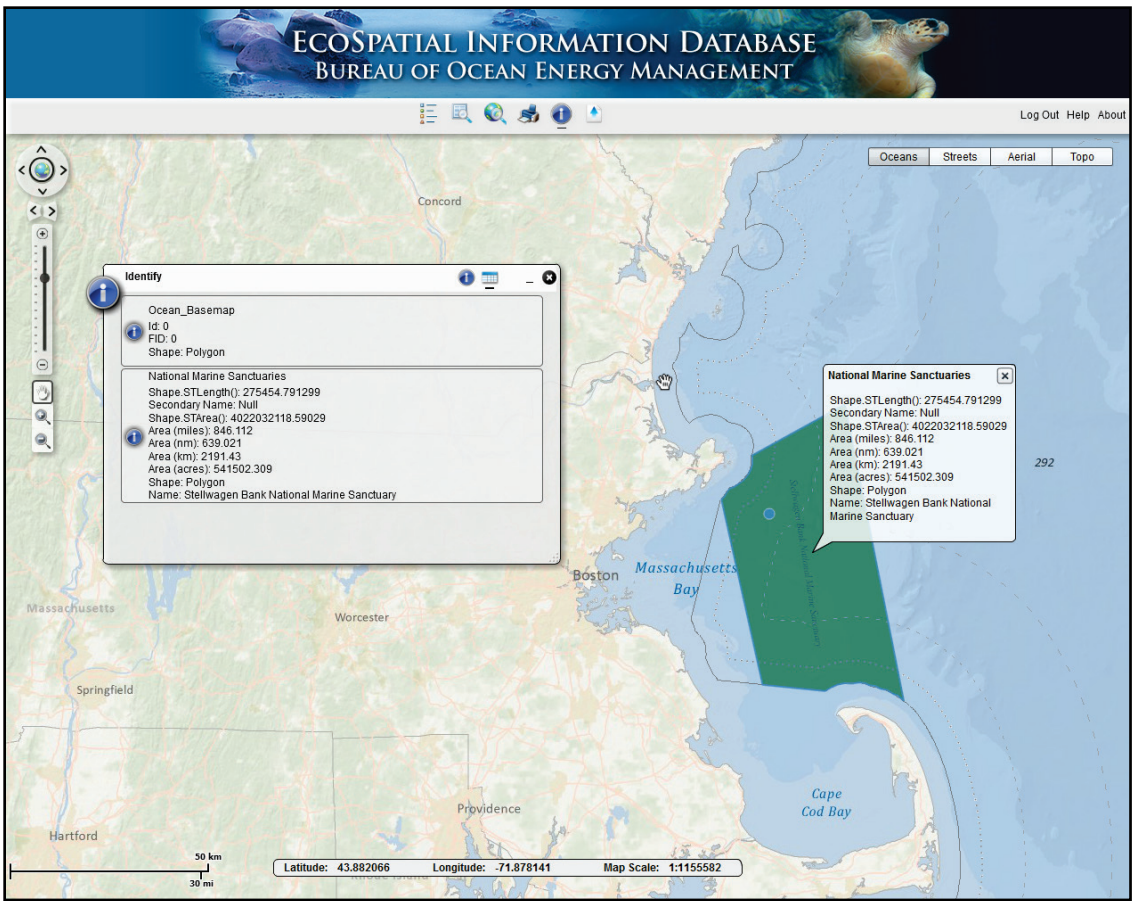


Figure 45. Identify Search Results window accessed using the Identify Features widget and the separate callout window for specific feature information.

8.2.3.6 Upload Resources

Authenticated users can upload new resources into the ESID using the Upload Resources widget. The resource information to be provided by the user includes all bibliographic information, supporting documents, and a resource footprint shapefile. The user must prepare the shapefile in advance and ensure satisfactory Optical Character Recognition (OCR) has been applied to the resource's PDF document. Templates are provided to create consistent study boundaries and bibliographies. After the user selects the Upload Resources widget, an Upload Resources window displays a list of all resources the current user has uploaded but that have not yet been published to the ESID database (Figure 46). The user can edit the bibliographic information until the system Administrator publishes the uploaded resource.

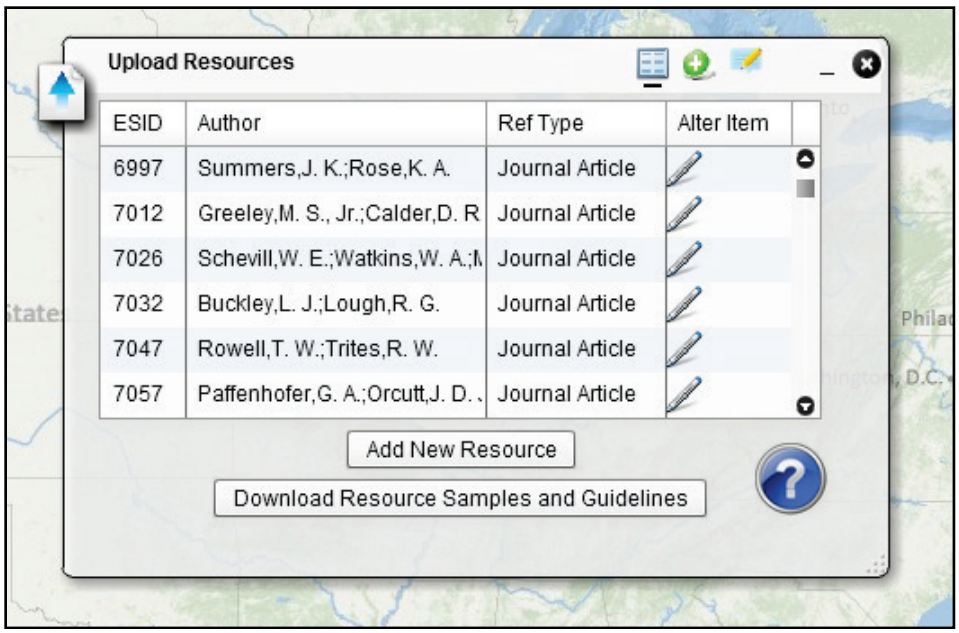


Figure 46. The Upload Resources window, showing resources that have been uploaded but not yet published.

Clicking the Add New Resource button opens the Add New Resource data entry form where the user types information for the new resource (Figure 47). The user selects the appropriate Reference Type (e.g., book, journal, abstract, etc.) from the drop-down menu. The choice of reference type changes the required information fields that are visible, because the fields necessary to produce a citation vary between reference types. The new resource will not be uploaded unless all required fields have been populated. In addition to the required information, the user can enter additional information associated with the resource (e.g., notes, ISSN/ISBN, Call Number, etc.). The user can also add an abstract or a location description, which is derived from the PDF document. Finally, the user clicks the Data Upload Button to upload the study footprint shapefile, PDF, and other related documents in .ZIP file format (Figure 47). Uploading these associated documents creates a folder on the server to store the documents related to the new resources. After the new resource is submitted, it is put in a queue for the system Administrator to review for content. The resource is not searchable in the ESID until the administrator publishes the resource.

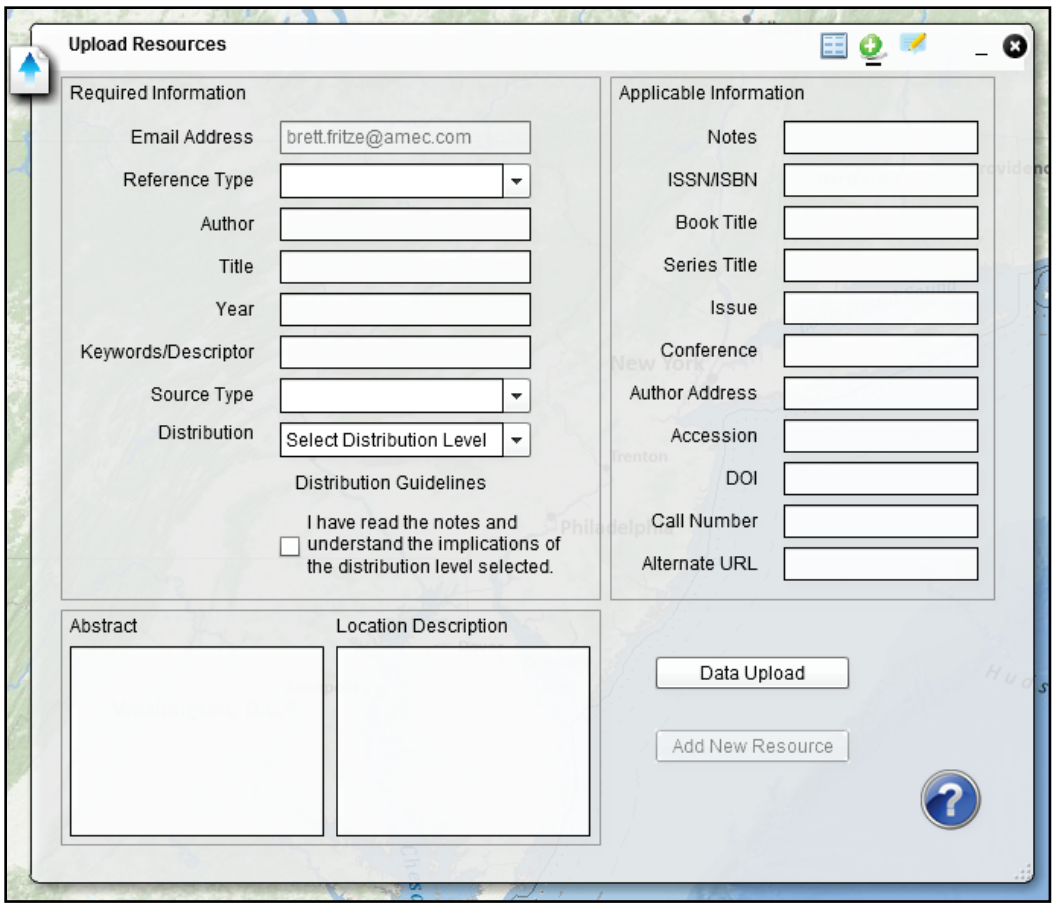


Figure 47. New Resource bibliographic data entry and upload form.

8.2.3.7 Publish/Manage Resources

Figure 48 shows the process for submitting and approving each new resource. Though an authenticated user may add a new resource, the resource will not be visible through the ESID until the system Administrator has reviewed, approved, and published it. Throughout this process, the user is notified by email that their resource is pending review, and then again after the resource has been approved or rejected. Upon submittal of the resource, two emails are generated: one to the user who submitted the resource and another to the system Administrator. Likewise, upon approval of the resource, two emails are generated: one to the user who submitted the resource and another to the system Administrator. When the system Administrator rejects a new resource, an email outlining the specific data errors found during the review process will be generated and sent to the user. The user can then revise the submission and resubmit the resource to begin the review process again.

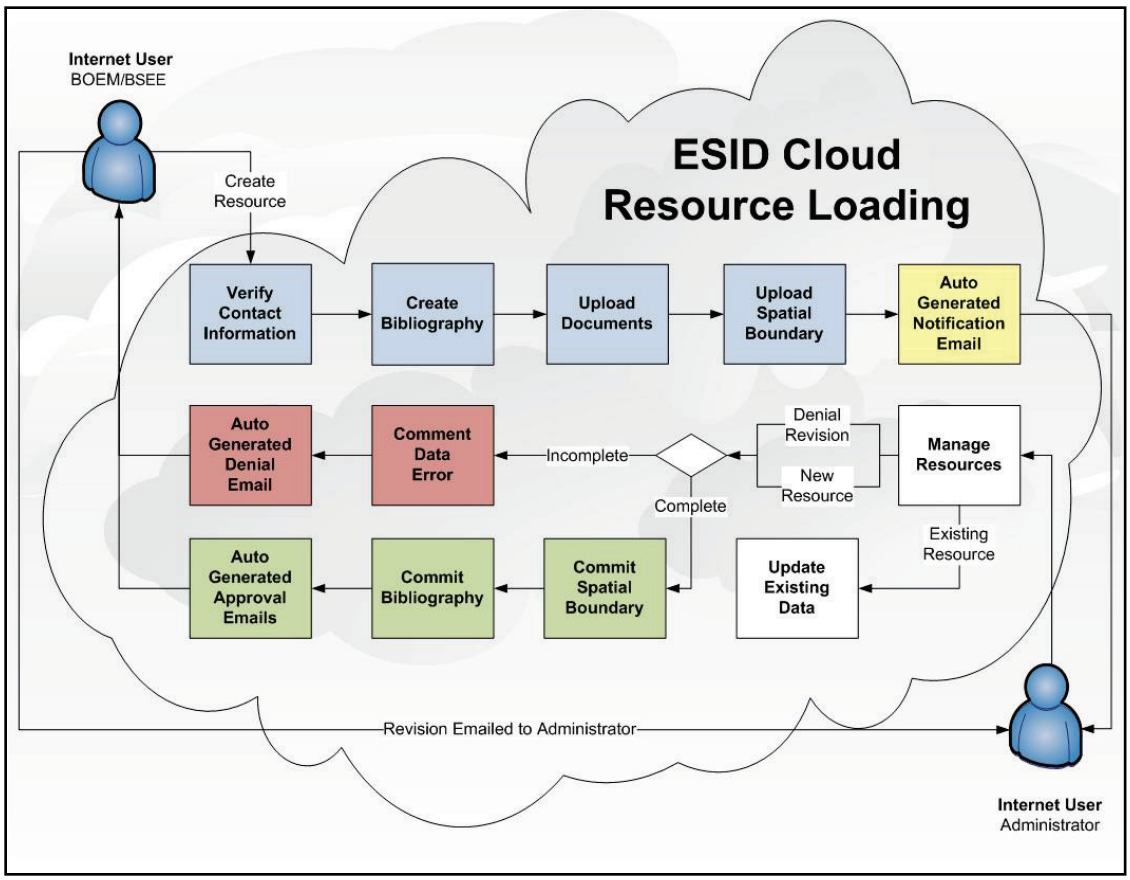


Figure 48. New resource submittal and approval process.

The system Administrator's review process involves evaluating the content of the submittal to ensure that the new resource is appropriate for the ESID and that the bibliographic information is complete. Next, the Administrator reviews the PDF document to determine if it is in OCR format or copyright protected and reviews the shapefile to verify that it contains the correct metadata and that the spatial boundary matches the information in the PDF document. The system Administrator then manually loads the shapefile into the ESID Geodatabase using Esri® ArcMap® Desktop GIS software. The system Administrator publishes the resource's bibliographic information by logging into the ESID website and opening the Upload Resources widget. When the Administrator is logged in, this widget shows a list of all ESID resources. The Administrator can open the bibliographic information for a new resource, review it for content, and then click the "Publish" button to make the resource visible in the ESID application. The system Administrator can also use this same process to update the bibliographic information for existing resources.

8.2.3.8 Manage Users

The Manage Users widget provides the system Administrator a list of users who have authenticated login credentials. In the Users window (Figure 49), the Administrator can also add new users and update current user information.

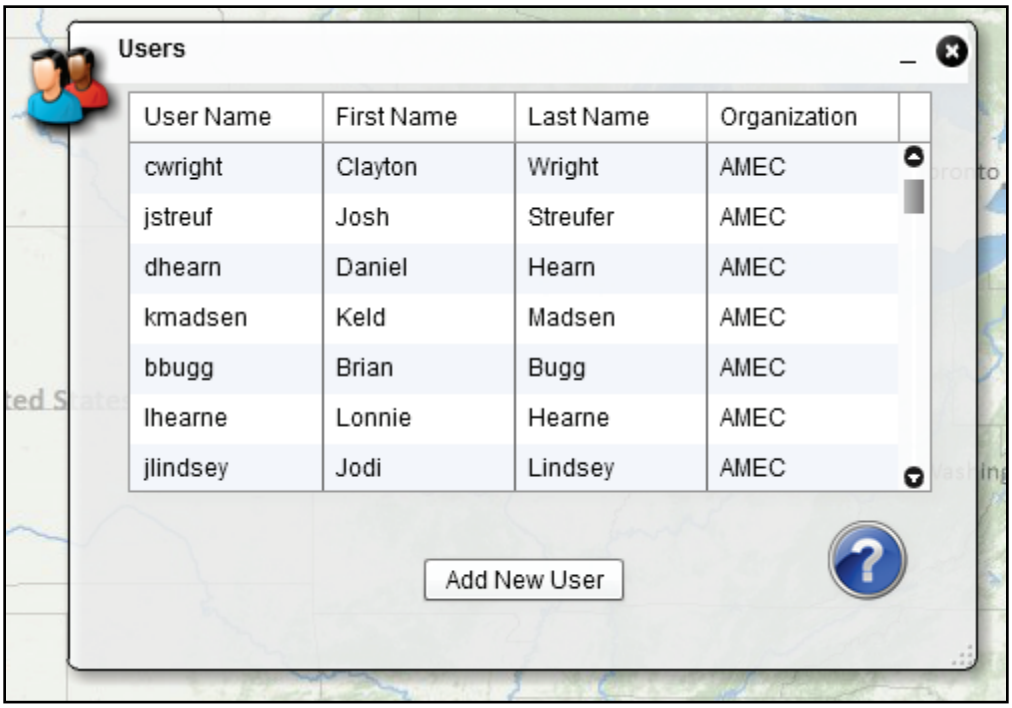


Figure 49. The Users widget.

8.2.4 Help Documentation

The ESID Web Application offers various forms of user help. Clicking "Help," displayed in the top right under the banner in the ESID Web Map Interface and various other places, takes the user to the full Help Documentation table of contents. From there, the user can navigate to a specific topic or function of the application (Figure 50).

On each form or window, widget specific help documents can be accessed by clicking the "?" icon. If the user hovers the mouse pointer over various controls within the ESID Web Map Interface, Tool Tips describing the use and functionality of the control will display on the screen (Figure 51).

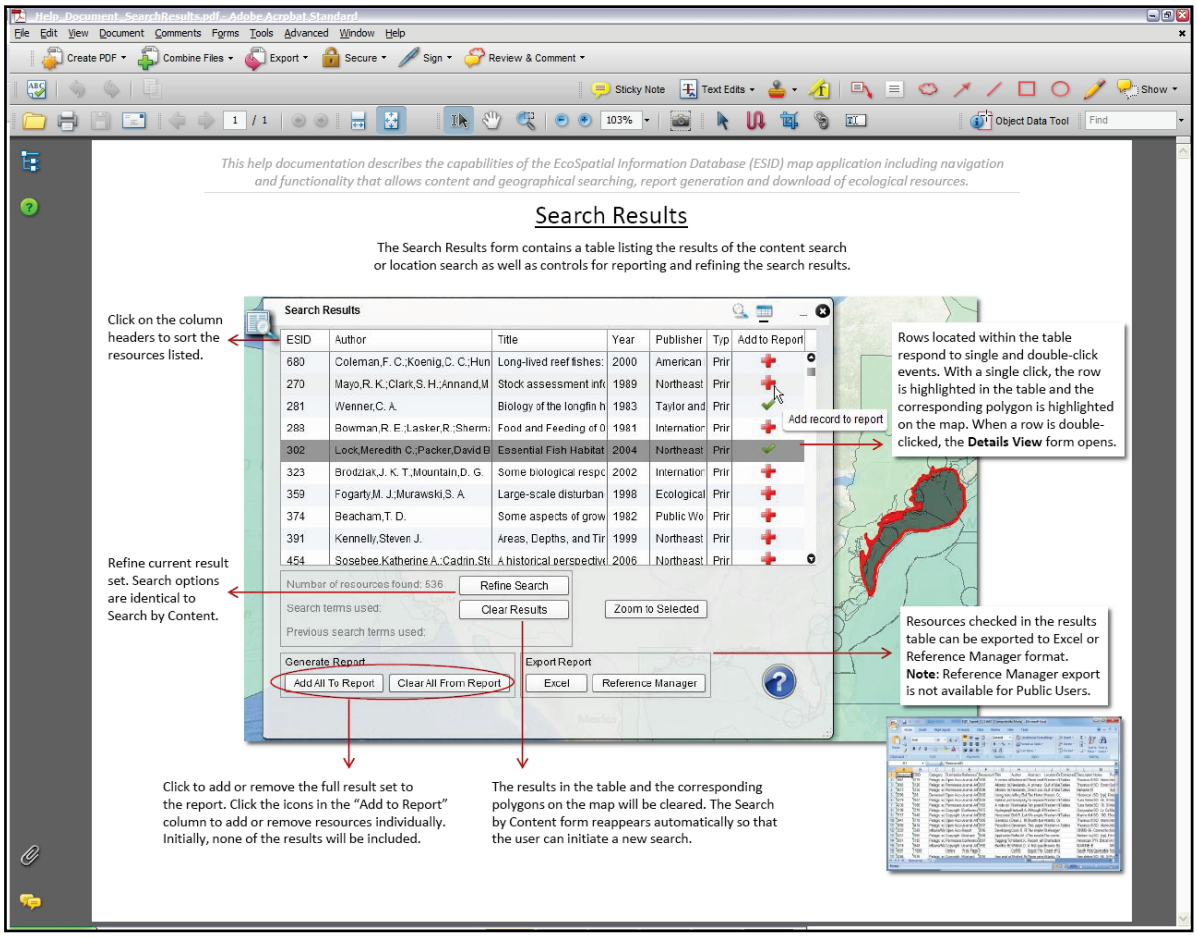


Figure 50. Example of Help Documentation for Search Results window.

Figure 51. Search by Location Tool Tip

9.0 CLOUD COMPUTING

9.1 NEED FOR CLOUD ARCHITECTURE

The ESID was initially envisioned as a desktop application, because it was anticipated that it would reside on the BOEM network and that GIS users would use Esri® ArcMap® to interact with the ESID. However, the initially proposed desktop version would not be able to accommodate users in other BOEM regions because of slow application speeds experienced using Esri® ArcMap® through Citrix. The desktop application would also prevent public user access and input, which was one of the end goals in developing the ESID.

The option to create a web-based ESID was investigated and it was determined that a web-based ESID would best meet the needs of the project and potential users. However, the process for getting approval for a web-based application through BOEM IT standards was cost prohibitive for the project and the application would most likely have been unable to support public users. Thus, the option of hosting the ESID in the Amazon EC2® cloud was the most appropriate solution within the given budget constraints. AMEC will manage the cloud-based ESID for a two-year maintenance period beginning in October 2011, following which BOEM or designated contractors will be responsible for the maintenance. Because the cloud provides a hosting environment that is independent of the BOEM and AMEC networks, the cloud will allow easy delivery of the application to BOEM once the maintenance period is complete.

9.2 DESIGN CHANGES FOR CLOUD DEPLOYMENT

The switch from the initial desktop application to the web-based ESID deployed to the cloud hosting environment required some basic design changes to the database structure. When development started on the cloud application, it was assumed that BOEM had an Esri® ArcGIS Server® Enterprise license for the geodatabase. In the cloud, a geodatabase must be built on a PostgreSQL database. Thus, when application development began, the Resource Table was loaded into a PostgreSQL database and the FeatureArea layer was separated as a standalone shapefile. It was then discovered that BOEM's Esri® ArcGIS Server® License was actually a Workgroup version which would use a SQL Server® Express database. Since the application was mostly developed at this point, it was decided to retain the Resource Table and the FeatureArea layer as separate databases, rather than combine them into one geodatabase as was originally designed.

The Resource Table currently resides in a PostgreSQL database and the FeatureArea layer was added back into the ArcMarine data structure and resides in a file geodatabase. The only change to the original ArcMarine data structure has been the inclusion of additional ESID-related attributes in the FeatureArea layer. The change in Esri® ArcGIS Server® licensing did not affect the overall function of the ESID application. The Workgroup license will provide a cost savings to the project.

9.3 ESID COMPONENTS IN THE AMAZON CLOUD

The "cloud" or cloud computing refers to the delivery of computing and storage capacity as a service through the Internet. Amazon was key in developing cloud computing to meet its own internal needs, and eventually moved to provide cloud computing capabilities to the general public through its Amazon Web Services (AWS) business line. Through AWS, Amazon has made computing and storage capacity available to rent on an on-demand basis. At its core, the cloud is designed to be highly expandable through a process known as "elastic computing." Elastic computing provides the ability to configure a website or service to be scalable to meet user demands in times of high traffic volume or intense computational needs where distribution of workload improves performance. The ESID does not currently use elastic computing; however, it is an option available in the event that heavy ESID use degrades performance. Currently, the ESID uses two Amazon Machine Instances (AMIs). These AMIs are preconfigured virtual servers, which have operating systems and specific software pre-installed. In the context of the ESID, each AMI serves a specific set of purposes, and they are wholly dependent on one another.

Figure 52 outlines the current configuration of the ESID's architecture. The green rectangles in the center represent paired AMIs with associated Elastic Block Storage (EBS). Each pair serves a specified set of purposes and is dependent on the other in the context of the ESID Web Application. The Application Server AMI/EBS acts as the primary web server hosting the ESID web application (folder icon), all web services (triangle icon), and all resource documents associated with the application (folder icon), along with the PostgreSQL database which houses the resource data for the ESID Web Application (cylinder icon). The Esri® ArcGIS Server® AMI/EBS pair is tasked with serving and storing the ESID spatial data for the web application.

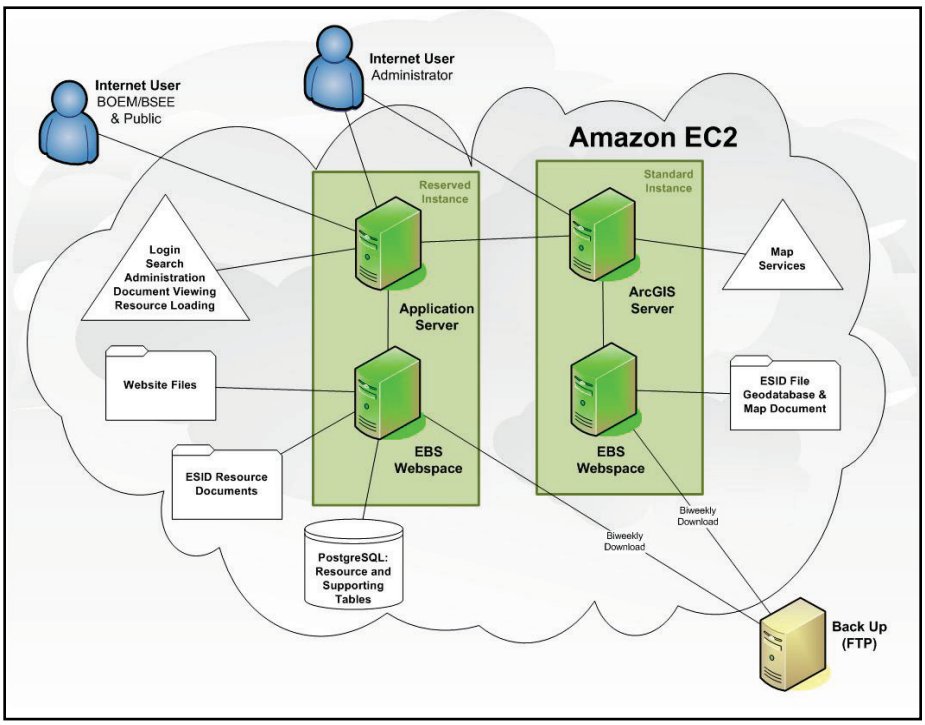


Figure 52. ESID Cloud Configuration.

ESID administrators are capable of accessing the servers directly outside of the Web Application to support and manage all aspects of the ESID Application. Authenticated users of the ESID Web Application be able to access the web site and use the ESID to query the database and supply and manage resources while public users (non-authenticated) can use the ESID to query the database and resources.

9.4 MAINTENANCE PERIOD

The ESID application will be maintained by AMEC for a period of two years (October 24, 2011 to October 24, 2013). During this time, AMEC will be the system Administrator, reviewing all new resource uploads to the ESID. After the new resources are approved by BOEM staff, AMEC will publish the resources to the ESID. The workflow and processes associated with the maintenance period are described in detail below.

9.4.1 Workflow

During the maintenance period, BOEM users will be able to create and upload resources in the ESID Web Application. Each time a new resource is uploaded, the BOEM representative and the system Administrator will receive an email. The BOEM representative will review the new resource, decide if it is applicable to the ESID, and forward the email with an approval or rejection to the system Administrator. The system Administrator will then complete the review and publishing process.

9.4.2 Review Process

The system Administrator's review of the resource will entail the following.

1. All bibliographic fields will be checked for appropriate information (i.e., no inappropriate language or incomplete data).

2. External links will be checked to make sure the link is active.

3. Required information will be checked based on the reference type (e.g., report, journal article, book, etc.) to make sure all information is filled out and that the citation format is correct.

4. The attached PDF will be checked to make sure that it is complete, searchable, and that it corresponds to the information filled out for the bibliographic information.

5. The shapefile will be checked to make sure the attribute table has been filled out and to make sure that it is in the proper projection to load into the database.

6. Any other attachments such as data tables will be reviewed for completeness and to make sure they correspond with the resource.

9.4.3 Publishing Resources

Every two weeks, the system Administrator will log into the ESID to publish or reject resources. If a resource is rejected, the BOEM user who uploaded the resource will receive an email requesting the missing or additional information needed for approval or informing them that the resource is not applicable to the ESID. Approved resources will be published to the ESID.

The process for publishing the new resources requires a mix of remote desktop protocol (RDP) and file transfer protocol (FTP; Figure 53). Because the ESID is hosted in the cloud, not on AMEC's network, the Administrator uses RDP to login to the cloud servers. The Administrator will copy the new resource documents from the "Resource" folder to the Application FTP folder on the Cloud Application Server. These document folders contain the searchable PDFs, shapefiles, and any other supporting documents. The Administrator will also export the supporting database to the FTP folder. The Administrator will then access the Application FTP site and download the Resource files to the AMEC network. This will be a backup for any new resources created in the cloud. The Administrator will add the shapefiles to the local copy of the ESID geodatabase and upload it to the ArcGIS FTP folder on the cloud GIS Server. The Administrator will use RDP to login to the cloud GIS Server. The ESID map service will be stopped, the geodatabase will be overwritten with the new copy from the FTP folder, and the map service will be restarted. Finally, the Administrator will log into the ESID Web application and publish the resources from the Upload Documents widget. The resource will then be searchable within the ESID and the spatial boundary will be visible in the ESID Web Map Interface.

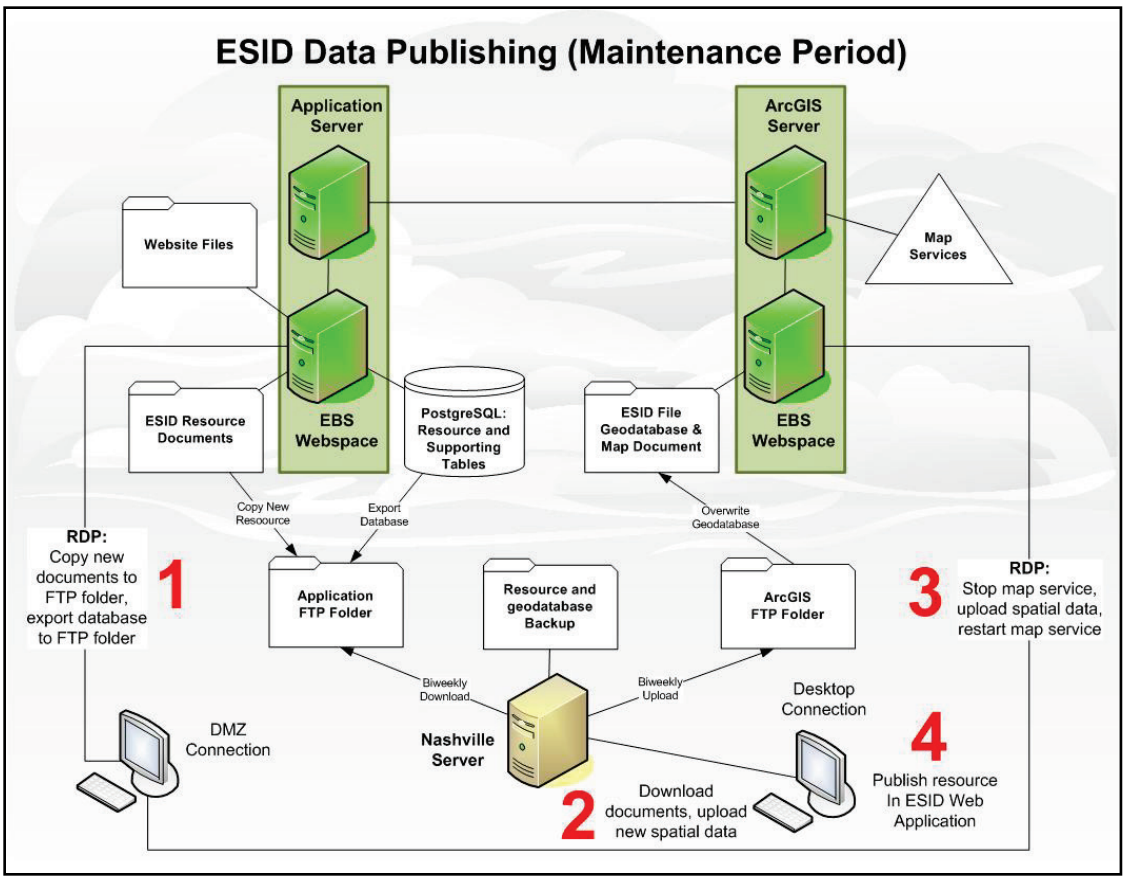


Figure 53. ESID Spatial Resource Boundary Publishing Process.

10.0 PUBLICATIONS AND PEER REVIEW

The contractual requirements of this project included: (1) formation of a Scientific Review Committee (SRC) to provide peer review for this document, (2) the presentation of the ESID project in at least one scientific meeting, and (3) the publication of at least one journal article in a relevant peer-reviewed journal to present the findings of this project.

The ESID project was presented at several scientific meetings, including the following: the Association for the Sciences of Limnology and Oceanography Aquatic Sciences Meeting (Madsen et al. 2011); Esri® Federal User Conference (Hearne et al. 2011); 26th Annual Gulf of Mexico Information Transfer Meeting (Hearne et al. 2012); 2011 Esri® Petroleum User Group Conference (Hearne 2011); BOEM Atlantic Wind Energy Workshop (Madsen 2011); and the Ecosystem-Based Management (EBM) Tools Network Live Demonstration (Madsen and Hearn 2012). A publication manuscript, "EcoSpatial Information Database for the Atlantic Outer Continental Shelf," will be submitted to the peer-reviewed journal, *Marine Policy*. This is the leading journal of ocean policy studies and frequently includes scientific papers on marine spatial planning and GIS planning projects, and it has a high impact factor (2.053).

11.0 CONCLUSIONS AND RECOMMENDATIONS

The ESID was designed to make ecological data for the Atlantic OCS readily accessible through advanced geographic and content data searches. It was also designed to support virtually unlimited expansion of geographic areas, subject matter, and file types. As a cloud-hosted GIS web application, the ESID provides broad access to the data and supporting documents and will help BOEM and BSEE meet NEPA requirements in its leasing decisions.

The ESID Web Map Interface allows users to perform advanced searches by content and location, apply filters and refine search parameters, view citations and abstracts, generate reports, view documents (as allowed by copyright restrictions), print map displays, identify mapped features, and upload additional resources (subject to system administrator approval). The system is designed for future expansion to accommodate the integration of new data types and to cover additional geographic regions.

11.1 DATABASE AND METADATA ISSUES

One of the critical elements of the project was the developing complete and descriptive metadata. The statement of work required the using FGDC standards for the ESID. The purpose of this metadata was to give validity to the resource data contained in the database and to provide a ready means for searching the bibliographic data for the resources. The project used the FGDC Data Content Standards for Metadata in developing the system. The GIS spatial data elements included full FGDC metadata, as outlined by the standard. However, the standards are designed specifically for geospatial data and the FGDC spatial data ontology is not readily transferrable to the metadata requirements for a bibliographic search. To accommodate the bibliographic search requirements of the system, metadata for non-spatial ESID data were incorporated into a Resource Table that includes the data typically associated with bibliographic abstracts and relevant keywords that would serve as search terms for rapid word search.

In essence, the metadata standard for the bibliographic metadata were derived based on the RefWorks® data format, as extended by the project team to accommodate the special needs of the ESID. For future projects, it is recommended that further research is conducted to clearly define requirements across interest groups.

11.2 COPYRIGHT ISSUES

As an integral part of the database design, the ESID required inclusion of searchable PDFs. Early on in the program, challenging copyright issues surfaced that had the potential to significantly reduce the use of the ESID. Although much of the scientific research in the world is conducted with public funding, the results of this research often end up in privately held scientific databases as copyrighted information; this limits public accessibility. Further complicating matters is the fact that the owners of most searchable public databases assert copyright protection over the document abstracts contained in their databases. These facts presented three problems to the ESID development.

1. Proper ISRT reviewing the document abstracts for relevance required purchasing multi-user access to the abstracts, an expense not initially contemplated.

2. Document abstracts are viewed as an essential element of bibliographic metadata within the system. Use of the abstracts as metadata would require dissemination of the abstract information on a scale that exceeds normal fair use guidelines.

3. The full text of copyrighted documents could not be included without getting copyright permission from the copyright holders.

To allow reasonable use of the abstracts, multi-use abstract permissions were purchased that allowed up to 25 users to view the abstracts simultaneously. This addressed both the ISRT usage problem and the long term use of the abstracts as a part of the ESID Resource Table. However, the problem of including the documents themselves still remained. The acquired documents were for single-use only and could not be stored or released to another entity or shared in a custom database or directory.

During the summer of 2010, BOEM and the team explored a variety of options, including obtaining a license from the Copyright Clearance Center. None of the options would have fully resolved the document access problem. In December of 2010, it was decided to approach all publishers to seek copyright exemptions for BOEM. The project team contacted all publishers and provided a project narrative with additional background information, history, and information about project execution. This resulted in the approval to use and store 881 of the copyright restricted documents in the ESID.

It is recommended that, in the future, resolving copyright issues is discussed in the early project stages and that a cooperative approach is explored for getting document permissions for ESID expansions or similar projects.

11.3 Level of Effort Required for Bibliographic Search

The initial estimate of the number of documents that would be acquired was between 2,000 and 3,000. In the end, this turned out to have been a fairly reasonable range. What was not anticipated was that over 30,000 documents would need to be reviewed for technical and geographic relevance to arrive at the final document set for the ESID. In the initial project estimates, collection of the document resources was estimated as a level-of-effort task, with the idea that once the allocated level of effort was reached, the resource data collection would end. However, it became apparent that the most important parts of the project were acquisition of the resource data and housing the acquired data in a robust database architecture. This included ensuring that proper bibliographic metadata were contained in the database and that the documents were properly geocoded to ensure that they could be searched geospatially. The assumption was that even if funds were depleted before the application was fully developed, the desktop prototype could be used to search the database until more funding was made available. The resource data collection effort resulted in a substantial overrun. This was mitigated by reprogramming funds and aggressively managing the remaining tasks in the project.

For future bibliographic data collection efforts, substantial management reserve should be allocated to address the potential for cost growth in the document acquisition phase.

11.4 DATA EXTRACTION ISSUES

The initial scope included data extraction of a broad range of data relevant to specific AOI in order to make the data readily accessible outside of the resource documents. Early on, it became apparent that this task was ill-defined and, to a large degree, open ended. It was agreed that the data extraction task requirement could be met by extracting the data tables within certain defined areas. The team was able to develop a semi-automated process to accomplish this and the task was successfully completed.

For future research efforts, BOEM may elect to request that data tables be submitted both within the documents and in a separate Microsoft® Excel® file for inclusion in the ESID.

11.5 CLIENT USER INVOLVEMENT

At the onset of the project, a number of stakeholders attended the project kickoff meeting and provided valuable input to the team's understanding of the requirement. However, as the project progressed, the primary user involvement was limited to the COTR and the BOEM ESB sponsor.

For future efforts of this type, it is highly recommended that the client designate a representative "user group." This would be a group of potential system users who would have a significant responsibility of working with the design team and providing on-going feedback to ensure that the system meets the user requirements. In the future, new data will either be entered into ESID by BOEM users or, for larger projects, will most likely be accomplished through new contracts on a competitive basis. These larger projects would be considered through BOEM's Environmental Studies Program as part of its annual studies development process.

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Appendix A

User Story and Business Requirements

REVISION HISTORY

Date	Version	Description	Author
03/02/2010	1.0	Initial Draft	Fritze
03/03/2010	1.1	Revision	Wrye
03/11/2010	1.2	Technical Review	Innes
03/15/2010	1.3	Revision	Fritze
03/17/2010	1.4	Technical Review	Chiasson
03/18/2010	1.5	Revision	Fritze
03/19/2010	1.6	Technical Review	Albee
09/23/2011	2.0	Major Revision (web-based)	Bugg
11/18/2011	2.1	Revised User Story and Business Requirements	Albee
11/21/2011	2.2	Technical Review	Madsen
02/02/2012	3.0	Revised Business Requirements and added appendix A	Fritze
03/15/2012	3.1	Revision	Fritze
03/19/2012	3.2	Reviewed Business Requirements and added appendix A	Albee

INTRODUCTION

The Bureau of Ocean Energy Management (BOEM) requires the ability to store, geographically reference, query, and retrieve digital ecological resources. This will be achieved through the creation of an application containing GIS enabled ecological resource documents called the EcoSpatial Information Database (ESID). This document expands on this high level requirements statement by providing an overview of the informational delivery, resource management, and operational requirements to deliver an application that meets the needs of the BOEM. Based on these statements two components are required:

A database, the ESID, to manage and store ecological resources and GIS database, and

An application, to allow the user to search and retrieve resource documents including report generation.

The following sections present the high level description of the system and the associated business requirements that the system must provide.

USER STORY

The EcoSpatial Information Database (ESID) is a collection of ecological resources for the U.S. outer continental shelf of the Atlantic Ocean. The ESID is a searchable library of spatially referenced ecological information with easy access through a map interface. It is intended to be unlimited in the geographic area and the amount of information it can support. This first project will create the ESID and populate it with a significant amount of ecological information from the North, Mid-, and South Atlantic Planning Areas. The database contains location information and related attributes derived from research studies and pre-existing information available through public and private sources. The ESID will house PDF files of study reports, journal articles, book chapters, etc related to marine ecology. Full reference citations will reside in an annotated bibliography. When available, it will also include data files, images, GIS files, and other products associated with those resources. Some resources may not include a report but may be only GIS files, Microsoft® PowerPoint presentations, maps, etc. Each resource will have associated metadata and a shapefile showing the study area footprint or sampling sites. The system is designed to accept any type of file (e.g., PDF, Microsoft® Excel®, Microsoft® Word, html, ASCII, ppt, jpeg, D-base, SPSS, Primer, GIS, etc); the end user is responsible for their ability to open the files and deciding the value of the information for their purposes.

The ESID also refers to an application that will be used to search, manage, and report on the data contained within the database. These tools and corresponding data will operate in a mapping environment in order to leverage the benefits of visualizing the data in conjunction with the BOEM planning areas and lease block area information. The ESID will have a map interface and search engine. It is not intended to display data on a map, but rather to provide easy access to the information. The map interface will display base layers with the option to display GIS footprints of subject categories or perform various searches. The end user will be able to draw a point, line, or polygon on the map to retrieve all files associated with that geographic area. Alternatively, the user can import and overlay a shapefile to search for resources that intersect with the shapefile. The interface will also provide tools to search the database directly via keywords, subjects, authors, etc. The system will provide the ability to refine searches. The intent is for PDF files to be fully character recognized so that full-text word searches are possible. All fields in the database will be searchable. The result of a search will be a table with links to all the associated documents and/or links to internet sources. The ESID will provide the ability for authorized users to upload and manage resources. Users will also have the ability to download the selected files and output information. The user will be able to export files of bibliographic information to Microsoft® Excel® files and to a format compatible with Reference Manager 12. Finally, help documentation will be accessible through the application.

The original ESID application was designed based as an ArcMap desktop extension. Details describing this application can be found in project documentation Deliverable D, ESID Design and Prototype Test Database per Section F.4. During the development of the ESID system, it has become apparent that the location and diversity of potential users dictate a more accessible implementation such as a web-based application. To that end, AMEC provided the Contracting Officer's Technical Representative (COTR) with a proposal to implement a web-based application hosted in the Amazon EC2 Cloud. From the approved proposal and subsequent

Modification 0002 for Contract No. M09PC00047 (See Appendix A) AMEC has developed the following business requirements for the Web-based Cloud ESID Application.

BUSINESS REQUIREMENTS DETAIL

This section outlines the business requirements of the application as listed in the user description:

Table 1.

Business Requirement Description

BR Id	Business Requirement Description
Information Delivery	
BR-1a	View resource boundaries overlaid with Multipurpose Marine Cadastre base map features and BOEM planning areas and lease blocks.
BR-1b	Search for resources within a user defined geographic extent or the radius of a point as interactively defined by the user and display the results.
BR-1c	Search for resources within a user defined geographic extent as retrieved from a user supplied Shapefile, and display the results.
BR-1d	Search for resources based on selections of lease blocks or other predefined areas of interest, and display the results.
BR-1e	Search for resources matching a user defined text search to the bibliographic database, and display the results.
BR-1f	Search for resources (full document scan) matching a user defined text search, and display the results.
BR-1g	Refine the user's search results with sub-queries.
BR-1h	View references, citations, and documents associated with a map resource.
BR-1i	Download selected resource files (Documents and associated data)
BR-1j	Generate reports based on selected resources in the search results table.
BR-1k	Export results of a query to a Reference Manager 12 compatible file.
Resource Management	
BR-2a	Create a bibliographic entry for a resource by completing an online form.
BR-2b	Upload resource documents and additional supporting files for a resource.
BR-2c	Create a geographic boundary which is linked to resource document(s) and bibliographic entry(s)
BR-2d	A designated "Gate Keeper" will review resource information before inclusion in the ESID.

Table 1 (continued). Business Requirement Description

BR Id	Business Requirement Description
Operational	
BR-3a	Will be a hosted web application.
BR-3b	Contain a GIS component with navigation control functions.
BR-3c	Store spatial data in a File geodatabase.
BR-3d	Store bibliographic data in a database.
BR-3e	Provide the user with help documentation and user guide.
BR-3f	Administrative component to create and manage user accounts.
BR-3g	User authentication will be required to create resources, and view copyrighted materials.
BR-3h	Non-authenticated (public) users will have restricted access, unable to view “Permission Granted” or "Copyrighted" documents.
BR-3i	Restrict authenticated access to 25 concurrent BOEM/BSEE staff

CONTRACT MODIFICATION

Task 10: Create Custom ArcGIS Server® Web Interface

The Contractor shall interface the SDE Geodatabase through a web-based map interface (e.g., Esri® ArcGIS Server® 10) with hosting in "the cloud" to access the data in the ESID system. The National Institute of Standards and Technology (NIST) defines cloud computing as "…a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." Detail for production and implementation of ESID in the cloud shall be coordinated with and submitted for review and approval with BOEMRE through the COR. This product shall be due thirty (30) months after award.

A preliminary version of the ESID application shall be available at twenty-four (24) months after award. The preliminary ESID application shall have the following functionality:

Viewing, navigation, textual and spatial searching (by drawing an area of interest on the map or searching for keywords in the database) and basic report generation.

The final deliverable shall include the functionality of login for viewing "permission granted" resources, full text search of documents, and data loading capabilities.

The Contractor shall maintain the system in the cloud for BOEM for a period of two years from the date of its debut on the internet. This maintenance shall include overseeing the process by which new content is incorporated into the ESID, but will not include developing new content. The web application shall have the functionality that was to have been developed in the previously planned desktop application including the ability to search resource documents, return selected resource boundaries, and display bibliographic information. Access to the site shall not be password protected and the public shall be able to access the ESID functions; the public shall be able to search, view, and download resources from the database, including resources, resource boundaries, bibliographic information, and metadata, subject to the restrictions of copyright. Authorized users shall have log-in credentials to enable them to view "copyright restricted" information to the extent that limited permissions are provided in the ESID, subject to the restrictions of copyright.

Provide access to all the relevant ecological data by clicking on the applicable feature in the map interface. This ecological data includes any data in other linked tables, bibliographical information, metadata, documents, etc.

Provide public access to the ESID database with restricted access to any included copyright protected resources in accordance with copyright.

Provide geographic search capability, i.e., the user can select an area or a polygon to return all data associated with the area selected. Incorporate the ability to refine search results.

Provide a textual search capability based on predefined and/or user specified queries using keywords related to specific areas of scientific inquiry. This would include the ability to search using multiple criteria including specific scientific terms, author and date and keyword, publisher and keyword, date range, etc. The web applications shall utilize the base map data currently maintained on the BOEM SDE Enterprise Geodatabase to enhance the base map and represent ecological data.

Generate reports of bibliographic information associated with selected geographic areas with the option to choose fields.

Provide the ability to search and browse the database tables directly.

Document instructions for using the ESID Interface.

Create a user's guide.

Create help pages.

Provide any other relevant documentation

Adhere to BOEM security standards as relevant.

Consult with the COR for approval of the application design and functionality.

Appendix B

Guidelines for Preparing Keywords

Keywords are used to locate a document in a document-retrieval system, i.e., they are words or phrases useful when indexing or searching for a document. Keywords should identify the major topics and underlying theme of a document as well as the field or discipline to which the document corresponds.

If a document does not have keyword tags available, provide a list of keywords for the document.

Choose keywords commonly used for corresponding discipline or industry.
Keywords should be specific and involve standard phrases.
Browsing a journal relevant to the document being reviewed can provide indications of which keywords are appropriate and which are not.
Use keywords from a standard list* specific to a journal or discipline, if one is available.
Provide 5 to 10 keywords, depending on the size of the document. More keywords may be better for a large document with multiple chapters or a range of subject matters.
Generally, provide keywords from the title of the document as well as keywords that relate to:
geography (e.g., provide geographic descriptors**),
subject matter (e.g., provide topical descriptors***),
methodology (e.g., provide sampling or analytical descriptors****),
resource(s) (e.g., provide environmental resource descriptors*****),
type of document (if appropriate), and
time frame (if this is significant).

* - if the document was retrieved from a database during a search for a set of keywords developed for a specific topic area, keywords from that list could be used.
** - may include planning area designations, area descriptions [e.g., South Atlantic Bight], and submarine features [e.g., DeSoto Canyon]).
*** - may include disciplines such as chemistry, biology, geology, ecology, fisheries.
**** - may include box core, Van Veen grab, otter trawl, or sediment analysis.
***** - may include benthos, soft bottom, infauna, or water quality.

Appendix C

Dialog Databases

ASFA (Aquatic Sciences and Fisheries Abstracts)

ASFA is the premier reference in the field of aquatic resources. Input to ASFA is provided by a growing international network of information centers monitoring more than 5,000 serial publications, books, reports, conference proceedings, translations, and limited distribution literature. ASFA is a component of the Aquatic Sciences and Fisheries Information System (ASFIS), formed by four United Nations agency sponsors of ASFA and a network of international and national partners.

BIOSIS Previews®

BIOSIS Previews® contains citations from Biological Abstracts® (BA) and Biological Abstracts/Reports, Reviews, and Meetings® (BA/RRM) (formerly BioResearch Index®), the major publications of BIOSIS®. Together, these publications constitute the major English-language service providing comprehensive worldwide coverage of research in the biological and biomedical sciences. BA includes approximately 350,000 accounts of original research yearly from nearly 5,000 primary journal and monograph titles. BA/RRM includes an additional 200,000+ citations a year from meeting abstracts, reviews, books, book chapters, notes, letters, and selected reports.

Dissertation Abstracts Online

Dissertation Abstracts Online is a definitive subject, title, and author guide to virtually every American dissertation accepted at an accredited institution since 1861. Selected Masters Theses have been included since 1962. In addition, since 1988, the database includes citations for dissertations from 50 British universities that have been collected by and filmed at the British Document Supply Centre. Beginning with DAIC Volume 49, Number 2 (Spring 1988), citations and abstracts from Section C, Worldwide Dissertations (formerly European Dissertations), have been included in the file.

Enviroline®

Enviroline® covers the world's environmental related information. It provides indexing and abstracting coverage of more than 1,000 international primary and secondary publications reporting on all aspects of the environment. These publications highlight such fields as management, technology, planning, law, political science, economics, geology, biology, and chemistry as they relate to environmental issues. Enviroline® corresponds to the print, Environment Abstracts.

Geoarchive®

GeoArchive® is a comprehensive database covering all types of information sources in geoscience, hydroscience, and environmental science. The criteria for inclusion in GeoArchive® are that the source should be publicly available and have relevant information content, even if the reference is to a small news item in a magazine. GeoArchive®, produced by Geosystems, provides international coverage of over 5,000 serials, books from over 2,000 publishers, geological maps, and doctoral dissertations.

GEOBASE™

GEOBASE™ is a unique multidisciplinary database supplying bibliographic information and abstracts for development studies, the Earth sciences, ecology, geomechanics, human geography, and oceanography. The database provides current coverage of almost 2,000 international journals, including both peer-reviewed titles and trade publications, and provides archival coverage of several thousand additional journal titles and books. GEOBASE™ is unequalled in its coverage of international literature of the core scientific and technical periodicals. GEOBASE™ has a unique coverage of non-English language and less readily available publications including books, conference proceedings, and reports, making this the best resource available for multidisciplinary searches of international literature.

GeoRef®

GeoRef®, the database of the American Geosciences Institute (AGI), covers worldwide technical literature on geology and geophysics. GeoRef® corresponds to the print publications: Bibliography and Index of North American Geology, Bibliography of Theses in Geology, and the Geophysical Abstracts, Bibliography and Index of Geology Exclusive of North America. GeoRef® organizes and indexes papers from more than 13,000 serials and other publications representative of the interests of the 50 professional geological and earth science societies that are members of the AGI. GeoRef® is international in coverage with about 40% of the indexed publications originating in the United States and the remainder from outside the U.S. Publications of international organizations represent about 7% of the file. The database includes current coverage of more than 3,500 journals as well as books and book chapters, conference papers, government publications, theses, dissertations, reports, maps, and meeting papers.

Inside Conferences

Inside Conferences is produced by the British Library. The database contains details of all papers given at every congress, symposium, conference, exposition, workshop, and meeting received at the British Library Document Supply Centre (BLDSC) since October 1993. Each year over 16,000 proceedings are indexed, covering a wide range of subjects published as serials or monographs. Over 500,000 bibliographic citations for individual conference papers will be added annually. Most records are in English, with many languages represented in the source documents.

NTIS (National Technical Information Service)

The NTIS database comprises summaries of U.S. Government-sponsored research, development, and engineering, plus analyses prepared by federal agencies, their contractors, or grantees. It is the means through which unclassified, publicly available, unlimited distribution reports are made available for sale from agencies such as the National Aeronautics and Space Administration, Department of Defense, Department of Energy, U.S. Department of Housing and Urban Development, Department of Transportation, Department of Commerce, and some 240 other agencies. Additionally, some state and local government agencies contribute summaries of their reports to the database. NTIS is the lead U.S. Government agency for cooperation in international technical information exchange, and receives information from the National Aerospace Laboratory in Japan, Micromedia in Canada, among others.

Oceanic Abstracts

Oceanic Abstracts is focused exclusively on worldwide technical literature pertaining to the marine and brackish-water environment. The journal has long been recognized as a leading source of information on topics relating to oceans. It focuses on and is totally comprehensive in its coverage of marine biology and physical oceanography, fisheries, aquaculture, non-living resources, meteorology and geology, plus environmental, technological, and legislative topics.

Scisearch®

SciSearch®: A Cited Reference Science Database is an international, multidisciplinary index to the literature of science, technology, biomedicine, and related disciplines produced by Thomson Scientific. SciSearch® contains all of the records published in the Science Citation Index® (SCI®), plus additional records in engineering technology, physical sciences, agriculture, biology, environmental sciences, clinical medicine, and the life sciences. SciSearch® indexes all significant items (articles, review papers, meeting abstracts, letters, editorials, book reviews, correction notices, etc.) from more than 6,100 international scientific and technical journals.

Zoological Record Online®

Zoological Record Online®, currently published by Thomson Scientific, formerly BIOSIS and the Zoological Society of London until 2004, is the world's most comprehensive index to zoological and animal science literature. Records cover every aspect of zoology, including biochemistry, behavior, ecology, evolution, genetics, etc., with particular emphasis on biodiversity and systematic/taxonomic information. More than 5,000 international serials plus approximately 1,500 non-serial publications are currently monitored, including professional journals, magazines, newsletters, monographs, books, reviews, and conference proceedings. The database corresponds to the printed index, Zoological Record®, and includes thorough subject indexing in both controlled- and natural-language format, complimented by an online thesaurus.

Appendix D

Literature Search Statements

Set 1:
SS coral? OR reef? OR hardbottom OR (hard OR rocky)()bottom OR livebottom OR live()bottom OR hardground or hard()ground OR bioherm? OR octocoral? OR gorgonian? OR Antipatharia? OR cnidaria? Or Desmophyllum OR Goniocorella? OR Leptogorgia? OR Lophelia OR Oculina OR Madrepora OR Paragorgia OR Solenosmilia

Set 2:
SS outcrop? OR pinnacle? OR ridge? OR rock? OR canyon? OR escarpment? OR scarp? OR seamount? OR boulder?

Set 3:
Benth? OR epibenth? OR biota? OR epibiot? OR epifauna? OR epiflora? OR (alga? NOT (coast? OR estuar?))

Set 4:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR ((east OR northeast? OR southeast?) (1n) coast AND (US OR USA OR United()States))

Set 5:
SS (Chesapeake OR new()york OR atlantic OR midatlantic)(1n)bight OR georges()bank OR gulf(1n)maine OR Jordan()basin OR blake(2n)(plateau OR spur OR escarpment) OR cape()(cod OR may OR fear OR lookout) OR Delmarva OR Hatteras OR Carolinas OR outer()banks OR Charleston()bump OR Stellwagen()bank NOT (Florida(3n)(Key or keys))

(Set 1 OR (Set 2 AND Set 3)) AND (Set 4 OR Set 5)

Set 1:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR (east OR northeast? OR southeast?) (1n) coast AND (US or USA or United()States)

Set 2:
SS (Chesapeake or new()york or atlantic or midatlantic)(1n)bight or georges()bank or gulf(1n)maine or Jordan()basin or blake(2n)(plateau or spur or escarpment) or cape()(cod or may or fear or lookout) or Delmarva or Hatteras or Carolinas or outer()banks

Set 3:
SS fish or fishes or ichthyofauna? or groundfish? Or bottomfish?

Set 4:
SS benth? or trawl? Or video or hook(1n)line or camera or baited()trap? Or demersal or reef? Or marmap or (hard or live)()bottom or continental()(shelf or slope or rise) or abyss? Or canyon?

(Set 1 or Set 2) AND (Set 3 or Set 4)

Set 1:
SS geomorph? Or geochemi? Or stratigraph? or (ridge(1n)swale) OR sediment? Or bedform? or turbidite? Or biostrome? Or micrite? Or basalt or pore()water(2n)flux? Or leveed()fan()valley? Or boundstome? Or mass()(wasting or movement) or sand()(ridge? Or bank?) or scarp? or continental()margin OR alluvial()(fan OR fans) OR disconformity OR fault? OR guyot? OR seamount? OR igneous()rock? OR ripple()mark? OR sand()wave?

Set 2:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR ((east OR northeast? OR southeast?) (1n) coast AND (US or USA or United()States))

Set 3:
SS (Chesapeake OR new()york OR atlantic OR midatlantic)(1n)bight OR georges()bank OR gulf(1n)maine OR Jordan()basin OR blake(2n)(plateau OR spur OR escarpment) OR cape()(cod OR may OR fear OR lookout) OR ((Delmarva OR Hatteras OR Carolinas OR outer()banks) and Atlantic) or Charleston()Bump or Stellwagen()bank

Set 4:
SS lagoon or river? Or estuar?/ti,id,de

Set 1 AND (Set 2 or Set 3) NOT Set 4

Set 1:
SS pelagic or mesopelagic or epipelagic or bathypelagic or water()column or thermocline or halocline or vertical()profile or migration or nekton or Sargassum or predation or predator? Or trophic or food()web? Or (producti? NOT primary); SS connectivity or life()histor? Or population()dynamics or biodiversity or highly()migratory()species Or marmap or seamap or plankton? Or holoplankton or zooplankton or meroplankton or ichthyoplankton

Set 2:
SS red()tide? Or cnidaria? Or krill or chaetognath? Or pteropod? Or salp? Or ctenophore? Or diel OR neuston OR copepod?

Set 3:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR (east OR northeast? OR southeast?) (1n) coast AND (US or USA or United()States)

Set 4:
SS (Chesapeake or new()york or atlantic or midatlantic)(1n)bight or georges()bank or gulf(1n)maine or Jordan()basin or blake(2n)(plateau or spur or escarpment) or cape()(cod or may or fear or lookout) or Delmarva or Hatteras or Carolinas or outer()banks or Charleston()Bump or Stellwagen()bank

(Set 1 or Set 2) AND (Set 3 or Set 4)

Set 1:
Ss (Seagrass? Or sea()grass? Or halophila or syringodium or zostera()marina or eelgrass or manateegrass or (eel or paddle or star or manatee)()grass? or SAV or submerged()aquatic()vegetation) NOT (lagoon or coastal Or estuar? Or shore? Or beach?)

Set 2:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR ((east OR northeast? OR southeast?) (1n) coast AND (US or USA or United()States))

Set 3:
SS (Chesapeake OR new()york OR atlantic OR midatlantic)(1n)bight OR georges()bank OR gulf(1n)maine OR Jordan()basin OR blake(2n)(plateau OR spur OR escarpment) OR cape()(cod OR may OR fear OR lookout) OR Delmarva OR Hatteras OR Carolinas OR outer()banks or Charleston()Bump or Stellwagen()bank

Set 1 and (Set 2 or Set 3)

Set 1:
SS Macrofauna? or macroinfauna? or infauna? or meiofauna? or epifauna? or megafauna? or (macro or meio or epi or mega)()fauna? or ((macrobenth? Or benth?) NOT (coral? Or foraminif?)) OR sediment()profile()imag?

Set 2:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR ((east OR northeast? OR southeast?) (1n) coast AND (US or USA or United()States))

Set 3:
SS (Chesapeake OR new()york OR atlantic OR midatlantic)(1n)bight OR georges()bank OR gulf(1n)maine OR Jordan()basin OR blake(2n)(plateau OR spur OR escarpment) OR cape()(cod OR may OR fear OR lookout) OR Delmarva OR Hatteras OR Carolinas OR outer()banks or Charleston()Bump or Stellwagen()bank

Set 1 and (Set 2 or Set 3)

Set 1:
SS water()quality or turbid? or suspended()solid? or particulate? or secchi or extinction()coefficient? or photosynthetically(1n)radiation or dissolved()oxygen or oxygen()demand or hypoxi? or anoxi? or nutrient? or eutroph? or ammoni? or nitrate? or nitrite? or phosphate? or silica? or dissolved()(organic or inorganic) or organic()carbon or pollut? or contamina? or (trace or heavy)()metal? or hydrocarbon? or PAH? or TPH? or tar or DDT? or DDE? or PCB? or dioxin? or furan? or pesticide? or polychlorinated or biphenyl? or organochlorine? or benzoyrene or pyrene or phthalate? or radionuclide? or biogeochem? or red()tide? or pH or sewage or pathogen? or PCB? or (plastic?(f)(seawater or ocean or debris))

Set 2:
SS western()north()atlantic OR (Atlantic()Ocean AND (Maine OR Massachusetts OR Connecticut OR Rhode()Island OR Delaware OR Maryland OR Virginia OR Georgia OR Florida OR New()(Hampshire OR Jersey OR York) OR (North OR South)()Carolina)) OR ((east OR northeast? OR southeast?) (1n) coast AND (US or USA or United()States))

Set 3:
SS (Chesapeake OR new()york OR atlantic OR midatlantic)(1n)bight OR georges()bank OR gulf(1n)maine OR Jordan()basin OR blake(2n)(plateau OR spur OR escarpment) OR cape()(cod OR may OR fear OR lookout) OR ((Delmarva OR Hatteras OR Carolinas OR outer()banks) and Atlantic) or Charleston()Bump or Stellwagen()bank

Set 4:
Ss (estuar? Or river or lagoon?)/ti,id,de

Set 1 AND (Set 2 or Set 3) NOT Set 4

Appendix E

WorldCat™ and Aquatic Commons Search Page Screen Captures

Staff View **WorldCat Expert Search**

- Enter search terms in one or more boxes and click on **Search**.
- If you have saved marked record(s), you can access them here: Saved Records

Searching | Results | Resource Sharing

Article Exchange | My Statistics | My Account | Options | Policies Directory | Comments | Exit | Hide tips

Basic Search | Advanced Search | Expert Search | Previous Searches | Go to page

Index | Subjects | News | Help

Current database: **WorldCat**

Search | Clear

Search in database: WorldCat (Updated: 2012-01-30)
OCLC catalog of books and other materials in libraries worldwide

Search for:

```
(su= "Environmental impact statements") AND
(su= "United States")
```

Indexed in: Keyword (kw:)

Limit to:
Year (format: YYYY-YYYY)
Language No Limit Show all languages ...
Number of Libraries All

Limit type to: match any of the following
- [x] Books
- [ ] Serial Publications
- [ ] Articles
- [ ] Visual Materials
- [ ] Sound Recordings
- [ ] Musical Scores
- [x] Computer Files
- [ ] Archival Materials
- [ ] Maps
- [x] Internet Resources
- [ ] Continually Updated Resources

Subtype limits Any Audience | Any Content | Any Format

Limit availability to: match any of the following
- [ ] Items in my library (FLCSA, CSA LIBRARY)

Library Code Find codes ...

Rank by: Number of Libraries

Search | Clear

```
Plurals, truncation, and wildcards
Use + for plurals (s and es)
Use * for truncation
Use # for a wildcard character
Use ?N for up to N characters
```

Internet 100%

All 52 | Books 43 | Internet 8 | Computer 1

Limit results: Any Audience | Any Content | Any Format | Search

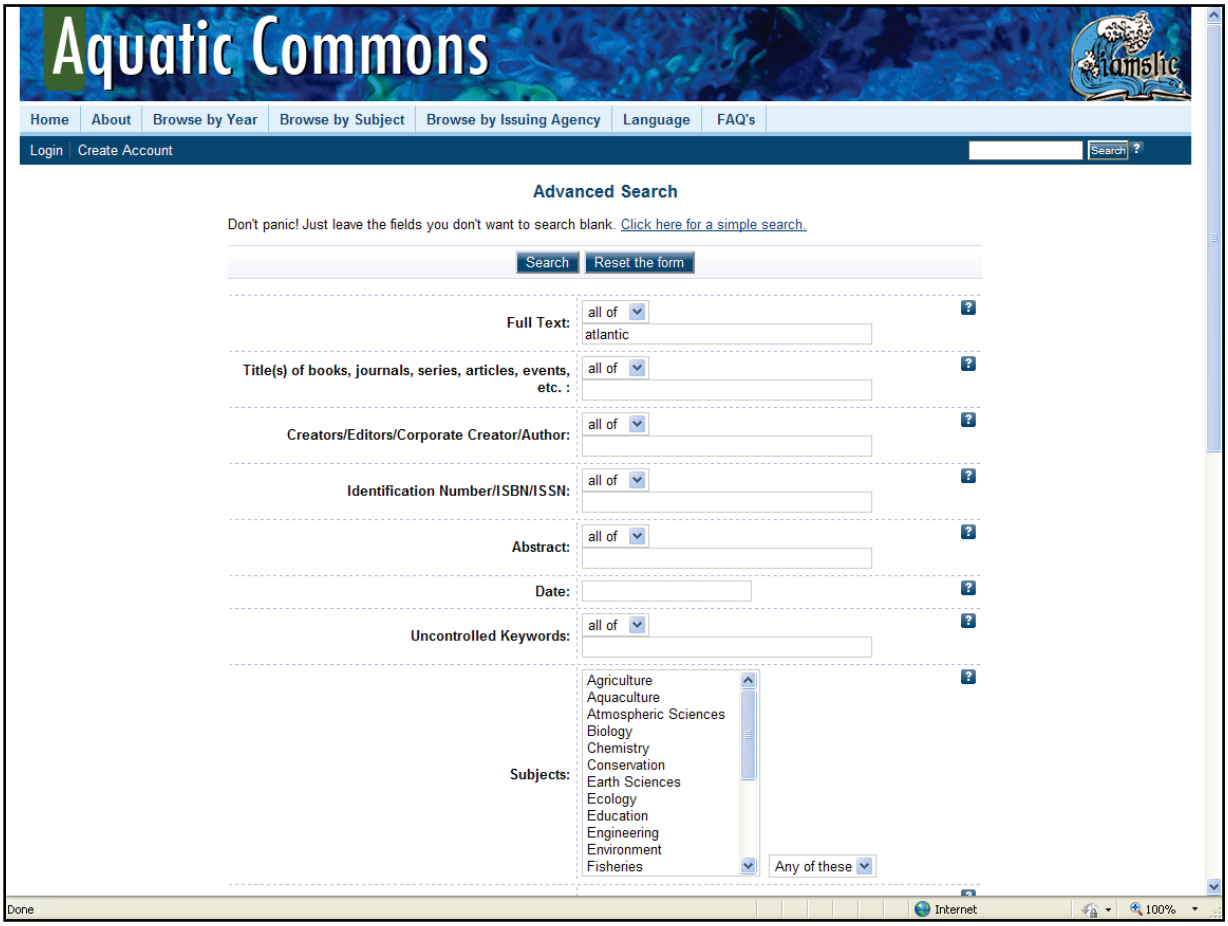
1. **Programmatic EIS for outer continental shelf renewable energy and alternate use regional planning areas on the outer continental shelf.**
http://purl.access.gpo.gov/GPO/LPS94614
Corp Author: United States., Minerals Management Service. **Publication:** [Washington, D.C. : Minerals Management Service, 2007
Document: English : Internet Resource Map Computer File
Libraries Worldwide: 135 | Regional Holdings | State Holdings
Group Holdings
Select
Accession No: OCLC: 228880688 **National Library Cataloging:** U.S. Government Printing Office (GPO)
More Like This: Advanced options ...

2. **Programmatic Environmental Impact Statement for alternative energy development and production and alternative use of facilities on the outer continental shelf final environmental impact statement /**
http://purl.access.gpo.gov/GPO/LPS106940
http://www.ocsenergy.anl.gov/eis/guide/index.cfm
http://www.ocsenergy.anl.gov/documents/fpeis/Alt_Energy_FPEIS_ExecutiveSummary.pdf
Corp Author: United States., Minerals Management Service. **Publication:** [Washington, D.C.] : U.S. Dept. of the Interior, Minerals Management Service, 2007
Document: English : Internet Resource Computer File
Libraries Worldwide: 131 | Regional Holdings | State Holdings
Group Holdings
Select
Accession No: OCLC: 180911332 **National Library Cataloging:** Program for Cooperative Cataloging (PCC)
More Like This: Advanced options ...

3. **Proposed 1983 Outer Continental Shelf oil and gas lease sale offshore the Mid-Atlantic states, OCS sale no. 76 : final environmental impact statement /**
Publication: [New York, N.Y.] : U.S. Dept. of the Interior, Minerals Management Service, Atlantic Outer Continental Shelf Region-New York Office, 1982
Document: English : Book
Libraries Worldwide: 92 | Regional Holdings | State Holdings
Group Holdings
Select
Accession No: OCLC: 8674398 **National Library Cataloging:** Library of Congress (DLC)
More Like This: Advanced options ...
See more details for locating this item

4. **Outer continental shelf natural gas and oil resource management : comprehensive program, 1992-1997 : final environmental impact statement.**
Corp Author: United States., Minerals Management Service.
Publication: [Herndon, VA] : U.S. Dept. of the Interior, Minerals Management Service, 1992
Document: English : Book
Libraries Worldwide: 83 | Regional Holdings | State Holdings
Group Holdings
Select
Accession No: OCLC: 27642592 **National Library Cataloging:** Library of Congress (DLC)
More Like This: Advanced options ...
See more details for locating this item

Done | Internet | 100%


Aquatic Commons
Home
About
Browse by Year
Browse by Subject
Browse by Issuing Agency
Language
FAQ's
Login
Create Account
Search
Advanced Search
Don't panic! Just leave the fields you don't want to search blank. Click here for a simple search.
Search
Reset the form
Full Text:
all of
atlantic
Title(s) of books, journals, series, articles, events, etc. :
Creators/Editors/Corporate Creator/Author:
Identification Number/ISBN/ISSN:
Abstract:
Date:
Uncontrolled Keywords:
Subjects:
Agriculture
Aquaculture
Atmospheric Sciences
Biology
Chemistry
Conservation
Earth Sciences
Ecology
Education
Engineering
Environment
Fisheries
Any of these
Done
Internet
100%

1. Devoe, Richard (2010) *The South Atlantic Alliance: A southeastern U.S. state Governors initiative to address opportunities and challenges embodied in the region's coastal and ocean domain.* In: Shifting Shorelines: Adapting to the Future,The 22nd International Conference of The Coastal Society , June 13-16, 2010 , Wilmington, North Carolina.

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9. Schöne, Rüdiger and Ulleweit, Jens (2005) *Die Fischerei im Nordostatlantik im Jahre 2004.* Informationen aus der Fischereiforschung = Information on Fishery Research, 52(1), pp. 66-73. DOI: 10.3220/Infn52_66-73_2005

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12. Schöne, Rüdiger (2003) *Fischereisituation, Probennahme und Zustand der Nutzfischbestände im Nordostatlantik im Jahre 2002.* Informationen fÃ¼r die Fischwirtschaft aus der Fischereiforschung, 50(1), pp. 3-9.

Done Internet 100%

Appendix F

Example of Inter-library Loan Request Form

OCLC FirstSearch: Request Confirmation

Your requested information from your library CSA LIBRARY

Return

Search Active Requests
Search Closed Requests

Request Identifier (an:) Search

62756126

General Record Information

Request Identifier:	62756126	Status:	PENDING 20100216
Request Date:	20100216	Source:	FSILLSTF
OCLC Number:	12781550		
Borrower:	FLCSA	Need Before:	20100302
Receive Date:		Renewal Request:	
Due Date:		New Due Date:	
Lenders:	*FDA, FXG, FQR, FHM, FHM		
Request Type:	Copy		

875

Bibliographic Information

Rec 2-17

Title:	Symbiosis.
ISSN:	0334-5114
Imprint:	Philadelphia, Pa. : Balaban Publishers, 1985 9999
Article:	Buhl-Mortensen, L and P.B. Mortensen, "Gorgonophilus canadiensis ...."
Volume:	37
Number:	1-3
Date:	2004
Pages:	155-168
Verified:	WorldCat CODEN: SYMBER Desc: v. :Type: Serial

Borrowing Information

Patron:	Spring, Keith 875 (2261-1 1010_CH)
Ship To:	Library CSA International Inc. 8502 SW Kansas Avenue Stuart FL 34997
Bill To:	same
Ship Via:	Ariel 74.175.108.194 / Lib Mail / FL libs - DO NOT SEND VIA DLLI
Electronic Delivery:	Ariel (FTP) - 74.175.108.194; Ariel (E-mail) - kmetzger@conshelf.com
Maximum Cost:	IFM - $20.00
Copyright Compliance:	CCL

Appendix G

Example of Inter-library Loan Invoice

Welcome, CSA LIBRARY |

ILL Fee Management Program Borrower Report

Reporting Period: March 2010
Institution: CSA LIBRARY
Symbol: FLCSA
Show Summary

Lender Symbol	Institution Name	ILL Record	Title	Patron	Patron Dept	Loan Copy	Request Date	Date Shipped	Date Received
							Grand Total	All Institutions	$129.00
							Grand Total	Count	9
ANC	ANTIOCH COL	064028290	Effects of gas-pipeline construction on the Little Miami River aquatic ecosystem : final report, Sep	Olsen, K. 948 (2077-3)		C	2010-03-22	2010-03-23	2010-03-23
ANC	ANTIOCH COL							Monthly Total	$20.00
								Monthly Count	1
LHL	LINDA HALL LIBR	063553280	The proceedings of the Seventeenth (2007) International Offshore and Polar Engineering Conference Li	Olsen, K. 928 (2077-3)		C	2010-03-08	2010-03-10	2010-03-11
LHL	LINDA HALL LIBR							Monthly Total	$16.00
								Monthly Count	1
OAJ	NATIONAL MARINE FISHERIES SERV, SE	064037518	Benthic habitats and the effects of fishing : proceedings of Symposium on Effects of Fishing Activit	Snyder D. 950 (396 DF 2261-1)		L	2010-03-22	2010-03-23	2010-03-30
OAJ	NATIONAL MARINE							Monthly Total	$15.00

Appendix H

Example of Dataset Search Tracking Spreadsheet

Table 1.

Dataset Search Tracking Spreadsheet

Web Address	Description	Unique ID Number	Data available?	Priority	Reason for ESID Ineligibility	Datatype	Location	Year	ISRT Leader(s) Associated	Abstract	Notes
http://coastalscience.noaa.gov/data/welcome.html	NCCOS Data	N/A	No	P0	No data	N/A	N/A	N/A	N/A	NCCOS data consists of digital imagery as well as chemical, biological and physical measurements and is used to describe ecosystems, forecast current and future ecological health, and evaluate management strategies. Currently available NCCOS data is accessible through the links below.	Publications available.
NOAA's National Status and Trends Program (NS&T):											
http://ccma.nos.noaa.gov/about/coast/nsandt/welcome.html	COAST's National Status & Trends	N/A	No - links to data	P0	No data	N/A	N/A	N/A	N/A	NS&T is comprised of two nationwide programs, Mussel Watch and Bioeffects, that are designed to describe the current status of, and detect changes in, the environmental quality of our Nation's estuarine and coastal waters through environmental monitoring, assessment and related research.	Because this program only encompasses projects/data in coastal waters it was not evaluated.
National Benthic Inventory											
http://www.nbi.noaa.gov/default.aspx	National Benthic Inventory: Welcome	N/A	No	P0	No data	N/A	N/A	N/A	N/A	The National Benthic Inventory (NBI) is a dynamic quantitative database on benthic species distributions obtained from studies conducted by NOAA and partnering institutions in estuarine and other coastal areas of the United States.	
http://www.nbi.noaa.gov/searchResults.aspx?study=2002+Ocean's+Exploration	Searchable Database by Taxa for the 2002 Ocean Exploration Project: Benthic Infauna Species and Density Data and Depth	N/A	Yes	P1	N/A	Benthic infauna data	Offshore regions between SC and northern FL	2002	Balcom	Benthic species data (species list, density) and depth collected during the 2002 Ocean Exploration cruise conducted along the shelf edge between South Carolina and northern Florida.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?study=2000+Gray's+Reef+NMS	Searchable Database by Taxa for the 2000 Grays Reef National Marine Sanctuary: Benthic Infauna Data, Depth, Salinity	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2000	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2000 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results

Table 1 (continued). Dataset Search Tracking Spreadsheet

Web Address	Description	Unique ID Number	Data available?	Priority	Reason for ESID Ineligibility	Datatype	Location	Year	ISRT Leader(s) Associated	Abstract	Notes
http://www.nbi.noaa.gov/searchResults.aspx?study=2001+Gray's+Reef	Searchable Database by Taxa for the 2001 Grays Reef National Marine Sanctuary: Benthic Infauna Data, Depth, Salinity	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2001	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2001 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?study=2002+Gray's+Reef	Searchable Database by Taxa for the 2002 Grays Reef National Marine Sanctuary: Benthic Infauna Data, Depth, Salinity	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2002	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2002 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?study=2003+Gray's+Reef	Searchable Database by Taxa for the 2003 Grays Reef National Marine Sanctuary: Benthic Infauna Data, Depth, Salinity	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2003	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2003 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?project=Gray's%20Reef%20Halo%20and%20Trophic%20Interactions%20Study	Gray's Reef Halo and Trophic Interactions Study	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2003	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2003 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?project=Gray's%20Reef%20NMS%20Benthic%20Assessment	Gray's Reef NMS Benthic Assessment	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2000-2005	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2003 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?project=Gray's%20Reef%20transects%20from%20estuary%20to%20shelf%20edge	Gray's Reef transects from estuary to shelf edge	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2001-2002	Balcom	Benthic species data (species list, density), depth, and salinity collected during the 2003 cruise conducted at Gray's Reef National Marine Sanctuary.	Links to download data and map your results
http://www.nbi.noaa.gov/searchResults.aspx?study=2002+Ocean's+Exploration	Ocean's Exploration Islands in the Stream	N/A	Yes	P1	N/A	Benthic species data	Offshore region between GA and FL	2002	Balcom	Benthic species data (species list, density) and depth collected during the 2002 cruise conducted offshore of South Carolina, Georgia, and Florida.	Links to download data and map your results

Table 1 (continued). Dataset Search Tracking Spreadsheet

Web Address	Description	Unique ID Number	Data available?	Priority	Reason for ESID Ineligibility	Datatype	Location	Year	ISRT Leader(s) Associated	Abstract	Notes
http://www.nbi.noaa.gov/searchResults.aspx?study=1998+EPA+Jacksonville+Dredge+Project	Searchable Database by Taxa for the 1998 EPA Jacksonville Dredge Disposal Site: Benthic Infauna Data and Depth	N/A	Yes	P1	N/A	Benthic infauna data	Offshore region between GA and FL	1998	Balcom	Benthic species data (species list, density) and depth collected during the 2002 Ocean Exploration cruise conducted along the shelf edge between South Carolina and northern Florida.	Links to download data and map your results
http://nbi.noaa.gov/searchResults.aspx?study=1998+EPA+Jacksonville+Dredge+Project	National Benthic Inventory - Search Results EPA Jackson Dredge Disposal Infauna	N/A	Yes	P1	N/A	Infauna data	US EPA Jacksonville Dredge Disposal Site	1998	Balcom	Bioeffects Assessment Program identifies and assesses biological effects associated with contaminant exposure. Over forty intensive regional studies have been conducted since 1986 using the Sediment Quality Triad approach which utilizes a stratified random sampling method to determine the areal extent of contaminated sediments. The data include: sediment chemistry, toxicity, and species diversity and quantity for the same suite of organic contaminants and trace metals as the Mussel Watch Program.	
National Benthic Inventory: Complete List of Datasets											
http://www.nbi.noaa.gov/studies.aspx	National Benthic Inventory: Complete List of Datasets	N/A	No	P0	No data - links to data	N/A	N/A	N/A	N/A	Web page with links to all datasets in the National Benthic Inventory.	
http://www.nbi.noaa.gov/searchResults.aspx?study=2005%20Gray's%20Reef%20NMS	Searchable Database by Taxa for the 2005 Grays Reef National Marine Sanctuary: Benthic Infauna Data, Depth, Salinity	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Grays Reef National Marine Sanctuary	2005	Balcom and Montgomery	Benthic species data (species list, density), depth, and salinity collected during the 2005 cruise conducted at Gray's Reef National Marine Sanctuary.	
http://www.nbi.noaa.gov/searchResults.aspx?study=2006%20Mid-Atlantic%20Bight%20Coastal%20Assessment	2006 Mid-Atlantic Bight Coastal Assessment: Taxa List, Benthic Infauna Data, Depth, Salinity	N/A	Yes	P1	N/A	Benthic infauna data and salinity	Offshore Mid-Atlantic Bight	2006	Balcom and Montgomery	Benthic species data (species list, density), depth, and salinity collected during the 2006 cruise conducted offshore in Mid-Atlantic Bight.	Several stations may be inshore of project area boundary.

Table 1 (continued). Dataset Search Tracking Spreadsheet

Web Address	Description	Unique ID Number	Data available?	Priority	Reason for ESID Ineligibility	Datatype	Location	Year	ISRT Leader(s) Associated	Abstract	Notes
Georgia Coastal Analysis Partnership (GCAP) --> Data and Metadata											
http://www.chbr.noaa.gov/gcap/data.aspx	GCAP - Data and Metadata	N/A	Yes	P1	N/A	ArcExplorer and ArcView files	Offshore Georgia	N/A	Phillips	Both the ArcExplorer and ArcView project files allow a user to obtain specific information by individual sampling site, including the kinds of samples collected, sampling gear type, date sampled, geographic coordinates, and other parameters measured at the site.	Potential GIS data. The GRNMS and CCFHR data are within ESID area and on ecologically important topics (ichthyoplankton, juvenile fish). The others (EMAP, GADNR, and NCA) are coastal only.
Georgia Coastal Analysis Partnership --> Data and Metadata --> Map of Sampling Projects											
http://www.chbr.noaa.gov/gcap/map.aspx	GCAP - Map of Sampling Projects	N/A	Yes	P1	N/A	Figure of sampling locations on web page	Georgia	N/A	Phillips	GCAP is a joint initiative (begun July 2001) by scientists from the National Oceanic and Atmospheric Administration (NOAA), the U.S. Environmental Protection Agency (EPA), the Georgia Department of Natural Resources (GA DNR), and the Skidaway Institute of Oceanography (SkIO) to coordinate results of ongoing federal and state monitoring programs along the coast of Georgia in an effort to support common research and coastal-management goals.	Only those projects within the study area were evaluated and listed below.

Table 1 (continued). Dataset Search Tracking Spreadsheet

Web Address	Description	Unique ID Number	Data available?	Priority	Reason for ESID Ineligibility	Datatype	Location	Year	ISRT Leader(s) Associated	Abstract	Notes
http://www.chbr.noaa.gov/gcap/metadata/grnms.htm	Grays Reef National Marine Sanctuary (NOAA) Sampling Data	N/A	Yes	P1M	N/A	Sediment and macroinfaunal metadata	Grays Reef National Marine Sanctuary	2000-2002	Balcom, Strum	A field study was conducted to assess condition of macroinfaunal assemblages, concentrations of chemical contaminants in sediments, and contaminant body-burdens in target benthic species of the Gray's Reef National Marine Sanctuary off the coast of Georgia. Prior research in the sanctuary has focused on the impressive live-bottom assemblages of algae, invertebrates, fishes, and turtles associated with rock outcrops. In contrast, there has been limited work on the ecology of unconsolidated substrates which surround the rocky-reef structures and characterize much of the inner-shelf area in the general vicinity of Grays Reef. The present study will provide a comprehensive baseline on condition of the soft-bottom benthos and background contaminant levels of this important natural underwater resource. The macrobenthos is a key component of this system, playing vital roles in detrital decomposition, nutrient cycling, and energy flow to higher trophic levels. Moreover, because of their relatively stationary existence within sediments, benthic infauna can serve as reliable indicators of potential environmental disturbances to the seafloor. Such information is of direct importance to the development of management plans for the Sanctuary as an additional contribution to our understanding of the basic ecology of this system and as a baseline for monitoring any future changes due to either natural or anthropogenic influences.	All monitoring data collected at GRNMS from 2000-2005 (excluding 2004) was obtained from NOAA on 7/8/10 (Access® database) and sent to AMEC.

Table 1 (continued). Dataset Search Tracking Spreadsheet

Web Address	Description	Unique ID Number	Data available?	Priority	Reason for ESID Ineligibility	Datatype	Location	Year	ISRT Leader(s) Associated	Abstract	Notes
										The present benthic survey, led by NOAA scientists from the Center for Coastal Environmental Health and Biomolecular Research (CCEHBR), is a component of a larger, ongoing coordinated site characterization of the sanctuary by the GRNMS Office and two NCCOS Centers (CCEHBR and the Center for Coastal Fisheries and Habitat Research - CCFHR).	
http://www.chbr.noaa.gov/gcap/metadata/ccfhr.htm	NOAA Center for Coastal Fisheries and Habitat Research	N/A	Yes	P0	Not applicable to the resource categories	Ichthyoplankton and juvenile fish catch metadata	Offshore Georgia	2000-2001	N/A	Samples were collected from the NOAA Research Vessel Ferrel (R-492) between April 2000 and June 2001. Ichthyoplankton were sampled with 3 gear types: 60 cm bongo, 1m sled, and neuston nets. Juvenile fish were collected using a 2 m beam trawl.	
FinBase											
http://www.chbr.noaa.gov/FinBase/	FinBase Photo-Identification Database System	N/A	No	P0	No data - link to database	N/A	N/A	N/A	N/A	FinBase is a customized Microsoft® Access® database that stores and manages textual and numerical data from photo-identification surveys of bottlenose dolphins. It also performs many of the tasks associated with image management and analysis.	Photo database. Not applicable to resource categories and therefore not evaluated.
ReefFish database											
http://www8.nos.noaa.gov/biogeo_public/query_main.aspx	Coral Reef Ecosystem Assessment and Monitoring Database Report Module	N/A	No	P0	No data - link to metadata	N/A	Puerto Rico, USVI, and Flower Garden Banks	N/A	N/A	Fish, habitat, water quality, and photo database for Puerto Rico, USVI, and Flower Garden Banks	Outside of the project area.
NOS Data Explorer											
http://oceanservice.noaa.gov/dataexplorer/welcome.html	NOS Data Explorer	N/A	N/A	99	N/A	N/A	N/A	N/A	N/A	N/A	This website has its own spreadsheet tracker (003 NOS)

Appendix I

Dataset Search Written Protocols

Protocol for Dataset Evaluation
National Oceanographic Data Center's Ocean Archive System
http://www.nodc.noaa.gov/cgi-bin/search/prod/accessionsView.pl

A query of the National Oceanographic Data Center's Ocean Archive System was conducted from 1/5/10 – 2/1/10 by Leslie Duncan (Atkins). From the homepage, a query of the available datasets was conducted based upon those "Sea Areas" that are relevant to the ESID project. The following sea areas were queried: Coastal Waters of Florida, East Coast-US/Canada, Georges Bank, Gray's Reef National Marine Sanctuary, Gulf of Maine, Mid-Atlantic Bight, New York Bight, North American Coastline - North, North American Coastline - South, North Atlantic Ocean, Northwest Atlantic (limit 40W), Sargasso Sea, Stellwagen Bank National Marine Sanctuary, Straits of Florida, and World-Wide Distribution. The resulting NODC accessions and associated info were transferred to a Microsoft® Excel® spreadsheet and each accession was subsequently evaluated.

Threshold Criteria and Prioritization
To determine whether a particular NODC accession was relevant to the ESID project, the accession was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NODC accessions were evaluated against the threshold criteria based upon the dataset descriptors available in association with each accession, as shown in the following table:

ESID Threshold Criteria	**NODC Dataset Descriptors**
Topic	Datatype
	Title
Location	Sea Area
	Details (as needed)

Not Eligible: Datasets that met the following criteria were given a Priority 0 (P0) because they were not relevant to the ESID project:
Datasets that did not meet either one of the ESID Threshold Criteria
Datasets that only contain meteorological data and/or physical oceanographic data (e.g., current, wave, temperature, salinity, conductivity, etc.)
Datasets that are known to be heavily focused on the collection of meteorological data and/or physical oceanographic data, although they may also collect some water quality data (i.e., Gulf of Maine Ocean Observing System (GoMOOS) data)

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – Those datasets that contain
Water quality data that include pollutants (e.g., hydrocarbons, PCBs)
Datatypes that contain biological data, with or without water quality data

Priority 2 (P2) Datasets – Those datasets that contain water quality data (e.g., dissolved oxygen, secchi depth, transmissivity, chlorophyll, fluorescence, nutrients), or a combination of water quality and physical oceanography data.

Eligibility Unknown: A number of datasets met the "topic" criterion, while the "location" criterion was not descriptive enough to determine whether the data fell within the ESID project area. Such datasets were considered Priority 3 (P3).

PROTOCOL FOR DATASET EVALUATION

NOAA National Centers for Coastal Ocean Science (NCCOS)
http://coastalscience.noaa.gov/data/welcome.html

An evaluation of the National Oceanographic and Atmospheric Administration's National Centers for Coastal Ocean Science (NCCOS) Data website was conducted from 2/2/10-5/11/10 by Leslie Duncan (Atkins). No query feature was available on the NCCOS website and the available NCCOS data is currently accessible only through external web links. Each of the external web links on the NCCOS Data page were searched for datasets. All data available were documented in an Excel® spreadsheet and subsequently evaluated. Web links with access to publications were noted in the Excel® spreadsheet.

The first web link accessed was NOAA's National Status and Trends Program (NS&T). NS&T is comprised of two nationwide programs, Mussel Watch and Bioeffects, which are designed to describe the current status of, and detect changes in, the environmental quality of U.S. estuarine and coastal waters through environmental monitoring, assessment, and related research. Because this program only encompasses projects in coastal waters, the available data is not applicable to the ESID project, and the individual datasets were not evaluated.

The second web link accessed was the National Benthic Inventory (NBI). Using the map feature on this website, the regions Virginia to Maine and Florida to North Carolina were selected. Most of the studies within the regions selected were conducted within coastal waters and thus not applicable to the ESID project. Exceptions included studies on the Gray's Reef National Marine Sanctuary, the EPA Dredge Disposal Site, and the Ocean Exploration sites, which were investigated for applicable data. In addition to the map feature, from the National Benthic Inventory home page, additional datasets were discovered when the complete list of datasets was selected.

The third web link accessed was the Georgia Coastal Analysis Partnership (GCAP). The user then selected the link to Data and Metadata on the left side of the web page and proceeded to browse using the interactive map.

The fourth web link accessed was the Finbase website, which is not applicable to the ESID project and was not analyzed.

The fifth web link accessed was the ReefFish database, which directs the user to the Coral Reef Ecosystem Assessment and Monitoring Database Report Module. The information in this database is not applicable to the ESID project because all data fell outside the ESID project area.

The final web link accessed was the National Ocean Service (NOS) Data Explorer, which was not searched because this website has its own tracking spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular NCCOS dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID **Threshold Criteria**:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NCCOS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also considered P0:
Datasets solely containing fisheries landings/catch data (no additional ecological or biological data).

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

Priority 1 (P1) Datasets - The following datasets were assigned P1:
Ecological (e.g., species density data versus depth) and water quality data available for offshore sites within the project area.
Sediment texture and contaminant data at national marine sanctuary within the outer continental shelf (OCS).

Priority 1 Metadata (P1M) - A code of "P1M" was assigned to those web links with metadata for a corresponding P1 dataset.

Priority 2 (P2) Datasets – No P2 datasets were found.

PROTOCOL FOR DATASET EVALUATION

NOAA National Ocean Service Data Explorer
http://oceanservice.noaa.gov/dataexplorer/

An evaluation of the National Oceanographic and Atmospheric Administration's (NOAA) National Ocean Service (NOS) Data Explorer website was conducted from 3/12/10 – 4/6/10 by Susan Colley Theodosiou (Atkins) and Beth Zimmer (Atkins). Because the query feature available on the NOS Data Explorer website searches all available datasets, it was determined that the most efficient method for evaluating the website was to assess the datasets themselves for applicability to the ESID project. Thus, from the Data Explorer Home Page, each dataset was reviewed under the "Data Web Sites" link, which provides a description of all the accessible datasets. In addition, the main NOS Home Page was perused for available datasets. From the NOS Home Page, web links were followed and pertinent links were evaluated for relevancy to the project. All web links were documented in an Excel® spreadsheet with a description of available data or information. The resulting datasets and URLs were then evaluated for relevance to the ESID project. URLs with access to publications were noted in the Microsoft® Excel® spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular NOS dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area.

The NOS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. *This search revealed no datasets that were identified as eligible for the ESID.*

PROTOCOL FOR DATASET EVALUATION

NOAA's Undersea Research Center (NURC)
University of North Carolina Wilmington
http://www.uncw.edu/nurc/index.htm

An evaluation of the National Oceanic Atmospheric Administration Undersea Research Center (NURC) website was conducted on 4/16/10-4/27/10 by Cheryl Wapnick (Atkins). The information links on this website are listed across the top of the webpage. No query feature was available on the NURC website, so the web links were followed until datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If available data was found under more than one web link, it was included in the spreadsheet only under the web link where it was first identified.

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. All links obviously leading to websites that do not contain data (e.g., images of the Aquarius habitat, aquanaut profiles, information for media inquiries) were not evaluated further; however the existence of these links was described in the spreadsheet. Web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular NURC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NURC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. In addition, those datasets containing only physical oceanography data (e.g., temperature, salinity, etc) were assigned a P0 priority.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – Those datasets that contain environmental/ecological data along with the mapped distribution of habitats.

Priority 2 (P2) Datasets – The following datasets were assigned a P2:
Those datasets that contain fish sighting frequency and density scores.
Those datasets that contain water quality data (e.g., fluorescence, PAR, backscatter, dissolved oxygen, chlorophyll), or a combination of water quality and physical oceanography data.

PROTOCOL FOR DATASET EVALUATION

NOAA's Coastal Services Center
http://www.csc.noaa.gov/

An evaluation of the National Oceanic Atmospheric Administration's Coastal Services Center (CSC) website was conducted on 5/3/10-6/10/10 by Cheryl Wapnick (Atkins). The search for data was conducted by exploring the links in the toolbar located across the top of the webpage, as well as the links in the "Regional and State Initiatives" section of the webpage. No query feature was available on the CSC website, so the web links were followed until datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If available data was found under more than one web link, it was included in the spreadsheet only under the web link where it was first identified.

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. All web links obviously leading to websites that do not contain data (e.g., employment opportunities, staff directory, upcoming events, directions, and funding opportunities) were not evaluated further; however the existence of these links was recorded in the Excel® spreadsheet. URLs with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular CSC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two **ESID Threshold Criteria:**

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The CSC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also considered P0:
Datasets containing solely of fisheries landings/catch data (without additional ecological or biological data).

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – The following datasets were assigned a P1:
GIS data for bottom sediment sampling and sidescan sonar at Oculina Bank, which may be located partially within the ESID project area and
GIS data for seafloor geology and surficial sediment data for the offshore Atlantic Ocean.
Sediment texture data for Oculina Bank, which may be located partially within the ESID project area.

Map displaying bottom geology interpretation of sidescan sonar along the US Atlantic Continental Margin Exclusive Economic Zone (EEZ).

Priority 2 (P2) Datasets – Bottom type maps for Oculina Bank were assigned a P2 based on the limited amount of data available within these maps.

PROTOCOL FOR DATASET EVALUATION

NOAA Coral Reef Information System
http://coris.noaa.gov/

An evaluation of the National Oceanographic and Atmospheric Administration's Coral Reef Information System (CoRIS) website was conducted on 2/2/10 – 4/8/10 by Leslie Duncan (Atkins). The available data on this website was accessed by using the "Region Portal" and selecting "Florida", as the other regions were not applicable to the ESID. Once within the Florida region, the "Metadata" link was selected, allowing the user to search the CoRIS data and publications section for Florida metadata, data, and publications. All results (i.e., data, metadata, and publications) were assessed. The numerous publications discovered using this query were separated into an individual spreadsheet, titled "NOAA-CoRIS_Publications.xlsx", for later use. The data and metadata were documented in an Excel® spreadsheet and subsequently evaluated.

It is important to note that CoRIS is an information system with users adding data and publications on a daily basis. Some of the web links in the tracking spreadsheet refer to a record number (e.g., http://coris.noaa.gov/data/?region=Florida;rec=64 or record number 64). As data and publications are added to CoRIS, the record numbers change and unfortunately the web links in the tracking spreadsheet are not simultaneously updated. As a result, web links with record numbers may not correspond to the project description in a given row.

Threshold Criteria and Prioritization
To determine whether a particular CoRIS dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The CoRIS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID and were categorized as Priority 1 (P1) or Priority 2 (P2).

Priority 1 (P1): Datasets that 1) included spatially explicit data on coral reef or hardbottom community taxa within the project area or 2) contained relevant ecological data from benthic and water column sampling.

Priority 2 (P2): Only one dataset was assigned a Priority 2 (P2). These data consisted mainly of study area locations, ship tracks, sampling station locations, plus routine meteorological and oceanographic data collected along the ship tracks. While the oceanographic data are mainly temperature and salinity readings, some chlorophyll measurements are included.

PROTOCOL FOR DATASET EVALUATION

VIMS Center for Coastal Resources Management GIS Data & Maps
http://ccrm.vims.edu/gis_data_maps/data/index.html

An evaluation of the Virginia Institute of Marine Science Center for Coastal Resources Management GIS Data & Maps website was conducted on 3/18/10 and 3/19/10 by Cheryl Wapnick (Atkins). The available data on this website is organized into three main URLs titled "Data", "Interactive Maps", and "Static Maps". No query feature was available on the VIMS website, so the URLs were followed until datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If available data was found under more than one URL, it was included in the spreadsheet under the URL where it was first identified. URLs with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular VIMS dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The VIMS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. There were no VIMS datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

Rosenstiel School of Marine and Atmospheric Science
http://www.rsmas.miami.edu

An evaluation of the University of Miami's (UM) Rosenstiel School of Marine and Atmospheric Science (RSMAS) website was conducted from 3/22/10 – 4/13/10 by Susan Colley Theodosiou and Leslie Duncan (Atkins). No query feature was available on the RSMAS website, so the web links were followed in search of data. From the RSMAS Home page, tabs at the top of the web page were assessed, starting with "About RSMAS" and proceeding to the right to "Resources". Some of the home page tabs were not searched exhaustively since their purpose was informational or public relations oriented (e.g., the "Students" tab). Internal links within these

tabs were visited, documented in an Excel® spreadsheet, and subsequently evaluated for relevance to the ESID project. URLs with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular RSMAS dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The RSMAS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – No high priority datasets were identified on the RSMAS website.

Priority 2 (P2) Datasets – Those datasets that contain relevant water quality data (e.g., dissolved oxygen, transmissivity, fluorescence, plankton counts, etc.).

PROTOCOL FOR DATASET EVALUATION

Woods Hole Oceanographic Institution (WHOI) Data Center
http://www.whoi.edu/page.do?pid=7140

An evaluation of the Woods Hole Oceanographic Institution (WHOI) Data Center website was conducted on 6/28/10 - 6/29/10 by Amy Dalton (Atkins). The information links on this website are listed down the center of the page and across the top of the web page under the tab for "Research". The sub-tabs located under "Research" were searched; however, no data were available. Thus, these sub-tabs were not documented on the spreadsheet. The "Additional Resources" tab on the left of the page was documented in a separate search and has its own tracking spreadsheet (015 - WHOI Additional Resources).

The web links found on the WHOI Data Center page were evaluated to determine whether data were readily available. If data appeared to be readily available, web links were followed until applicable datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If data did not appear to be readily available, the web link was typically not evaluated further but was documented in the spreadsheet. If available data were found under more than one web link, the data were included in the spreadsheet only under the web link where it was first identified. Web links with access to publications were noted in the Excel® spreadsheet.

The third web link on the web page, Biological and Chemical Oceanography Data Management Office (BCO-DMO), contains marine biogeochemical and ecological data. The list of BCO-

DMO datasets was assessed for relevance to the ESID project (http://osprey.bcodmo.org/dataset.cfm). Only those datasets potentially within the ESID project area were included in the Excel® spreadsheet and were subsequently evaluated.

Threshold Criteria and Prioritization
To determine whether a particular WHOI Data Center dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The WHOI Data Center datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: The following datasets were assigned a P0:
Datasets that do not meet either one of the ESID Threshold Criteria.
Datasets solely containing fisheries landings/catch data (no additional ecological or biological data).
Meteorological and physical oceanography data (i.e., air temperature, sea surface temperature, salinity, wind speed).
Bacterial abundance, biomass, and productivity data.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – The following datasets were assigned a P1:
Zooplankton data and species lists from Georges Bank
Lobster distribution data from Maine to Canada
Abundance, size, and fecundity of *Salpa aspera* in the slope waters off northeastern USA
Video plankton recorder data
Surficial sediment data collected in the Western North Atlantic and worldwide
A category of "P1M" was assigned to metadata identified as relevant to the ESID

Priority 2 (P2) Datasets – The following datasets were assigned a P2:
Fisheries-dependent catch data with additional biological data (e.g., fish size, age, health)
Water quality and nutrient data without a biological component
Algal data (e.g., chlorophyll, phaeopigment, photosynthetically active radiation (PAR) data)
Sampling data for sediments, pore water, and bottom water – samples used for culturing studies of benthic foraminifera

PROTOCOL FOR DATASET EVALUATION

NOAA National Geophysical Data Center
http://www.ngdc.noaa.gov/

An evaluation of the National Oceanic and Atmospheric Administration National Geophysical Data Center (NGDC) website was conducted on 3/24/10 – 5/18/10 by Cheryl Wapnick (Atkins) and Beth Zimmer (Atkins). No query feature was available on the NGDC website, so the web links were followed until datasets were located. The information on this website is organized

into six primary web links titled "Marine Geology and Geophysics" , "Bathymetry and Global Relief", "Space Weather and Solar Events", "Earth Observations from Space", "Geomagnetic Data and Models", and "Natural Hazards". Secondary web links entitled "Marine Geophysics", "Marine Geology", and "Ocean Depths" were all found under the primary web link titled "Marine Geology and Geophysics". The resulting web links and datasets were documented in an Excel® spreadsheet and subsequently evaluated for relevance to the ESID project. Web links with access to publications were noted in the Microsoft® Excel® spreadsheet. In addition, all NGDC publications are available at the following website:
http://www.ngdc.noaa.gov/nndc/struts/results?op_1=eq&v_1=PUB&t=102759&s=15&d=10,15,11

Threshold Criteria and Prioritization
To determine whether a particular NGDC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NGDC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESI**D** Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also assigned a P0:
Data from deep coring projects, including studies of plate tectonics, earth's crustal structure and composition, conditions in ancient oceans, and paleoclimatology.
Paleoclimatological data, which is not useful for current conditions.
C-14 dating data, which is not useful for current conditions.
Igneous rock data, which is not representative of seafloor environmental conditions for the outer continental shelf (OCS).

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – datasets containing surficial sediment data, including descriptive, grain size, and texture data, as well as sediment samples with contamination data.

Priority 2 (P2) Datasets – The following datasets were assigned P2:
Datasets with only minor quantities of surficial sediment data.
Datasets with data for ferromanganese nodules only.
Dataset containing total sediment thickness data which is not of primary importance for data depicting current conditions.

PROTOCOL FOR DATASET EVALUATION

NOAA Coastal Services Center Digital Coast
http://www.csc.noaa.gov/digitalcoast/data/index.html
http://www.csc.noaa.gov/digitalcoast/tools/index.html

An evaluation of the National Oceanographic and Atmospheric Administration's (NOAA) Coastal Services Center (CSC) Digital Coast website (http://www.csc.noaa.gov/digitalcoast/index.html) was conducted from 2/2/10 – 3/15/10 by Leslie Duncan (Atkins) and Beth Zimmer (Atkins). The available data on this website is organized into two main URLs titled "Data" and "Tools". No query feature was available on the CSC Digital Coast website, so the URLs were followed until datasets were located. The resulting datasets/webtools were documented in an Excel® spreadsheet and subsequently evaluated. URLs with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular CSC digital coast dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The CSC digital coast datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets –The dataset on the CSC Digital Coast website that was identified as P1 (Multipurpose Marine Cadastre) contains geological and seafloor data (i.e., sediment type), as well as benthic habitat data.

Priority 2 (P2) Datasets – The dataset on the CSC Digital Coast website that was identified as P2 (Cumulative Impacts Model) contains ecosystem habitat layers; however, the focus of the dataset is on global-scale mapping and anthropogenic impacts based on modeling data.

PROTOCOL FOR DATASET EVALUATION

usSEABED
http://walrus.wr.usgs.gov/usseabed/

An evaluation of the U.S. Geological Survey (USGS) usSEABED website (http://walrus.wr.usgs.gov/usseabed/) was conducted from 3/31/10 – 5/10/10 by Susan Colley Theodosiou (Atkins) and Leslie Duncan (Atkins). No query feature was available on the usSEABED website; thus, the URLs were followed until datasets were located. From the usSEABED home page, available URLs were followed from the sidebar located on the right side of webpage. Each URL was and assessed for relevancy to the ESID project and documented in an Excel® spreadsheet with a description of any available data or information. URLs with access to publications were noted in the Excel® spreadsheet.

While searching the usSEABED website, an external URL was located - the USGS Coastal & Marine Geology InfoBank (CMG InfoBank; http://walrus.wr.usgs.gov/infobank/). The CMG

InfoBank website contains information for many USGS projects conducted within the ESID study area. Applicable projects were located by accessing the "Field Work - Past" section of the CMG InfoBank website, which resulted in a large list of project metadata links and location information. Only those links that appeared to be within the project area were assessed for relevancy to the ESID project and were documented in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, the project description provided in the metadata files was first evaluated to determine whether it met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

Not Eligible: Datasets that met the following criteria were given a Priority 0 (P0) because they are not relevant to the ESID project:
Datasets that did not meet either one of the ESID Datasets that contain only meteorology or physical oceanography data (e.g., currents, waves, temperature, salinity, conductivity, etc.)
Interactive mapping servers or viewers of data (the datasets populating each interactive server/viewer was individually evaluated within the Excel® spreadsheet)
Physical catalogs of sediment samples (i.e., sample type, sample coordinates, water depth, core length, information about sample archival)
Deep (stratigraphic) sediment core samples, which are not useful for current conditions.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – The following datasets were assigned P1:
Datasets containing surficial sediment data (e.g., description, grain size, texture, and contaminant data)
A category of "P1M" was assigned to metadata identified as relevant to the ESID. This includes:
Google KMZ and KML files with navigation data and sampling locations
Relevant ecological data collected partially or completely within the ESID study area, including:
otter trawl and bottom dredge samples
benthic invertebrate samples
benthic habitat and fish productivity data
geological and biological samples
character/distribution of fisheries habitats and quantification of trawling/dredging on epibenthic megafauna in fished/un-fished areas
sediment samples used for studies of benthic infauna, microbiology, heavy metal and organic geochemistry
abundance and distribution of juvenile cod and haddock in relation to bottom sediment type
sediment distribution and bottom morphology
lobster abundance data
transect survey data (i.e., megafauna data and their habitats and faunal and substrate samples for contaminants including hydrocarbons, trace metals, and PCBs)
Water quality datasets that include biological data (e.g., zooplankton and herring larvae).

Priority 2 (P2) Datasets – The following datasets were assigned P2:
Maps of core and grab sampling locations, which contain links to technical documents presenting the sampling results
Water quality data with suspended matter/sediment concentrations
Mostly geophysical data that contains some geological components (i.e., vibrating core and grab samples)
Sediment grab sample data - heavy mineral delineation
A category of "P2M" was assigned to metadata identified as relevant to the ESID.
Google KMZ and KML files with navigation data and sampling locations
Sediment stratigraphy data
Sediment data with mineral deposit data

PROTOCOL FOR DATASET EVALUATION

National Undersea Research Program (NURP) Library
http://www.nurp.noaa.gov/Library.htm

An evaluation of the National Undersea Research Program (NURP) Library website as conducted on 8/24/10 by Beth Zimmer (Atkins). This webpage contains web links leading to data and publications associated with the NURP. Each of the web links were explored and primary hyperlinks that contained related sub-hyperlinks were evaluated to determine if data were readily available. If data appeared to be readily available, hyperlinks were followed until the datasets were located. If data did not appear to be readily available, the hyperlink was typically not evaluated further. Each web link was assessed for relevancy to the ESID project and documented in an Excel® spreadsheet with a description of any available data or information. URLs with access to publications were noted in the Excel® spreadsheet.

The NURP Library web page contained web links under five major headings: "Data Products", "Multimedia", "Publications", "Documents" and "Links to Other Oceanographic Websites". The web link available under "Data Products" is the *NURP Research Explorer*. This link was not working. Attempts to contact the webmaster for the page did not result in any responses.

Threshold Criteria and Prioritization
To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NURP Library datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.
Priority 1 (P1) Datasets – No datasets were assigned a P1.

Priority 2 (P2) Datasets – Sediment core sampling data from deep-sea drilling projects.

PROTOCOL FOR DATASET EVALUATION

National Undersea Research Center North Atlantic and Great Lakes (NURC-NAGL) Research Explorer
http://www.nurc.uconn.edu/research/mis/rexplorer.asp

An evaluation of the National Undersea Research Center North Atlantic and Great Lakes (NURC-NAGL) Research Explorer website was conducted on 8/5/10 by Leslie Duncan (Atkins). Available data and technical information was accessed by using the query feature on the main web page. The search for data was conducted by using the "*Environments*" Keyword search. Only those Environment categories potentially within the ESID project area were selected, including *Mid-water/Pelagic, Rise/Abyss Hydrothermal Vents, Rise/Abyss Seamounts, Shelf – Coral Reef, Shelf – Ecological Reserves and Sanctuaries, Shelf – Hard Substrate, Shelf – Rocky Cobble/ Reef, Shelf – Soft Substrate*, and Slope – *Submarine Canyons*. All query results were assessed, documented in an Excel® spreadsheet, and subsequently evaluated for relevance to the ESID project. Web links with access to publications were noted in the Excel® spreadsheet.

In addition, other web links within the NURC Research Program website were searched briefly for data. No data was located during this additional search.

Threshold Criteria and Prioritization
To determine whether a particular NURC-NAGL dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NURC-NAGL datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID and were categorized as Priority 1 (P1) or Priority 2 (P2).
Priority 1 (P1): The following datasets were assigned a P1:
A category of "P1M" was assigned to web links with metadata associated with the following projects or topics:
Deep-sea coral communities
Shallow and deep-water octocoral communities
Microbe-coral interaction studies
Habitat distribution and community composition
Benthic habitats and fish usage/movements
Characterizations of the physical, chemical, and biological environments

Biodiversity studies
Habitat suitability model that can be used to predict where deep-water corals may be abundant

Priority 2 (P2): No datasets were assigned a P2.

PROTOCOL FOR DATASET EVALUATION

Woods Hole Oceanographic Institution (WHOI) Additional Resources
http://www.whoi.edu/page.do?pid=11535

An evaluation of the Woods Hole Oceanographic Institution (WHOI) Additional Resources website was conducted on 6/30/10 - 7/06/10 by Amy Dalton (Atkins). The information links on this website are listed down the center of the page. The "Data Center" tab on the left of the page was documented in a separate search and has its own tracking spreadsheet (009 - WHOI Data Center).

The web links found on the WHOI Additional Resources page were evaluated to determine whether data were readily available. If data appeared to be readily available, web links were followed until applicable datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If data did not appear to be readily available, the web link was typically not evaluated further but was documented in the spreadsheet. If available data were found under more than one web link, the data were included in the spreadsheet only under the web link where it was first identified.

Threshold Criteria and Prioritization
To determine whether a particular WHOI Additional Resources dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The WHOI Additional Resources datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following dataset was also assigned a P0:
Geochemical data of ocean floor igneous and metamorphic rocks including major oxides, trace elements, stable and radiogenic isotope ratios, and analytical ages.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. This search revealed no datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

NOAA New England Fishery Management Council (NEFMC)
http://www.nefmc.org/

An evaluation of the National Oceanic Atmospheric Administration New England Fishery Management Council (NEFMC) website was conducted on 3/26/10 – 4/14/10 by Cheryl Wapnick (Atkins). The technical information links on this website are listed down the left side of the webpage. No query feature was available on the NEFMC website, so the URLs were followed until datasets were located. All web links were documented in an Excel® spreadsheet with a description of available data or information. The resulting datasets and web links were then evaluated for relevance to the ESID project. If available datasets were found under more than one web link, they are included in the Excel® spreadsheet only under the web link where they were first identified. Web links with access to publications were noted in the Excel® spreadsheet.

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. Links obviously leading to websites that do not contain data (e.g., meeting summaries and agendas, stakeholder letters, public hearings, press releases, scoping hearings) were not searched exhaustively since their purpose was informational or public relations oriented.

In many cases, the NEFMC website did not provide a direct link to a specific web link. In these instances, the new information was available under the previous web address. This is indicated in the spreadsheet.

Threshold Criteria and Prioritization
To determine whether a particular NEFMC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
Location – the dataset applies, or may apply, to the ESID study area

The NEFMC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also considered P0:
Datasets solely containing fisheries landings/catch data (no ecological or biological data).
Results of tagging surgery on monkfish (including mortality data).

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

Priority 1 (P1) Datasets – The following datasets were also considered P1:
Lobster larvae data including distribution, stage composition and abundance of lobster larvae and post-larvae.

Environmental contaminant data (e.g., metals, PCBs, and pesticides).
Zooplankton species abundance data.

Priority 2 (P2) Datasets – The following datasets were considered P2:
Location information for human-designated management areas (MPAs, EFH, critical habitat) with no ecological data.
Spatially explicit tag/recapture datasets.
Fisheries dependent catch data with some biological data (e.g., size, age, health of fish).

PROTOCOL FOR DATASET EVALUATION

NOAA Mid-Atlantic Fishery Management Council (MAFMC)
http://www.mafmc.org/

An evaluation of the National Oceanic Atmospheric Administration Mid-Atlantic Fishery Management Council (MAFMC) website was conducted on 5/6/10 – 5/11/10 by Mark Henry (Atkins). No query feature was available on the MAFMC website, so the web links were followed until datasets were located. The search originated with the web links located within the main website text, proceeded to the technical information links located on the left side of the web page, and terminated with the links located on the right side of the web page. All web links were documented in an Excel® spreadsheet with a description of available data or information. The resulting datasets and web links were then evaluated for relevance to the ESID project. If available datasets were found under more than one web link, they were included in the Excel® spreadsheet only under the web link where they were first identified. Web links with access to publications were noted in the Microsoft® Excel® spreadsheet.

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, these web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. Links obviously leading to websites that did not contain data (e.g., meeting summaries and agendas, stakeholder letters, public hearings, press releases, scoping hearings) were not searched exhaustively since their purpose was informational or public relations oriented.

In many cases, the MAFMC website did not provide a direct link to a specific web page. In these instances, the new information was available under the previous web address. This is indicated in the spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular MAFMC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The MAFMC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also considered P0:

- Datasets solely containing fisheries landings/catch data (no ecological or biological data).

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – No P1 datasets were found on the MAFMC website.

- Priority 2 (P2) Datasets – The following datasets were assigned P2:
  - Status of fishery resources off the northeastern United States - Status data, including distribution data, biology, management, fishery data, research vessel survey indices, and assessment results.
  - Species distribution maps

PROTOCOL FOR DATASET EVALUATION

NMFS Fishery Management Councils - South Atlantic Fishery Management Council (SAFMC)
http://www.safmc.net/

An evaluation of the National Marine Fisheries Service (NMFS) South Atlantic Fishery Management Council (SAFMC) website was conducted on 5/06/10 – 5/12/10 by Amit L. Hazra (Atkins). The website evaluation was broken into sections based on the HTML frames concept. The *top frame* includes all of the tabs which link to other sub-sites within the SAFMC website. Technical information potentially useful to the ESID was only available under some of the tabs and those pages are outlined in the Excel® spreadsheet. The *Home*, *About Us*, *News*, and *Meetings* tabs were briefly scanned for data and/or pertinent publication information but not recorded on the Excel® spreadsheet due to lack of any useful information or data products. The *Library, Habitat/Ecosystem, Fish ID and Regs, Links,* and *Socio-Economic* tabs were all thoroughly reviewed. Additionally, the *left frame* contains a *Quick Links* pane where access to technical information can also be accessed. All of these links were reviewed and summarized in the Excel® Spreadsheet. The *Right frame* dynamically changes based on the website topic. When related site information links were offered, each link was explored as an external website and was noted as such in the tracking spreadsheet.

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the web link was typically not evaluated further. Reiterating from the above, links obviously leading to websites that do not contain data (e.g., meeting summaries and agendas, stakeholder letters, public hearings, press releases, scoping hearings) were not searched exhaustively since their purpose was informational or public relations oriented.

The website contains a generalized *Search* tool but there are no specific query data abilities connected to the tool. It is important to note that this website actually contains another website within it. The Ecosystem-Based Management website is a sub-site containing its own top frame tabs and web pages. When a user clicks on the *Habitat/Ecosystem* tab from the homepage website, the top frame tabs dynamically change to a new set of topics. This entire sub-website's top frame tabs were also reviewed in the Excel® spreadsheet. It is also important to mention that only unique pages were recorded Excel® tracker. If available datasets were found under more than one web link, they were included in the Excel® spreadsheet only under the web link where they were first identified. Web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular SAFMC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The SAFMC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also considered P0:

- Datasets solely containing fisheries landings data (no ecological or biological data).

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – No P1 datasets were found on the SAFMC website.

- Priority 2 (P2) Datasets – The following datasets were assigned P2:
  - Only location information for human-designated management areas (MPAs, EFH, critical habitat) with no ecological data.
  - Fisheries dependent catch data with some biological data (e.g., size, age, health of fish).
  - Recapture maps for tagged species.

PROTOCOL FOR DATASET EVALUATION

Florida Fish and Wildlife Conservation Commission (FWC) GIS Data
http://ocean.floridamarine.org/efh_coral/ims/Description_Layers.htm

An evaluation of the Florida Fish and Wildlife Conservation Commission (FWC) GIS Data website was conducted from 5/11/10 - 6/3/10 by Tamara Mayer (Atkins). The available data on this website are grouped as topics, which include Base Map Description Layers, Ocean Observing Systems, Other Federally Managed Areas, Management and Regulatory, SAFMC

Gear Restrictions, SAFMC Essential Fish Habitat, Marine Sanctuaries, Unique Habitats, Coral HAPCs, SEAMAP Bottom Mapping, General Habitats, Estuaries, and Imagery. In addition, two website home pages were reviewed: the Fish and Wildlife Research Institute (http://research.myfwc.com/) and NOAA's Office of Coast Survey (http://www.nauticalcharts.noaa. gov/). Because the websites did not include a query feature, the web links were followed until datasets were located or the website was determined to not be applicable to the ESID project. Web links with applicable information or data to the ESID were documented in an Excel® spreadsheet. Those web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular FWC dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The FWC datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also assigned a P0:

- Data already held by MMS, including delineation of sand borrow areas offshore of North Carolina.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – The following datasets were assigned P1:
  - GIS benthic habitat data for Gray's Reef National Marine Sanctuary, locations off the east coast of Florida (including Oculina Bank), and the eastern U.S. continental shelf from the VA/NC border south to Jupiter Inlet in FL.

- Priority 2 (P2) Datasets – The following datasets were assigned P2:
  - Benthic GIS data layers. Note that the only layer applicable to the ESID project is the coral-hardbottom dataset. This dataset was assigned a P2 because it was generic and lacking in detail.
  - Datasets containing fisheries landings/catch data with life history information on priority fishery species.
  - A category of "P2M" was assigned to metadata identified as relevant to the ESID. (i.e., water quality metadata with nutrient concentrations or chlorophyll/phytoplankton biomass).

PROTOCOL FOR DATASET EVALUATION

USGS Coastal and Marine Geology Program
http://coastalmap.marine.usgs.gov/

An evaluation of U.S. Geological Survey's Coastal and Marine Geology Program (CMGP) website was conducted on 5/18/2010 – 5/24/2010 by Amit L. Hazra (Atkins). No query feature was available on the CMGP website, so the URLs were followed until datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. Primary hyperlinks that contained related sub-hyperlinks were evaluated to determine if data were readily available. If data appeared to be readily available, hyperlinks were followed until the datasets were located. If data did not appear to be readily available, the hyperlink was typically not evaluated further. Links obviously leading to websites that do not contain data (e.g., publications and bibliographies, calendars, About Us, press releases etc.) were not searched exhaustively since they typically never yielded relevant data. URLs with access to publications were noted in the Excel® spreadsheet.

When related site information links were offered, each link was explored as an external website. Only links to websites that fall within the ESID study area were documented. It is important to note that this web portal has links (with data) to many regions of the country should the need arise to extend the search location criteria. As with other searches, in an effort to efficiently lead the spreadsheet user to the correct location(s) on a webpage, the website is referenced by frames (top, bottom, left, right). The links at the top frame go to the exact same web pages as those on the left frame.

Portions of the CMGP website were reviewed in a separate tracking spreadsheet (012 usSEABED): the "Coastal and Marine Geology Program Internet Map Server", the "Coastal and Marine Geology Program" page, and the CMGP Science Centers page.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The CMGP datasets were evaluated against the threshold criteria based on the description provided on the website.

Not Eligible: Datasets that met the following criteria were given a Priority 0 (P0) because they are not relevant to the ESID project:

- Datasets that did not meet either one of the ESID Threshold Criteria
- Interactive mapping servers or viewers of data (because the data populating each interactive server/viewer was individually evaluated within the Excel® spreadsheet)

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – The following datasets were assigned a P1:
  - GIS datasets containing sediment sampling collection information, as well as relationships to published materials, and storage locations.
  - Datasets collected at Stellwagen Bank National Marine Sanctuary, including fisheries abundance data, surficial sediment texture data, and copper and zinc concentration data in surficial sediments.
  - Sediment texture and contaminant data for Boston Harbor and Massachusetts Bay.

- Priority 2 (P2) Datasets – No datasets were assigned a P2.

PROTOCOL FOR DATASET EVALUATION

USGS Marine Realms Information Bank
http://mrib.usgs.gov/

An evaluation of the USGS Marine Realms Information Bank (MRIB) website (http://mrib.usgs.gov/) was conducted from 5/20/10 – 5/27/10 by Amy Dalton (Atkins). Because the query feature available on the MRIB website conducts a search of all available datasets, it was determined that the most efficient method for evaluating the website was to assess the datasets themselves for applicability to the ESID project. Thus, from the USGS MRIB Home Page, the "Category>Location>Atlantic Ocean>North Atlantic Ocean" was chosen. A total of 669 records were displayed as a result of this query. Of these results, only those links that may contain data within the study area were explored further. In addition, other links on the main MRIB Home Page (http://mrib.usgs.gov/) were perused for available datasets. From the MRIB Home Page, web links were followed and pertinent links were evaluated for relevancy to the project. URLs with access to publications were noted in the Excel spreadsheet; however, it is important to note that the MRIB site can also be queried for publications.

Threshold Criteria and Prioritization

To determine whether a particular MRIB dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The MRIB datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – Sediment texture and concentrations of contaminants and metals in sediments.

- Priority 2 (P2) Datasets – No P2 datasets were located on the MRIB website.

PROTOCOL FOR DATASET EVALUATION

Census of Marine Life's Ocean Biogeographic Information System (OBIS)
http://www.coml.org/projects/ocean-biogeographic-information-system-obis

An evaluation of the Census of Marine Life's Ocean Biogeographic Information System (OBIS) website, specifically (http://www.iobis.org/), was conducted on 5/10/10 - 5/18/10 by Amy Dalton (Atkins). The information links on the OBIS website are listed across the top of the webpage. The web links were followed until datasets were located. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If available data was found under more than one web link, it was included in the spreadsheet only under the web link where it was first identified. It is important to note that not all links present on the main Census for Marine Life website (i.e., those links located on the left side of the assigned website) were documented in the Excel® spreadsheet, only those that contained pertinent data (i.e., data applicable to resource categories and within the project area).

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. All links obviously leading to websites that do not contain data (e.g., books, press releases, films, etc.) were not evaluated further; however the existence of these links was described in the spreadsheet. Web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular OBIS dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The OBIS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – The following datasets were assigned a P1:
  - Relevant ecological data collected partially or completely within the study area.

- GIS shapefiles depicting habitat data for Stellwagen Bank National Marine Sanctuary, which is an ecologically important habitat within the study area.
- Water quality data (CTD, phytoplankton, nutrients) with biological components (zooplankton abundance).
- A category of "P1M" was assigned to metadata identified as relevant to the ESID. This includes:
  - Marine species population data (corresponding data presented in other rows of spreadsheet).
  - GIS shapefile data depicting habitat data for Stellwagen Bank National Marine Sanctuary (corresponding data presented in other row of spreadsheet).
  - Water quality data with biological components (corresponding data presented in other row of spreadsheet).

- Priority 2 (P2) Datasets – The following datasets were assigned a P2:
  - Distribution maps with geographical relevance but no other data (simply location of occurrence).
  - Water quality data with chlorophyll/phytoplankton biomass data.
  - Seafloor topography data of a very limited study area within the outer continental shelf (OCS). This was also assigned as baseline data ("B" within the spreadsheet).
  - A category of "P2M" was assigned to metadata identified as relevant to the ESID. This includes:
    - Juvenile lobster abundance and distribution data using tag/recapture techniques.
    - Datasets consisting largely of catch data with some length/weight data that could be applicable to ecological investigations.

PROTOCOL FOR DATASET EVALUATION

American Fisheries Society (AFS)
http://www.fisheries.org/afs/index.html

An evaluation of the American Fisheries Society (AFS) website was conducted on 5/24/2010 – 5/27/2010 by Amit L. Hazra (Atkins). Each major section of the website was thoroughly reviewed in order to locate any pertinent ESID datasets; however, none of the major sub-sections yielded any data. This website is the main portal by which the AFS promotes their policy, manages membership, and promotes education, certification, and jobs. Since this is not a data-centric website, only the main pages were documented in the Excel® tracker. When related site information links were offered, each link was explored as an external website. Primary hyperlinks that contained related sub-hyperlinks were evaluated to determine if data were readily available. If data appeared to be readily available, hyperlinks were followed until the datasets were located. If data did not appear to be readily available, the hyperlink was typically not evaluated further. Web links with access to publications were noted in the Excel® spreadsheet. Reiterating from above, links obviously leading to websites that do not contain data (e.g., meeting summaries and agendas, policy letters, public hearings, press releases, certification

instructions, etc.) were not searched exhaustively since their purpose was informational or public relations oriented.

Links to News Feeds and Twitter were not included in this search. The external links at the bottom of the webpage were also omitted from the search since they have no relevance to science or the ESID project. The website contains a custom Google Search tool to use for keyword searches.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The AFS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. This search revealed no datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

National Biological Information Infrastructure (NBII)
http://www.nbii.gov/

An evaluation of the National Biological Information Infrastructure (NBII) website was conducted on 8/6/10 by Leslie Duncan (Atkins). No query feature was available; thus, the site's web links were followed until datasets were located. From the NBII home page, the tabs along the top frame (i.e., *About NBII, Plants Animals and Other Organisms, Habitats, Ecological Topics, Geographic Perspectives,* and *Toolkit*) were thoroughly searched for data. Each web link was assessed for relevancy to the ESID project and documented in an Excel® spreadsheet with a description of any available data or information. Because technical information that is potentially relevant to the ESID was only available under some of these tabs, only those web pages are included in the Excel® spreadsheet. The *Plants Animals and Other Organisms, Ecological Topics, Geographic Perspectives* and *Toolkit* tabs were scanned for data and/or pertinent information but not recorded on the Excel® spreadsheet due to lack of any useful information or data products. In addition, the *Standards, Data and Tools,* and *Explore NBII's Information Regionally* portions of the web page were also thoroughly searched for data. No additional data potentially applicable to the ESID was located.

Primary web links that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further.

It is important to note that only unique pages were recorded in the Excel® tracker. If available datasets were found under more than one web link, they were included in the Excel® spreadsheet only under the web link where they were first identified. Web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular NBII dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The NBII datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID and were categorized as Priority 1 (P1) or Priority 2 (P2).

- Priority 1 (P1) Datasets – The following datasets were assigned a P1:
  - Zooplankton abundance and species data

- Priority 2 (P2): The following datasets were assigned a P2:
  - Mollusk occurrence tabulation data in the Atlantic Ocean

PROTOCOL FOR DATASET EVALUATION

Center for Coastal & Ocean Mapping Joint Hydrographic Center (CCOM)
http://ccom.unh.edu/

An evaluation of the University of New Hampshire's Center for Coastal & Ocean Mapping Joint Hydrographic Center (CCOM) website was conducted on 5/13/10 – 5/14/10 by Amit L. Hazra (Atkins). The CCOM website contains a generalized *Search* tool but there are no specific query data abilities connected to the tool; thus, the web links were followed in search of data. Technical information potentially useful to the ESID project was only available under some of the tabs on the CCOM website. Relevant pages were visited and web links were documented in an Excel® spreadsheet and subsequently evaluated for relevance to the ESID project. The *About Us*, *Education*, *Outreach*, and *Publications* tabs were briefly scanned for data and/or pertinent

publication information; however, these links were not recorded on the Excel® spreadsheet due to lack of useful information or data products. Primary hyperlinks that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, hyperlinks were followed until the datasets were located. If data did not appear to be readily available, the hyperlink was typically not evaluated further. Only unique pages are recorded in the Excel® spreadsheet. When a tab or sub-tab revealed a web link which was previously visited, the web link was not documented twice.

URLs with access to publications were noted in the Excel® spreadsheet. The *Publications* tab does contain a vast list of scientific peer-reviewed publications in reference format mostly related to seafloor mapping and remote sensing techniques. The link tree located on the *Left* frame was not reviewed because the links are all redundant to the tabs at the top frame. The search focused on the *Research* tab, where all of the sub-tabs were visited and documented in the Excel® spreadsheet. When related site information links were offered, each link was explored as an external website.

The homepage has a link to the Data Visualization Research Lab. This is an internal sub-site within the main CCOM website. It contains its own set of topics. The *People*, *Education*, and *Contact Us* were all briefly reviewed; however, no information pertinent to the ESID project was located. Therefore, the only documented topic in the spreadsheet within this sub-site is the *Projects* topic.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The CCOM datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

The only data found on the CCOM website consisted of bathymetry/backscatter data for the North Atlantic Ocean. These datasets were assigned a priority "B". All other data and web links were assigned a P0.

PROTOCOL FOR DATASET EVALUATION

NOAA Fisheries Geographic Information Systems – Data (NMFS GIS)
http://www.nmfs.noaa.gov/gis/data/index.htm

An evaluation of the NOAA Fisheries Geographic Information Systems – Data (NMFS GIS) website was conducted on 5/14/2010 – 5/18/2010 by Amit L. Hazra (Atkins). No query feature was available on the NMFS GIS website, so the URLs were followed until datasets were located. Since the website assigned in this evaluation was specific to the "Data" section of the larger NMFS GIS website, only links on this page were reviewed. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. None of the other tabs on the left frame of the website were searched. URLs with access to publications were noted in the Excel® spreadsheet.

The two main sections reviewed in this webpage were "Fisheries Data" and "External Data". Each topic in the "Fisheries Data" section was separated by geographic region. Although each section was independently reviewed and assessed for relevance, only geographic regions pertinent to the ESID project were in included in the project tracker Excel® spreadsheet. The External Data section provided links to web portals; however, a majority of the topics led to the same portal. In the Excel® spreadsheet, the web address column lists all the hyperlinks in series that share the same URL (e.g., Water Quality Data, Stream Flow Data, General Mapping data, Topography Data, are all linked to the same U.S. Geological Survey web address: http://www.usgs.gov/).

When related site information links were offered, each link was explored as an external website. Primary hyperlinks that contained related sub-hyperlinks were evaluated to determine whether data were readily available. If data appeared to be readily available, the hyperlinks were followed until the datasets were located. If data did not appear to be readily available, the hyperlink was typically not evaluated further. Links obviously leading to websites that do not contain data (e.g., meeting summaries and agendas, stakeholder letters, public hearings, press releases, scoping hearings) were not searched exhaustively since their purpose was informational or public relations oriented.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The NMFS GIS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – No datasets were assigned a P1.
- Priority 2 (P2) Datasets – Those following datasets were assigned a P2:
  - Location information for human-designated management areas (MPAs, EFH, critical habitat) with no additional ecological data.

PROTOCOL FOR DATASET EVALUATION

Global Ecosystems Database (GED)
http://www.ngdc.noaa.gov/ecosys/cdroms/ged_iia/go.htm#top

An evaluation of the National Oceanographic and Atmospheric Administration's Global Ecosystems Database (GED) website was conducted on 8/18/10 by Leslie Duncan (Atkins). Any datasets encountered during the website review were documented in an Excel® spreadsheet and subsequently evaluated. The information links on this website are listed across the top and bottom of the web page. The links on the top of the web page (i.e., *Getting Started*, *About the Project*, and *How to Cite*) were not documented in the Excel® spreadsheet because the tabs did not lead to data. Similarly, three of the four links located on the bottom of the web page (i.e., *User's Guide*, *Software*, and *Using GIS*) were not documented because they did not contain data. All sub-links under the *Datasets* link were documented in the Excel® spreadsheet and subsequently evaluated. Web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular Global Ecosystems Database website dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The GED datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. This search revealed no datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

Lamont-Doherty Earth Observatory (LDEO) Database & Repositories
http://www.ldeo.columbia.edu/research/databases-repositories

An evaluation of the Lamont-Doherty Earth Observatory (LDEO) Database & Repositories website was conducted on 5/27/2010 – 6/3/2010 by Amit L. Hazra (Atkins). This webpage is an aggregation of all of the research databases and data repositories related to the LDEO. For each listed database web portal, the internal research abstract page was documented and then the link to the external website was followed. Each link was explored as an external website. Primary hyperlinks that contained related sub-hyperlinks were evaluated to determine if data were readily available. If data appeared to be readily available, hyperlinks were followed until the datasets were located. If data did not appear to be readily available, the hyperlink was typically not evaluated further.

The top frame tabs on the webpage were not reviewed since the target webpage was specific to a sub-page of the greater LDEO website. The left frame tabs were scanned to ensure that all of the database and repository webpages on the LDEO website were reviewed.

Many of the database/repository websites were actually links to the exact same search tool (MARGINS Data Portal). In these cases, the tracker notes reference rows where the site or search tool had already been documented. Of particular interest for data mining, this website contains an external link to the MGDS: Virtual Ocean Application. Once the application is downloaded and installed, it gives the user the ability to download a majority of the data found in all of the external links documented in the Excel® tracker.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The LDEO Database and Repositories datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project. The following datasets were also assigned a P0:

- Data from deep coring projects, including studies of plate tectonics, earth's crustal structure and composition, conditions in ancient oceans, and paleoclimatology.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – No datasets were assigned a P1.

- Priority 2 (P2) Datasets – The following links were assigned a P2:
  - Global deep-sea sediment core sample data
  - Marine sediment geochemistry data

PROTOCOL FOR DATASET EVALUATION

Marine Sciences at University of North Carolina at Chapel Hill
http://marine.unc.edu/

An evaluation of the Marine Sciences at University of North Carolina Chapel Hill (UNCCH) website was conducted from 5/27/10 - 6/03/10 by Amy Dalton (Atkins). The information links on this website are listed across the top and down the left side of the web page. All web links on the target website were documented in an Excel® spreadsheet and subsequently evaluated. If available data was found under more than one web link, it was included in the spreadsheet only under the web link where it was first identified. Links to external websites were briefly explored for data. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further. URLs with access to publications were noted in the Microsoft® Excel® spreadsheet.

In addition to the general search described above, the word "data" was also entered into the web page's query ("search") feature. This query produced 32 results and each was evaluated and documented in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The UNCCH datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. There were no UNCCH datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

Baruch Institute for Marine and Coastal Sciences (BIMCS)
http://www.baruch.sc.edu/

An evaluation of the University of South Carolina's Baruch Institute for Marine and Coastal Sciences (BIMCS) website was conducted from 6/11/10 - 6/14/10 by Amy Dalton (Atkins). No

query feature was available on the BIMCS website, so the URLs were followed until datasets were located. The information links on this website are listed across the top and down the left side of the web page. The resulting datasets were documented in an Excel® spreadsheet and subsequently evaluated. If available data was found under more than one URL, it was included in the spreadsheet under the URL where it was first identified. URLs with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular Baruch Institute for Marine and Coastal Sciences dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The BIMCS datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. This search revealed no datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

Scripps Institution of Oceanography (SIO) Library
http://libraries.ucsd.edu/locations/sio/

An evaluation of the Scripps Institute of Oceanography (SIO) Library website was conducted from 6/04/10 to 6/11/10 by Amy Dalton (Atkins). The web links found on the SIO Library web page were evaluated to determine whether data were readily available. If data appeared to be readily available, web links were followed until applicable datasets were located. The resulting datasets were documented in a Microsoft® Excel® spreadsheet and subsequently evaluated. If data did not appear to be readily available, the web link was typically not evaluated further but was documented in the spreadsheet. If available data were found under more than one web link, the data were included in the spreadsheet only under the web link where it was first identified. Web links with access to publications were noted in the Excel® spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular SIO Library dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories

2) Location – the dataset applies, or may apply, to the ESID study area

The SIO Library datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – The following datasets were assigned a P1:
  - Distributional data of hexacorallians in the Atlantic Ocean.
  - GIS data showing the distribution of endangered/threatened species within the ESID project area.
  - Distribution and characterization of deep-sea coral and sponge ecosystems within the EEZ.
  - Ecological characterization of Stellwagen Bank National Marine Sanctuary.
  - Benthic mapping and benthic resource data for Gray's Reef National Marine Sanctuary.
  - GIS data and maps of anthropogenic impacts within ESID project area.
  - GIS data and maps showing the distribution of marine habitats within the ESID project area.

- Priority 2 (P2) Datasets – The following datasets were assigned a P2:
  - Location information for human-designated management areas (MPAs, EFH, critical habitat) with no additional ecological data.
  - Aquatic species distribution maps.

PROTOCOL FOR DATASET EVALUATION

SCRIPPS Institute of Oceanography - Key Databases for Oceanography & Earth Sciences (SIO Databases)
http://libraries.ucsd.edu/locations/sio/resources/key-databases-for-oceanography-earth-sciences.html

The SCRIPPS Institute of Oceanography's Key Databases for Oceanography & Earth Sciences (SIO Databases) website contains a list of databases that contain documents (e.g., abstracts, publications, books, reports, conference proceedings) and requires a user's login information. Because no datasets are available on this website, an Excel® spreadsheet was not developed.

PROTOCOL FOR DATASET EVALUATION

NOVA Southeastern University (NSU) Oceanographic Center
http://www.nova.edu/ocean/

An evaluation of the NOVA Southeastern University (NSU) Oceanographic Center website was conducted on 6/4/10 by Tamara Mayer (Atkins). This web site is primarily used for student

recruitment. The NSU website contains a generalized *Search* tool but there are no specific query data abilities connected to the tool; thus, the web links were followed in search of data. The resulting datasets were documented in a Microsoft® Excel® spreadsheet and subsequently evaluated. Technical information and data were available under two of the tabs (i.e., *Prospective Students* and *Faculty/Staff*) on the target web page. The *Current Students, Our Graduates*, and *About Us* tabs were briefly scanned for data and/or pertinent publication information but not recorded on the Excel® spreadsheet due to lack of any useful information or data products. Web links with access to publications were noted in the Excel® spreadsheet.

The *Associated Institutes* listed on the home page provided external links to the *National Coral Reef Institute* (NCRI), the *Guy Harvey Research Institute*, and *Broward County's Florida Sea Turtle Conservation Program*. These external websites provided information or data, but were not applicable to the ESID.

Threshold Criteria and Prioritization

To determine whether a particular NSU dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The NSU datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID. This search revealed no datasets that were identified as eligible for the ESID.

PROTOCOL FOR DATASET EVALUATION

National Oceanic and Atmospheric Administration
http://www.noaa.gov/

An evaluation of the National Oceanic and Atmospheric Administration (NOAA) websitewas conducted from 6/4/10 to 8/10/10 by Tamara Mayer and Amy Dalton (Atkins). Any datasets encountered during the website review were documented in a Microsoft® Excel® spreadsheet and subsequently evaluated. The information links on this website are listed down the left and right sides of the page and across the top. The information links on the top left of the webpage (i.e., *About NOAA, Contacts, Staff Directory*, and *Help*) were not documented because the tabs did not lead to data. The links within the section *NOAA Responds to the Deepwater Horizon BP Oil Spill* were also not documented on the Excel® spreadsheet because the information pertains to the Gulf of Mexico and is outside of the project area. Similarly, the tabs located on the left side of the webpage (i.e., *Active Weather Alerts, NOAA Organizations, Working with NOAA,*

Media & Constituents, NOAA in Your State, Budget Information, Emergency Information for NOAA Employees, NOAA Watch, Tropical Weather Updates, Gulf Response, and *Disaster Assistance*) and the news links (*NOAA News* and *NOAA Now*) were not documented because they either did not contain data or did not contain data applicable to the ESID. The eight tabs listed under the heading *Explore NOAA* were followed until datasets were located. If available data was found under more than one web link, it was included in the spreadsheet only under the web link where it was first identified.

Primary web links on the main webpage that contained related sub-links were evaluated to determine if data were readily available. If data appeared to be readily available, web links were followed until the datasets were located. If data did not appear to be readily available, the sub-link was typically not evaluated further but was documented in the spreadsheet.

Threshold Criteria and Prioritization

To determine whether a particular NOAA website dataset was relevant to the ESID project, it was first evaluated to determine whether the dataset met the two ESID Threshold Criteria:

1) Topic – the dataset applies, or may apply, to at least one of the ESID Resource Categories
2) Location – the dataset applies, or may apply, to the ESID study area

The NOAA datasets were evaluated against the threshold criteria based upon the description provided on the website.

Not Eligible: If a dataset did not meet either one of the ESID Threshold Criteria, then it was given a Priority 0 (P0) because the dataset is not relevant to the ESID project.

Eligible: Those datasets that met both threshold criteria were considered eligible for the ESID.

- Priority 1 (P1) Datasets – Those datasets that contain exotic/invasive species information within the study area.

- Priority 2 (P2) Datasets – Those datasets that only contain location information for human-designated management areas (MPAs, EFH, critical habitat) with no ecological data.

Appendix J

Example of Inter-library Loan Receipt

Xc: Kristen

LYRASIS

INVOICE

NUMBER
0581681-IN

ORDER NUMBER: 01OCLC20665327008824000
BILL TO CUSTOMER ID: 00 8824000

Lyrasis
1438 WEST PEACHTREE ST.NW / SUITE 200 / ATLANTA, GA 30309-2955
PHONE 404.892.0943 / TOLL FREE 800.999.8558 / FAX 404.892.7879

TO:
Continental Shelf Assoc Intml
8502 SW Kansas Avenue
Stuart, FL 34997

REMIT TO
LYRASIS
PO BOX 116179
ATLANTA, GA 30368-6179

Ship To:

FEIN: 23-1365979

DATE	CUSTOMER ORDER NO.	SYMBOL	PAYMENT DUE UPON RECEIPT. Late penalties will be applied at the rate of 1% per month.
3/31/2010		FLCSA	Please refer to invoice number when paying.

QUANTITY	DESCRIPTION		AMOUNT
	OCLC CHARGES FOR MARCH 2010		
16.00	CON6082	Internet Hourly Access and Support Fee	0.00
1.00	CON6082	Internet Hourly Access and Support Fee	0.00
4.00	CRC3715	Cataloging Bibliographic Record Export	0.00
1.00	CRC3715	Cataloging Bibliographic Record Export	0.00
1.00	FIX1002	Cataloging Subscription Online-Monthly	22.14
1.00	FIX4500	ILL Subscription-Monthly	66.26
1.00	FIX6600	Access Subscription-Monthly	19.34
1.00	IFM4570	ILL Fee Management Library-to-Library Debit	see attached detail 129.00
9.00	IFM4572	ILL Fee Management Administration Fee	0.00
4.00	ONT2500	Cataloging Set Holdings	0.00
1.00	ONT2500	Cataloging Set Holdings	0.00
2.00	OTC4561	ILL Lending Credit	0.89-
130.00	RSH6700	WorldCat Resource Sharing Search	0.00
70.00	RSH6701	WorldCat Resource Sharing Request	0.00
1.00	SBC0961	Cataloging Searches 0ver 12,000/month Credit	0.00

APR 19 2010

Vendor # 00 0990000
PO #
Batch #
Acct #

Page 1 of 2

ORIGINAL DOCUMENT

CONTINUED

LYRASIS

INVOICE

NUMBER
0581681-IN

Lyrasis
1438 WEST PEACHTREE ST.NW / SUITE 200 / ATLANTA, GA 30309-2955
PHONE 404.892.0943 / TOLL FREE 800.999.8558 / FAX 404.892.7879

ORDER NUMBER: 01OCLC20665327008824000
BILL TO CUSTOMER ID: 00 8824000 -

TO :
Continental Shelf Assoc Intml
8502 SW Kansas Avenue
Stuart, FL 34997

REMIT TO
LYRASIS
PO BOX 116179
ATLANTA, GA 30368-6179

Ship To:

FEIN: 23-1365979

DATE	CUSTOMER ORDER NO.	SYMBOL	PAYMENT DUE UPON RECEIPT. Late penalties will be applied at the rate of 1% per month.
3/31/2010		FLCSA	Please refer to invoice number when paying.

QUANTITY	DESCRIPTION		AMOUNT
10.00	SBL0131	Cataloging WorldCat Search	0.00
1.00	SBL0131	Cataloging WorldCat Search	0.00
		Sales Tax	0.00

Page 2 of 2

ORIGINAL DOCUMENT

BALANCE DUE 235.85

Appendix K

Example of Copyright Permission Letter

www.sebiologists.org

Patricia B. Cox, President
Tennessee Valley Authority

Donald H. Roush, President-Elect
University of North Alabama

Jennifer Davis, Vice President
Shorter College

Conley McMullen, Secretary
James Madison University

Tim Atkinson, Treasurer
Carolina Biological Supply Company

Terry D. Richardson, Membership Officer
University of North Alabama

Deborah Atkinson, Database Manager
University of North Carolina-Chapel Hill

John M. Herr, Archivist
University of South Carolina

James D. Caponetti, Print Editor
University of Tennessee

Ricky Fiorillo, News Editor
University of Louisiana at Monroe

Ashley Morris, Web Editor
University of South Alabama

Scott Jewell, Meetings Coordinator
A2Z Convention Services

Members-at-Large:

Ronald V. Dimock, Jr. (2011)
Wake Forest University
Randall L. Small (2011)
University of Tennessee, Knoxville
Joey Shaw (2012)
University of Tennessee, Chattanooga
George Cline (2012)
Jacksonville State University
Ashley Morris (2013)
University of South Alabama
James Costa (2013)
Highlands Biological Station

Cox, Patricia B [pbcox@tva.gov]
Tuesday, December 28, 2010 9:12 AM
Lindsey, Jodi B
McMullen, Conley - mcmullck; Tim.Atkinson@carolina.com; Roush, Donald H.
Request to use copyrighted article from SEB
Request from AMEC. Dec 2010.pdf

Follow up
Flagged

Green Category, Blue Category

28 December 2010

AMEC Earth and Environment
3800 Ezell Road, Suite 100
Nashville, TN 37211

Dear Ms Lindsey

In response to your request to include the following article published in Southeastern Biology: "Distribution of Reef Fishes on the Outer Continental Shelf of the Carolinas" within your EcoSpatial Information Database is hereby granted.

This compilation of data for the Atlantic region is an important undertaking by your organization and ASB is proud to assist your efforts.

If you have questions or future request, please don't hesitate to ask.

Sincerely

Patricia B. Cox

Patricia B. Cox PhD
President

Patricia B. Cox Ph.D--President, Association of Southeastern Biologists
Botanical Specialist/Tennessee Valley Authority
Biological Permitting and Compliance
400 West Summit Hill Dr.-WT 11C
Knoxville, TN 37902
Office: 865-632-3609
Fax: 865-632-4223
Cell: 865-661-1241

Appendix L

Preliminary Data List

INTRODUCTION

This report describes the content for the deliverable "Preliminary List of Data to be incorporated into the ESID" prepared under DOI/BOEM contract M09PC00047 for the EcoSpatial Information Database (ESID).

According to contract requirements Section F.4.E, the following are to be submitted twelve (12) months after contract award:

- The contractor shall prepare and submit a preliminary list of data to be incorporated into the ESID.

This list contains both printed and electronic references and all have bibliographic entries which are accessible through a Microsoft® Access® database (version 2002) included in this submittal. The ESID will also contain resource boundaries and metadata on both layer and feature level as described in deliverable F.4 ESID Design and Prototype Test Database provided to BOEM March 22, 2010 for all entries included in this list.

PRELIMINARY RESOURCE LIST

The preliminary list of data reflects all resources to be incorporated into the ESID and contains both resource documents (Literature/Printed References) and web pages (Electronic References). All resources for both groups have bibliographic entries and can be queried through the Microsoft® Access® database provided.

The following resource categories were used to search for resources (Literature/Printed References) to be included in the ESID:

- Geology
- Water Quality
- Pelagic Ecology
- Infauna/Meiofauna (Benthic Ecology)
- Demersal Fish (Benthic Ecology)
- Coral/Hardbottom (Benthic Ecology)
- Seagrass (Benthic Ecology)

Concurrently with the literature searches, dataset searches (Electronic References) were performed. The source of potential datasets is the Internet, which was searched for potential GIS and non-GIS data relevant to the ESID. The electronic references are not necessarily devoted to one resource category. Additional procedures were developed to document the dataset process, which was described in further detail in Quarterly Report provided to BOEM April 30, 2010.

Per conversations with BOEM it was decided to deliver the preliminary list in a Microsoft® Access® format for the ability to query data tables and create customized outputs. This deliverable includes this preliminary resource report and a Microsoft® Access® database (ESID_Preliminary_List.mdb).

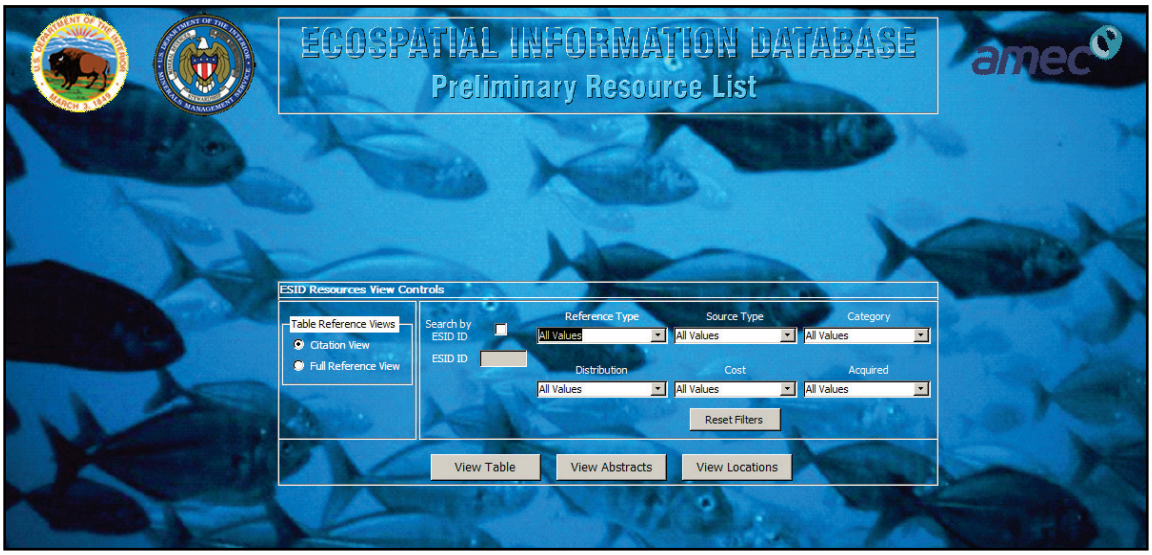


Figure 1. ESID_Preliminary_List.mdb.

The Microsoft® Access® database will open to a user form which will permit the user to view a tabular list of all resources to be included in the ESID. Also, the list can be filtered through the provided dropdown queries. The query will for example allow a list of resources to be created for the "Demersal Fish" category only.

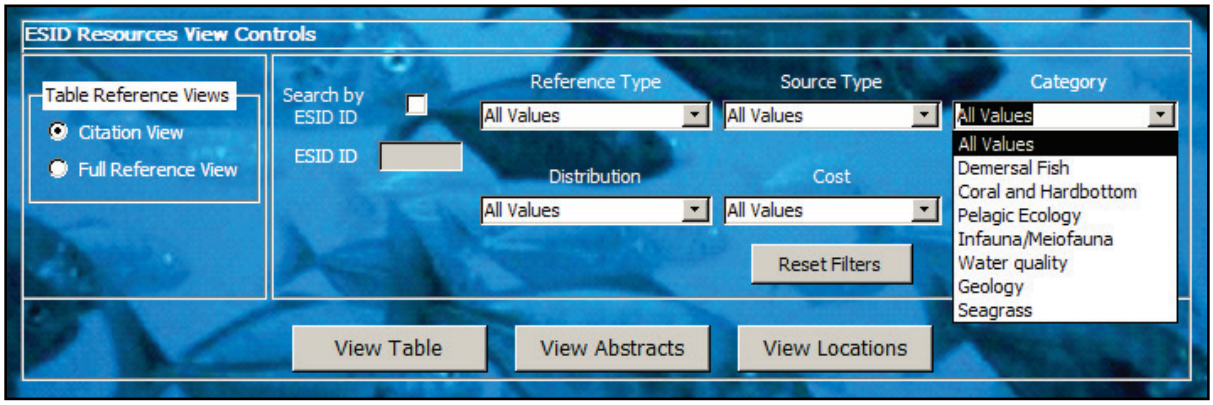


Figure 2. Query form for resource categories output.

The preliminary resource list can be filtered by "ESID" field, which is a unique identifier for resources in the database. Reports can be generated to view the Abstracts or the Locations (geographic characterization location description) in an easier to read format. Detailed documentation for using this form and querying the preliminary list of resources is attached as Appendix A.

STATISTICS

The Preliminary Resource List deliverable contains only resources that have been reviewed by the internal science review team (ISRT) and identified as priority 1. Each resource will have only one category; however it may have been reviewed by multiple ISRT members in other categories as well. If a resource was reviewed in multiple categories, the "Priority" field will show the additional categories along with the priority. Additionally, websites that were reviewed for relevance to the ESID were not assigned categories as they did not have the same search protocol as literature based searches. The table below outlines the total resources in the Preliminary Resource List by category (including websites).

Table 1.

Category summary table:

Category	Count
Geology	776
Water Quality	480
Pelagic Ecology	693
Infauna/Meiofauna (Benthic Ecology)	432
Demersal Fish (Benthic Ecology)	461
Coral/Hardbottom (Benthic Ecology)	90
Seagrass (Benthic Ecology)	1
Websites	394
Total Resources	**3327**

The ESID contains three levels of distribution; copyright restricted, open access, and online. Copyright restricted means the resource contain a restriction on the amount of users who can view the document. Open access permits a larger group to view the document; however copyright may still be a factor in distribution. Online refers to resources that are accessible online and are not restricted by copyright for viewing.

Table 2.

Distribution summary table:

Distribution	Count
Copyright Restricted	2140
Open Access	435
Online	392
Not Yet Acquired	360

While the preliminary resource table contains all priority 1 resources to be included in the ESID, not all of the resources have been acquired at the time of this deliverable. The distribution status of un-acquired documents can't be determined. Currently 8 of the 3327 priority 1 resources are unable to be acquired for various reasons.

HELP DOCUMENTATION

The ESID Preliminary Resource List Microsoft® Access® Form can show, filter, and generate reports for the preliminary ESID resources.

CONTROLS

The form controls are split into 4 groups, **View, Search, Filter**, and **Show**.

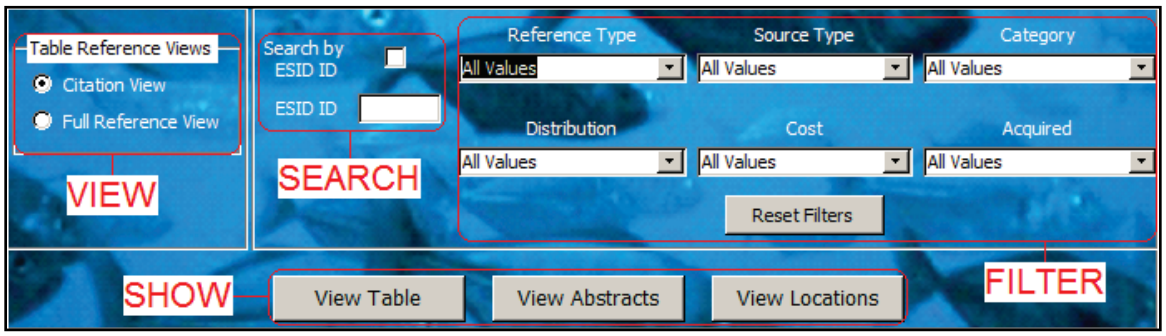


Figure 1. Preliminary resource list form.

The **View** control is a two state option group. The two choices, Citation View and Full Reference View, are mutually exclusive. When "Citation View" is selected (radio button with a black dot inside), the data shown in table view will be an abbreviated version showing minimal fields. When "Full Reference View" is selected, the entire table will be shown with all fields available. The selected view will be applied to both "Search" and "Filter" results. A list of fields included in the annotated bibliography and the corresponding descriptions is included at the end of this document for reference.

The **Search** control consists of a check box used to activate the control and a text box used to enter in the unique ESID ID value. When "Search by ESID ID" is checked, it overrides all controls in the "Filter" control. When it is not checked, the Search control is disabled and the filters are enabled. When the Search control is enabled, the user can enter a specific ESID ID into the search text box. The results of the search will show only the specified resource, the data can be viewed by clicking any of the three buttons in the "Show" control. This will only return the one row of data that corresponds to the specific ESID ID value.

The **Filter** control will filter results by the selected "Filter" control values. Multiple filters can be used at once to further refine the result. Select a value in one or more filters and click any of the three buttons in the "Show" control. This will result with data containing all of the values selected. To reset all of the filters back to "All Values" (the default selection) click the "Reset Filters" button located under the filter options.

The available filter options are listed below:

- The "Reference Type" filter includes all of the types of resources (i.e. journal or conference proceeding).
- The "Source Type" filter includes all of the formats of resources (i.e. print or electronic).
- The "Category" filter includes all ISRT search categories.
- The "Distribution" filter includes all copyright categories.
- The "Cost" filter returns resources with cost information or blank.
- The "Acquired" filter returns resources that have been acquired or not.

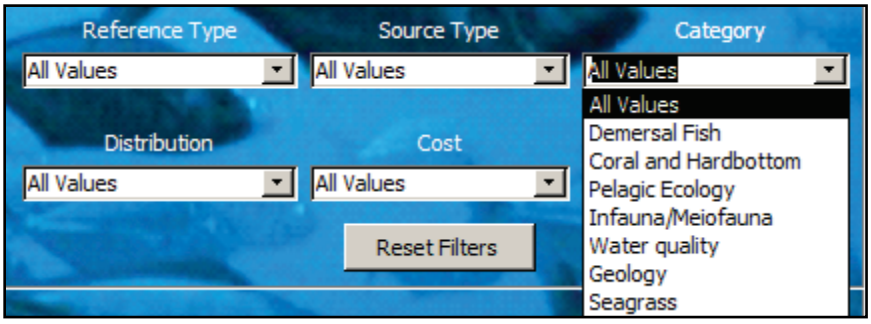


Figure 2. Filter reset button.

The **Show** control consists of 3 buttons to activate table and report views of the resource list. The "View Table" button shows an Access® table that fits the criteria in the "Search" or "Filter" controls. It will show "Citation View" or "Full Reference View" of the table, depending on the selected value in the View control.

The "View Abstract" and "View Locations" buttons show similar reports. The reports differ in that one shows the full "Abstract" value of results and the other shows the "Location" value of results. The data that is displayed in the "Abstract" and "Location" reports is not affected by the View controls. The "Search" and "Filter" controls will control which values are returned in the reports.

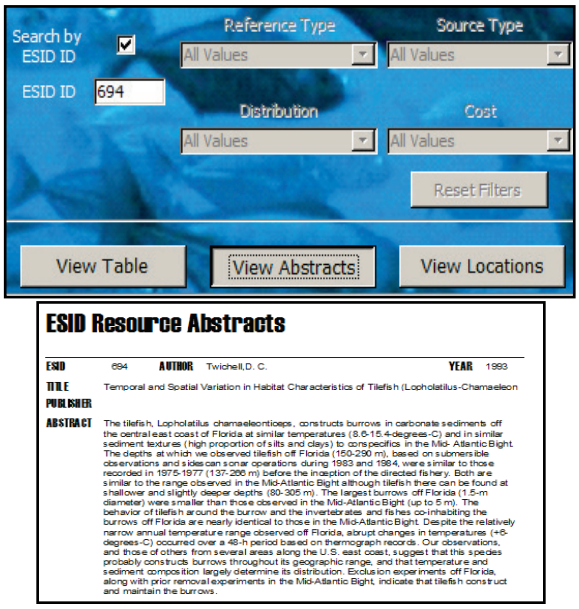


Figure 3. View abstract filter and report.

PRINTING AND EXPORTING

Microsoft® Access® provides functionality to print or export tables and reports. To print a table or report, click the print button at the top left of the Access® toolbar or click on the File menu and choose "Print". The Windows® print dialogue will appear. Choose the printer or file location and format and click the OK button to begin printing.

To export a table or report into another format, select the File menu option at the top left of the Access® main menu. Choose "Export". The Access® export dialogue will appear. Select the format in which to export and the correct file path. Click the Export button to export.

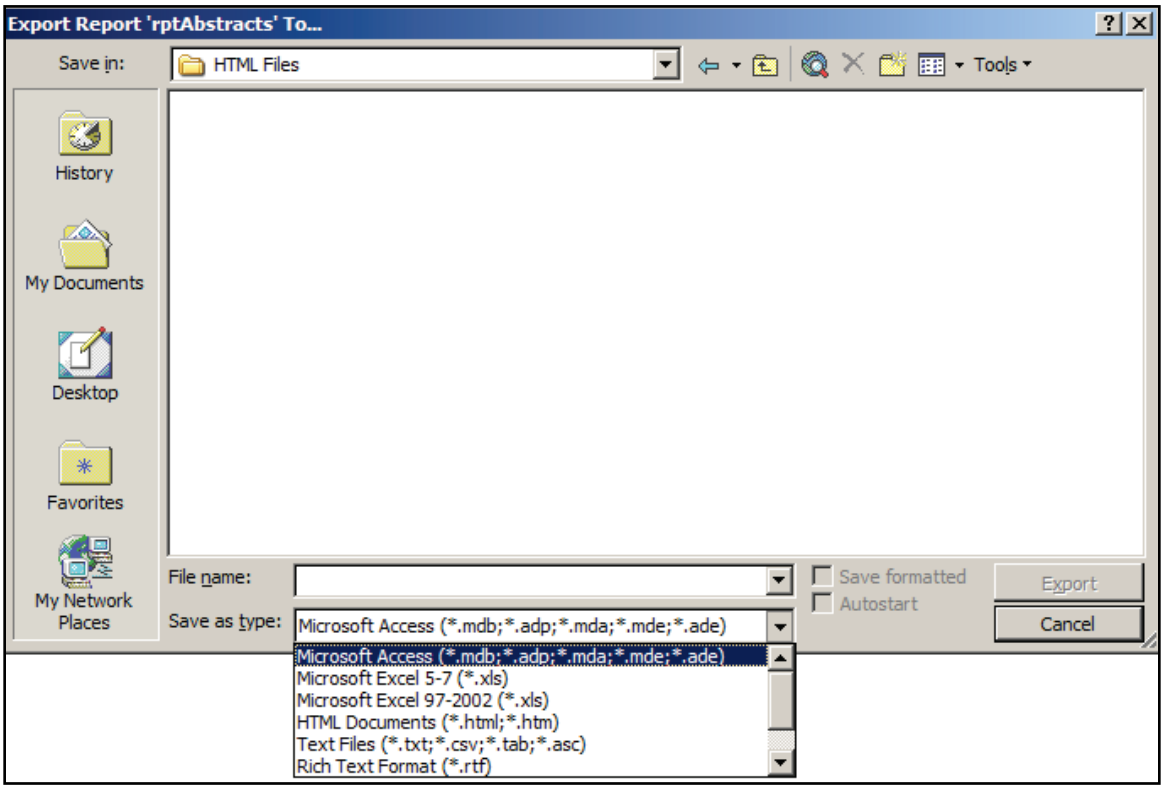


Figure 1. View export option in File menu.

The table below shows all fields included in the "Resources" table within the Access® database. Also included is the description for each field. This table is the preliminary resource list and is basis for queries made.

Table 1.

Database Field Descriptions

Database Field	Description
ESID	Unique ID for the resource.
Year	Year resource was produced.
Author	Resource author name.
Title	Title of resource.
Abstract	Abstract of publication.
Descriptor	Keywords found within the resource.
Notes	Additional information about the resource.
Reference Type	Type of resource (i.e. journal or conference proceeding).
Source Type	Format of resource (i.e. hard copy or electronic).
Periodical Full	Full description of source periodical.
Periodical Short	Short description of source periodical.
Conference Date	Date of conference if applicable.
Volume	Volume of document.
Issue	Issue of document.
Start Page	Starting page of resource within publication.
ISSN-ISBN	Unique identifier for periodicals.
Author Address	Author contact information.
Accession Number	Sequential number given to new publications.
DOI	Digital Object identifier: unique document identifier.
Language	Language document was written in.
Subfile	Additional associated files.
Output Language	Current language of the document.
Other Pages	Other relevant pages within the publication.
Series Title	Title of the publication series.
Publisher	Publisher of the resource.
Publication Place	Place of resource publication.
Links	Hyperlink to documentation.
URL 1	Primary web link to the resource.
Cited Reference	References the document cites.
Category	Search category in which the resource was located.
Resource Type	Type of Resource (i.e., publication or GIS dataset)
Distribution	Copyright category of the resource.
Cost	Purchase price of the resource.
Priority	Priority given by the reviewer.
Acquired	Date the resource was acquired.
File Name	File name of the resource.
Location Description	Description of the resource location extracted from the document.

Appendix M

Geographic Characterization Protocol

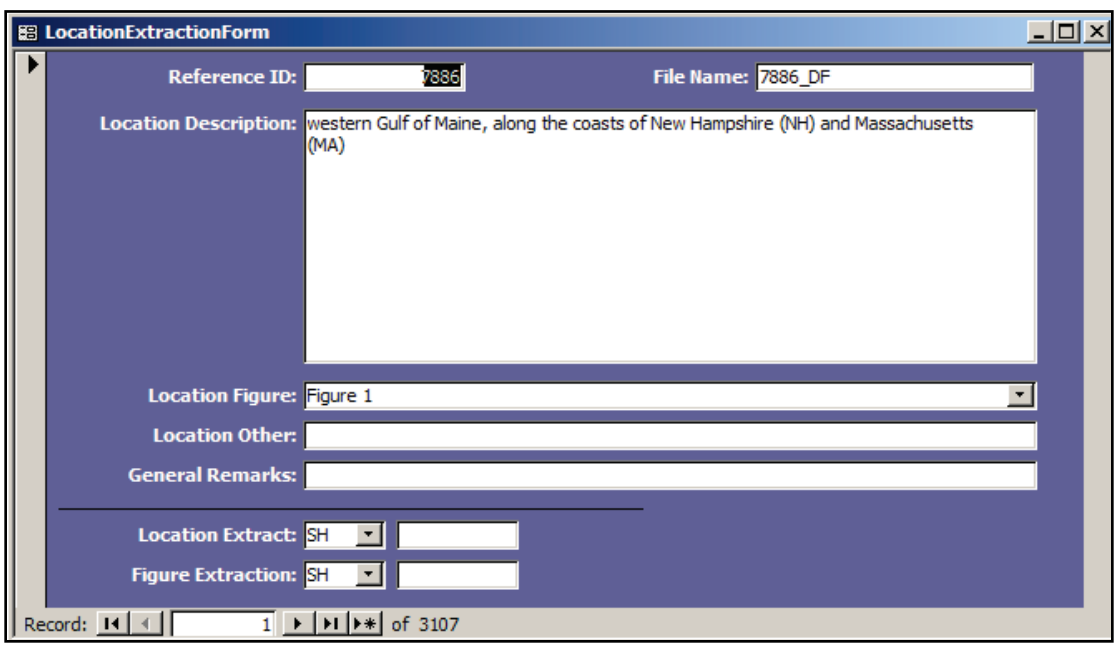
IDENTIFY AND EXTRACT GEOGRAPHIC EXTENT

The purpose of this task is to compile a list of consistently gathered resource location descriptions to expedite boundary digitization of the resources. The documents will be quickly reviewed by the team for information regarding the study location and geographic extent, which will become the "resource boundary" or "footprint" of the study.

The goal is to represent the entire extent of unique study sites individually, but NOT to digitize locations where multiple types of observations or measurements have been performed. If a figure has sites with unique names or are numbered, they are usually considered study sites (not observations), and thus would be digitized as separate polygons.

Location information may come in the form of a text description relative to a coastal feature (e.g., *200 km off the banks of Cape Hatteras*) or to an undersea feature (e.g., *collected at the Blake Plateau*); in a generalized figure; in latitude/longitude coordinates; in a lease block; or perhaps in some other form. Be aware that some studies have figures of other people's research, or geographic features that have no relevance to the actual resource itself. If the resource appears to be a literature study, this should be noted.

If a figure is found that describes where the study was performed, it will be extracted from the document. This is described in detail in Section B. Please see Attachment 1 for examples of the different types of location information that may be found in the resource documents. If a resource is not in the study area, no figures should be extracted, and "*XX*" should be entered in the tracking form seen below.



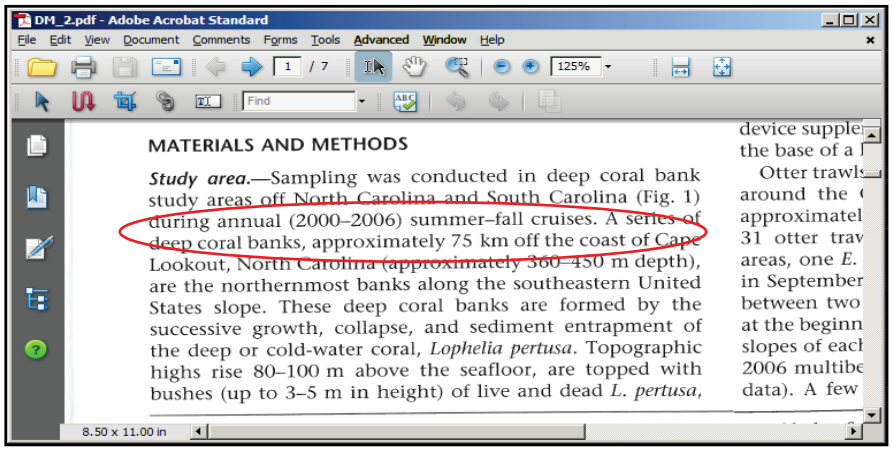
The following are the steps involved in identifying and extracting geographic extents.

LOCATION DESCRIPTION

1) Open the resource folder for the resources, organized by file name.

2) Review the PDF resource document for a text description of the study area. This is typically found in the "Materials and Methods" section of the paper as shown below.

Find the figure that shows the entire extent of the area studied and/or the most expansive limits of the study. It may be necessary to record several figures to describe the geographic extent.



3) Select the complete description from the PDF, and copy and paste it into the Form.

Example:
"Sampling was conducted in deep coral bank study areas off North Carolina and South Carolina (Fig. 1) during annual (2000-2006) summer-fall cruises. A series of deep coral banks, approximately 75 km off the coast of Cape Lookout, North Carolina (approximately 360-450 m depth), are the northernmost banks along the southeastern United States slope."

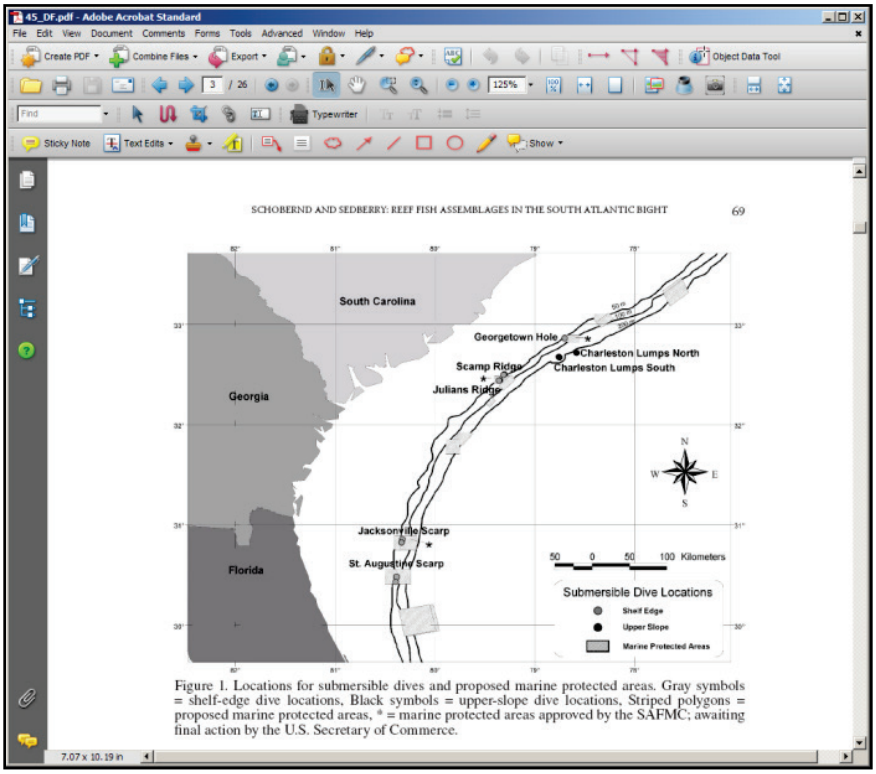
4) If a resource is not in the study area, no figures should be extracted.

5) Make a note of any additional tables or figures that might have geographic information, such as a table that has latitude/longitude coordinates. Any other observations, such as issues with the quality of the copy or if the resource is a literature review, should also be recorded.

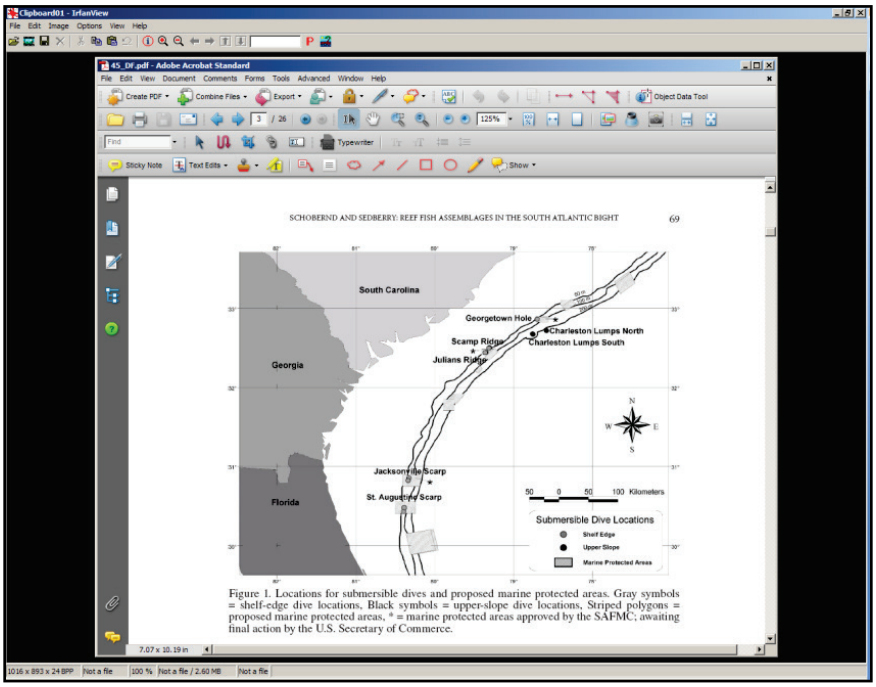
FIGURE AND TABLE EXTRACTION

1) The Task Manager will determine which resources need to have figures or tables extracted. The Task Manager will sort the database by name and export an Excel® file (see Figure 4) for each team member to record their progress. Each day, the team member will check for an Excel® file with their initials and date.

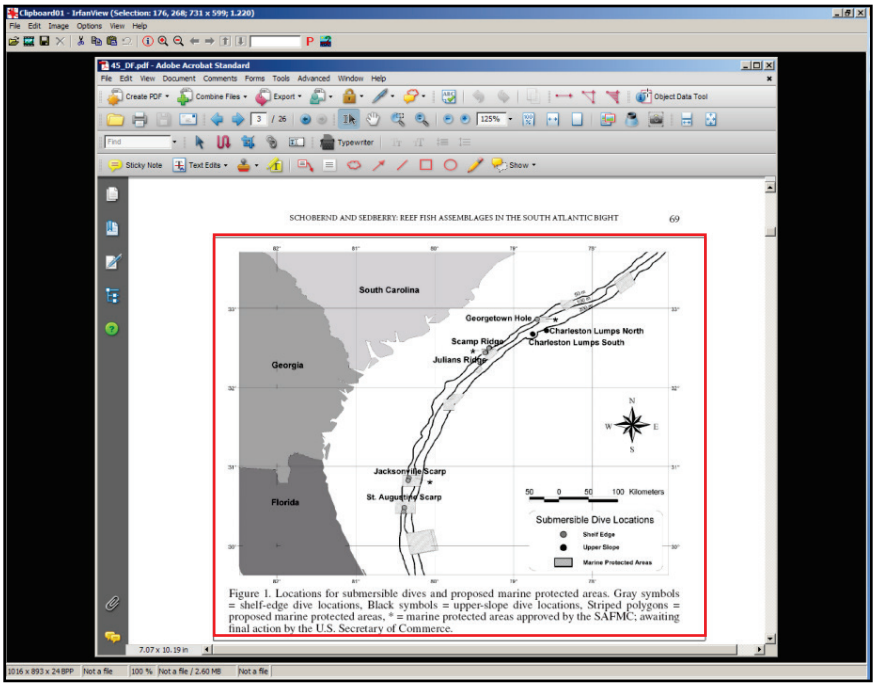
2) To begin figure extraction, position the page to the full extent of the figure, including title. Click the **"Alt"** and **"PrintScreen"** buttons simultaneously.



3) Open IrfanView and click the "Paste" button.



4) Use the left mouse button to click and drag a tight box around the figure, including the figure name and title.



5) In IrfanView, click **"Edit"** on the toolbar then **"Crop Selection"**, leaving only the cropped image.

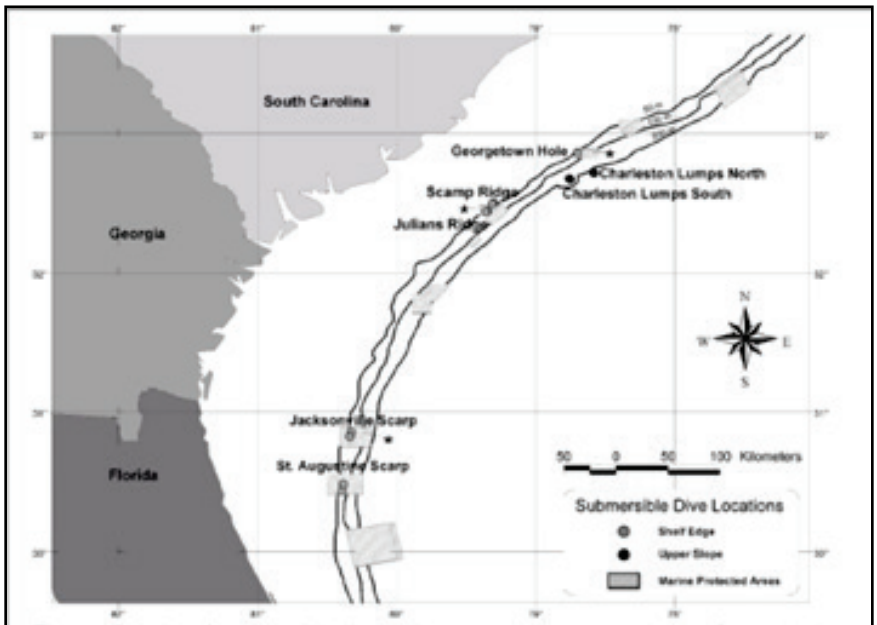


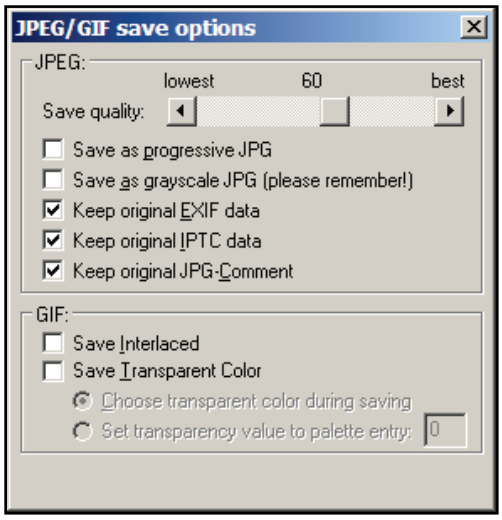
Figure 1. Locations for submersible dives and proposed marine protected areas. Gray symbols = shelf-edge dive locations, Black symbols = upper-slope dive locations, Striped polygons = proposed marine protected areas, * = marine protected areas approved by the SAFMC; awaiting final action by the U.S. Secretary of Commerce.

6) Hit the "**S**" key in IrfanView to save the file. Save in .jpg format with the following naming convention:

   e.g., 1_DM_F1
   Decoded: 1= "Ref_ID"; DM= demersal fish resource category, F1=Figure1

   Use the figure number from the document. If there are multiple figures extracted from the same document, label accordingly (e.g., _F1, _F7, etc). Figures may not exist in all documents. In some documents, there may be tables containing a geographic reference (e.g., lat/longs, undersea features, etc) instead of figures. In these cases, the table(s) should be extracted using the same procedure.

7) Use the default save settings below.



8) To clear the screen in IrfanView, hit the **"D"** key.

9) Perform QA/QC of the location description and figure extraction by randomly selecting an appropriate sample size of the resources. Check the geographic description and choice of figure(s) from the original document against the extracted figure(s). Initial and date the resources that were checked noting any irregularities in the tracking form. Re-assign resource extraction as necessary.

BOUNDARY DIGITIZATION

This task involves georeferencing figures (if available), and digitizing the resource boundary for display in ArcMap. Using the newly obtained location description and the detailed base map, the AMEC GIS team members will create a GIS shapefile, from a blank template, to spatially locate each resource. The resulting GIS shapefile will be one boundary layer, with features attributed with unique "*ESID's*."

The goal of this task is to *quickly* approximate the entire extent of the resource. Only the extracted figures and the location description will be used; it should not be necessary to open the actual resource.

Polygons will be created to represent the resource boundaries. The polygons will roughly represent the collective extent of the study. The polygons should not be rectangular or square, unless the extent of the study site appears that way. If the location description of the study area is only identified by points or lines, a polygon will be drawn around the extent of the point or line, roughly estimating a 1 mile buffer around the features.

If the resource is offshore, or does not specify otherwise, it should be clipped to the coastline using the "*Generalized Shoreline*" shapefile for the landward extent. When possible and if relevant, the feature templates (e.g., *New York Bight* shapefile) should be used for features that do not have more available detailed information. In addition, if only references to states are given, the features should be drawn from the coast to the extent of the state (using the *State Lateral Lines* shapefile) to the EEZ for the seaward extent. See Attachment 2 for extracted figure examples. Figure 5 shows an example of several digitized resource boundaries (in green) superimposed on the base map.

Although the method used to digitize the resource boundaries is a function of the available geographic information, the preferred methods are listed in order below.

Georeference a figure created from the document (see Task 1B above), and digitize (trace) polygons from the figure.
If relevant, draw a polygon from a lease block (see Attachment 1, Example 4).
Draw a polygon from the narrative that references geographic features.
Create points from coordinates in the paper.
Other Methods: draw a polygon from the name of an undersea feature, etc.

Specific steps required to digitize resource boundaries:

The Technical Manager will assign which resources need to have features digitized on a daily basis and record a team member's initials. The Task Manager will sort the database by name and export a customized Excel® file for each team member to record their progress. Each day the team member will check for a Microsoft® Excel® file with their name.

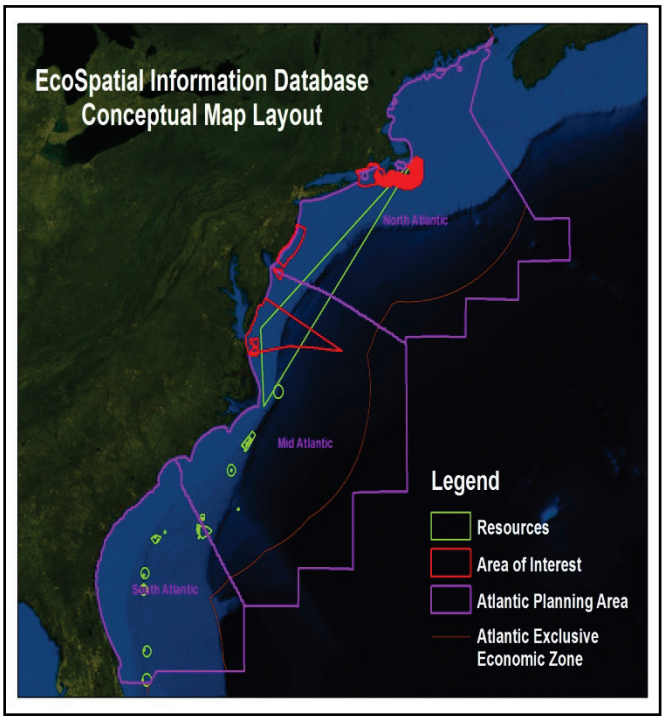


Figure 1. Digitized resource boundaries.

Open the base map, copy it to your local drive, and add an empty version of the shapefile to your map.

At the beginning of each day, each team member will start with an empty shapefile and populate it with the resources selected for work that day. At the end of each day, the team member will record the date in the Excel® file for the resources they actually completed. If the digitization was not completed, a date should not be entered.

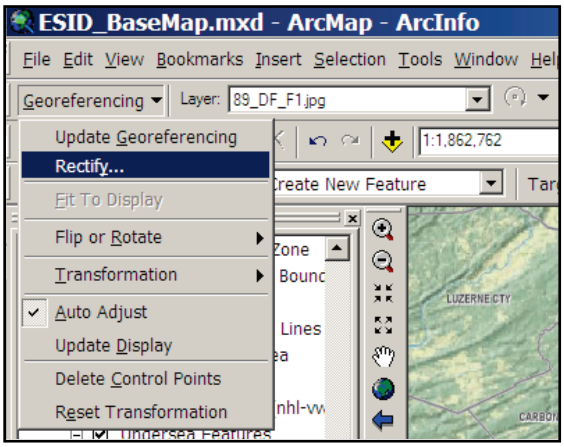
Review the location information for the resource in the Excel® file, and determine if there is a figure(s) available for the resource. If the Excel® file has a figure(s) identified, use the add data button to add it to the base map. *If not, follow the order of preferred methods listed above.*

To begin georeferencing, zoom to the general location of the study in the map window. Ignore the "*unknown spatial reference*" and "*build pyramids*?" messages.

Open the **Georeferencing Toolbar** and click "**Fit to Display**". Make the figure semi-transparent.

Going from unknown to known, match control points from the figure to coastal features on the base map. Add a minimum of 3 points, trying to achieve a triangular pattern. Do not create more than 5 control points or add points in a manner that causes the image to become skewed. If there is a problem georeferencing, make a note in the Excel® file and move on.

Click "**Rectify**" on the Georeferencing Toolbar to finalize the location and create the world file. Save the rectified image.



Click *"***Reset Transformation***"* on the Georeferencing Toolbar to start over.

Start an editing session on the shapefile on your local machine. There should be one empty 1 mile radius polygon feature in this layer. Copy this feature and move it over point and line features to estimate a 1 mile radius.

Review all of the location information for the resource in the Excel® file. One resource may have multiple study sites. The goal is to represent the entire extent of unique study sites individually, but not to digitize locations where multiple types of observations or measurements have been performed. Do not spend too long reviewing or digitizing any one resource. If there is a question, note it in the Excel® file**,** move to the next resource assigned, and leave it to the Task and Technical Managers to resolve. In addition, make sure to review any comments in the Excel® file that may give guidance on revising boundaries.

Digitize each study site as a separate polygon. Figure 6 depicts an example of the original georeferenced image and the digitized study sites in the shapefile. Attachment 2 gives examples of different types of resource boundaries.

Open the attribute table (see below) of the shapefile and populate the ESID (e.g., 3) and the Study_Site (e.g., Savannah Banks) fields. If the figure does not appear to have study site names, review the Geographic Description field in the customized **"**ExtentWorksheet" Excel® file (see below) for a name. If no study terms exist, use the generic term "Study Area" in the Study_Site field.

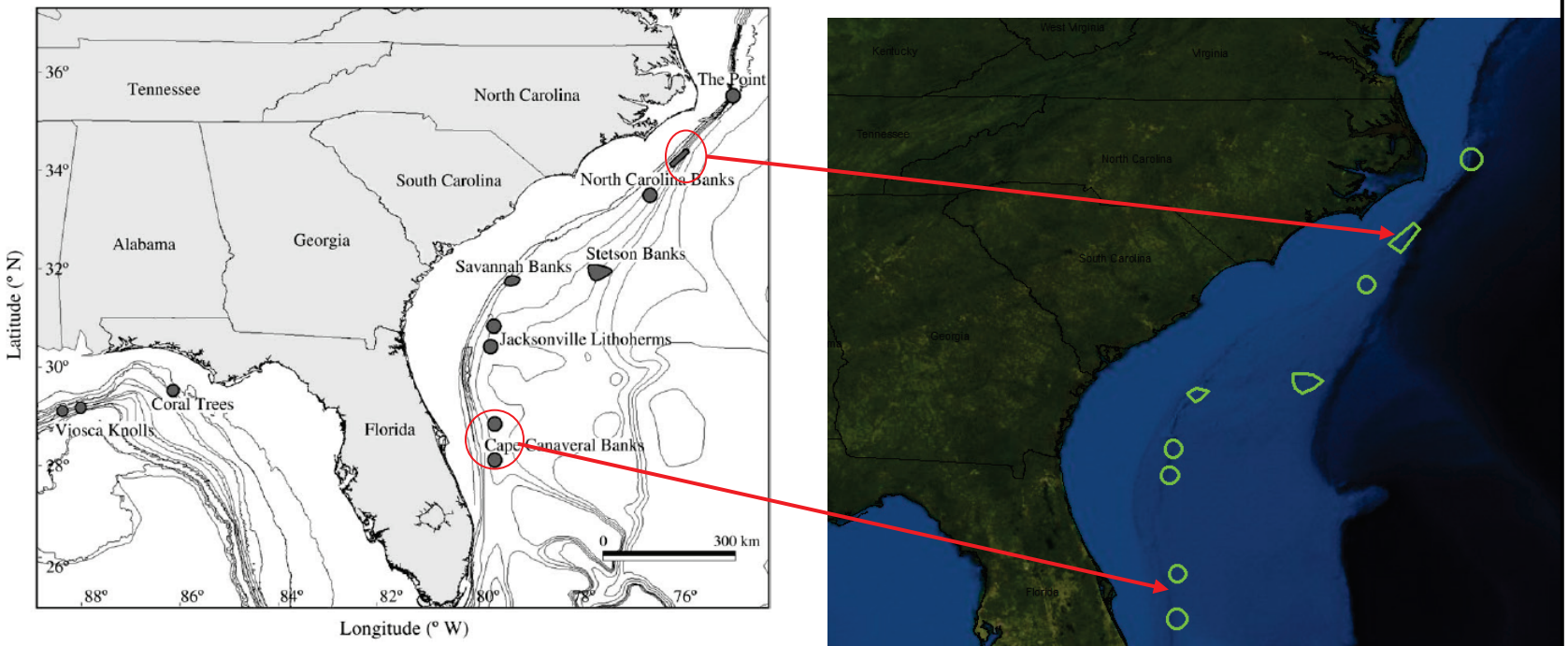


FIG. 1. South-eastern U.S. and northern Gulf of Mexico illustrating general areas (darkly shaded shapes) of submersible operations and surface ship collections related to lophiiform fishes, 2000–2005. 'The Point' is a rugged, muddy canyon; all other study areas are continental slope deep-sea coral habitats or other hard elevated substrata.

Figure 2. Example of original figure and digitized study sites in the resource boundary layer.

Attributes of ESID.FeatureArea

OBJECTID *	FEATUREID	FEATURECODE	ESID	STUDY_SITE	Shape *	SHAPE.AREA	SHAPE.LEN
1333	<Null>	<Null>	939	Study Area	Polygon	4395115982.07819	267405.879291
1332	<Null>	<Null>	713	Study Area	Polygon	626217078239.128	10471925.088007
1331	<Null>	<Null>	706	Study Area	Polygon	140687851914.64	4457041.240427
1330	<Null>	<Null>	554	Study Area	Polygon	190124539353.756	2406249.002703
1329	<Null>	<Null>	549	Study Area	Polygon	37231551.39946	26821.911675
1328	<Null>	<Null>	540	Study Area	Polygon	347283653119.08	4278559.442374
1327	<Null>	<Null>	505	Study Area	Polygon	6947656.982807	15220.89916
1326	<Null>	<Null>	369	Study Area	Polygon	94490476099.0358	4379779.030377
1325	<Null>	<Null>	334	Study Area	Polygon	4369920986.38376	411921.471789
1324	<Null>	<Null>	297	Study Area	Polygon	391357110054.598	4006682.165032
1323	<Null>	<Null>	288	Study Area	Polygon	339298587961.51	3427219.803976
1322	<Null>	<Null>	1226	Study Area	Polygon	56266721954.9724	1591405.593493
1321	<Null>	<Null>	1199	Grays Reef Study Area	Polygon	137165208.288082	47265.89986
1320	<Null>	<Null>	1197	Study Area 2	Polygon	43837411150.5984	843558.509688
1319	<Null>	<Null>	1197	Study Area 1	Polygon	39868245629.9862	857010.702738
1318	<Null>	<Null>	1149	Grays Reef Marine Sanctuary Study Area	Polygon	81247100.328346	36459.783971
1317	<Null>	<Null>	1101	Grays Reef Study Area	Polygon	137165208.288082	47265.89986
1316	<Null>	<Null>	1082	Study Area	Polygon	1422650628811.72	15892587.472403
1315	<Null>	<Null>	1070	Study Area	Polygon	17512866.91713	19484.418941
1314	<Null>	<Null>	1058	Study Area	Polygon	798411551961.402	9102587.375753
1313	<Null>	<Null>	1047	Study Area	Polygon	886815385706.009	17664518.343773
1312	<Null>	<Null>	1046	Gulf of Maine Study Area	Polygon	127459755606.865	1869151.376393
1311	<Null>	<Null>	1044	Ammen Rock Study Area	Polygon	8136014.449727	10111.597437
1310	<Null>	<Null>	900	Gulf of Mexico Study Area	Polygon	2155154322152.6	7979786.676004
1309	<Null>	<Null>	680	Study Area	Polygon	3661286775556.68	23703703.815043
1308	<Null>	<Null>	1034	Study Area	Polygon	3277676158778.68	25849091.582429
1307	<Null>	<Null>	1189	Study Area	Polygon	3772462037163.7	23719528.838722
1306	<Null>	<Null>	707	Study Area	Polygon	455556136418.043	5078595.768654
1305	<Null>	<Null>	254	Study Area	Polygon	75053596600.0466	1808072.462414
1304	<Null>	<Null>	253	Study Area	Polygon	89854916842.6716	1299545.469017
1303	<Null>	<Null>	123	Study Area	Polygon	449218544935.26	9406754.406625

Record: 0 Show: All Selected Records (0 out of 741 Selected) Options

ExtentWorksheet_052010_JL.xls [Compatibility Mode] - Microsoft Excel

	A	B	C	D	E	
1	ESID	FileName	LocationDescription	LocationFigure	LocationOther	LocationRemarks
2	2566	2566_GEO	Florida Escarpment, Gulf of Mexico; Blake Ridge, Atlantic Ocean; Rainbow Hydrothermal Vent Area, Mid-Atlar	NF		partly outside study area; literature study
3	2172	2172_GEO	the continental shelf east of the Delmarva Peninsula	Figure 1		
4	3632	3632_PE	over the continental shelf off Norfolk, Virginia (SEEP-II study area) near mooring 1 (37° 52.50'N; 74° 43.50'W)	Figure 1		
5	7256	7256_PE	the Deepwater Dumpsite#106 (Western Atlantic)	Figure 1		
6	7510	7510_PE	Georges Bank	Figure 2		
7	9327	9327_WQ	six states along the east#coast of the United States	Figure 1		
8	9356	9356_WQ	Narragansett Bay, New York Bight, Chesapeake Bay, and Ochlockonee Bay in USA; Laholm Bay in Sweden	Figure 1		partly outside study area
9	10111	10111_WQ	coastal zone	Figure 3		model study; partly outside study area
10	10315	10315_DF	South Atlantic Bight	Figure 1		
11	10316	10316_DF	South Atlantic Bight	Figure 3		
12	10320	10320_DF	The New England Seamounts (NES): The seamounts explored on these dives were Manning (38° 11.96'N 60°	Figure 1		
13	10323	10323_DF	Middle Atlantic Bight	Figure 2		
14	10339	10339_DF	the inner continental shelf generally out to approximately the 20#m isobath and shore of the region between Ce	Figure 2		
15	10386	10386_DF	North Carolina Outer Continental Shelf	Figure 1		
			Two study sites off central eastern Florida off			
			depths of 6 and 80 m. The 6-m reef consists of coquinoid#			
			limestone ledges which run parallel to shore. The base of#			
			an isolated, 17-m high coral bank was selected as the#			
16	1152	1152_CH	80-m station (27 °32.8'N, 790 58.8'W).	NF		
17	10181	10181_CH	Off the southeastern#United States (SEUS) coast and in the Gulf of Mexico	Figure 1; Figure 2		partly outside study area; figures very unclea
			North Atlantic Seamounts: include three seamount#			
18	10243	10243_CH	groups, the New England seamount chain, the Corner Rise seamounts and Muir#	Figure 1		
19	3095	3095_IM	New York Bight	Figure 1		
20	3103	3103_IM	Central and Eastern Gulf of Maine, 29 stations	Figure 1		
			Hard Bottom Reefs off the Southeastern United States: six trawl cruises on the continental shelf. 11 hard			
21	3104	3104_IM	bottom stations#	NF		
22	10314	10314_PE	South Atlantic Bight	Figure 1		
23	10322	10322_PE	Middle Atlantic Bight and New York Bight	Figure 3; Figure 4; Figure 5		
24	10354	10354_PE	the entire continental shelf from Cape Hatteras, North Carolina, to Cape Sable,#Nova Scotia	Figure 1		
25	10161	10161_WQ	Chesapeake Bay, deep waters; New York Bight; southern New England estuaries	NF		
26	10388	10388_DF	Atlantic, Gulf of Mexico, Pacific, Alaska regionigs	NF		partly outside study area; literature study
27	2534	2534_GEO	New York Bight	Figure 5		
28	8507	8507_WQ	New York Bight	Figure 5		literature study
29	9480	9480_WQ	New England	Figure 3; Figure 8		several studies in one document, focused on
30	9481	9481_WQ	Gulf of Maine	NF		

The new shapefile can be clipped using the "*Generalized Shoreline"* shapefile for the landward extent if it appears that the western extent of the resource is the coast. First, create a polygon and digitize the eastern boundary, then grossly estimate the coastal side and run the clip tool in ArcToolbox.

If a figure is not available to digitize, follow the order of preferred methods listed above. Use the "*Location Description"* in the Excel® file to visually locate the boundary on the map. This can be done by identifying base map features for reference and using the measure tool for distance. Particularly useful base layers are the "*Undersea Features, Undersea Feature Placenames"* layer and the "*Protected Places"* sublayer in the base map. The attribute table may be queried for specific features such as "Blake Plateau". In addition, there may be available shapefiles developed in the future to facilitate creating boundaries for features that are studied frequently (e.g., New York Bight).

The graticule layers (e.g., Degree_015, Degree_001) may also be used to narrow down latitude/longitude locations, if specified in the geographic description in the Excel® file.

If a figure is not available, and an XY coordinate is given, use the "**Go To XY**" tool to place a point on the map. Enter the coordinates and click the "**Add Labeled Point"** button. Remember that longitudes are negative in our hemisphere.

Use the "**Measure"** tool to estimate a one (1) mile radius from the point. Then use the circle tool on the **Advanced Editing Toolbar** and draw a circle, roughly 1 mile radius, around the point. Remember that there is an empty feature in the layer that is an exact 1 mile radius polygon for your use.

If a figure is not available, and a group of coordinates are given for the same study site (see Table I under Example 3 in Attachment 1), draw a tight box that encompasses all of them.

Save the completed shapefile.

Record your initials and the date in the Excel® file when a resource boundary has been completed. Make notes in the Excel® file describing any issues associated with the resource.

Before turning in your resource boundaries to be loaded into SDE, use this checklist to check your work:

Look to see if there is a QA Remark on your worksheet to help resolve any problems. Also check the GIS Remark field, as we may have resolved an issue you identified earlier.
Check your ESID number on your Excel® spreadsheet against your created shapefile extents- Do they match?
Import your shapefiles into a geodatabase or calculate the area of your shapefiles using XTools, delete any duplicates (e.g., look for any areas that are exactly the same). A 1 mile circle radius will have the same area, but should have different names or location.
Check for spelling mistakes in the attribute table of your shapefile.
Make any necessary notes in the Excel® file, or indicate if you need additional information.
Do not add a date until the extent is digitized/completed (i.e., all issues resolved).
Make sure the shapefiles are clipped to the coastline (if relevant); check that nothing extends inland beyond the coast.
Check anything that extends beyond the EEZ to be sure it is correct.

The Task Manager will load the shapefiles into SDE on a daily basis.

Perform QA/QC of the boundary by randomly selecting appropriate sample size of the resources, looking at the boundary and attribute table and comparing these to the original resource and extracted figure. Initial and date the resources checked in the database. Any irregularities will be noted in the Excel® file and the resource will be re-assigned.

Any questions regarding identifying or spatially locating studies not addressed above should be directed to the Task Manager or Technical Managers.

SUMMARY OF THE KEY POINTS

1. If the resource appears to be a literature study, this should be noted in the tracking form.
2. If a resource is NOT in the study area, no figures should be extracted.
3. If a study includes areas within the project boundary as well as other sites outside the project boundary, such as the Gulf of Mexico, it will be included, and will have a boundary created or digitized for all polygons.
4. The preferred order to the digitization methods should be followed. The first preference is to use a figure.
5. The goal is to represent the entire extent of unique study sites individually, but NOT to digitize locations where multiple types of observations or measurements have been performed. If a figure has sites with unique names or are numbered, they are usually considered study sites (not observations), and thus would be digitized as separate polygons.
6. The boundary should be clipped to the coast using the "*Generalized Shoreline*" shapefile. Templates for common areas, such as New York Bight, should be used instead of recreating these areas.
7. If only references to states are given, the features should be drawn from the coast to the extent of the state (use *State Lateral Lines* shapefile) to the EEZ for the seaward extent.
8. Use the checklist before turning in the digitized boundaries.
9. When digitizing, it should not be necessary to open the actual resource. If there is a question, it should be noted in the Excel® sheet.
10. Only polygons will be created to represent the resource boundaries. Use the 1 mile boundary buffer where appropriate.
11. No one other than the Technical or Task Managers may alter the base map .mxd, base map layers, or load data into SDE.

Attachment **1**
Location Extraction Description Examples

Example 1:

Deep-sea reef fish assemblage patterns on the Blake Plateau (Western North Atlantic Ocean)

Steve W. Ross & Andrea M. Quattrini

Location Information:
Deep-sea reef fishes, assemblage patterns:

Cape Lookout A - coral bank system approx. 75 km southeast of Cape Lookout, North Carolina, 366-443 m dives
Cape Lookout B--coral bank system approx. 11 km southwest of Cape Lookout A system, 366-450 m dives
Cape Fear-coral mounds approx. 140 km east of Cape Fear, North Carolina, and approx. 80 km southwest of southernmost Cape Lookout B coral mound, 368-443 m dives
Republic wreck--wooden 1865 steamer and surrounding habitat, approx. 250 km east of GA-SC border, 489-492 depth
Stetson-coral banks approx. 300 km east of GA-SC border, 592-721 m and 540-646 m dives
Savannah-approx. 160 km east of Savannah, Georgia, 497-544 m dives
Jacksonville-deep reef habitats along the slope off the FL-GA border, approx. 170 km northeast of Jacksonville, FL, 517-674 m dives
North Cape Canaveral--reefs located approx. 95 km northeast of Cape Canaveral, FL, 709-770 m dives
South Cape Canaveral--broad area of slopes approx. 80 km south of North Cape Canaveral sites, 679-745 m dives

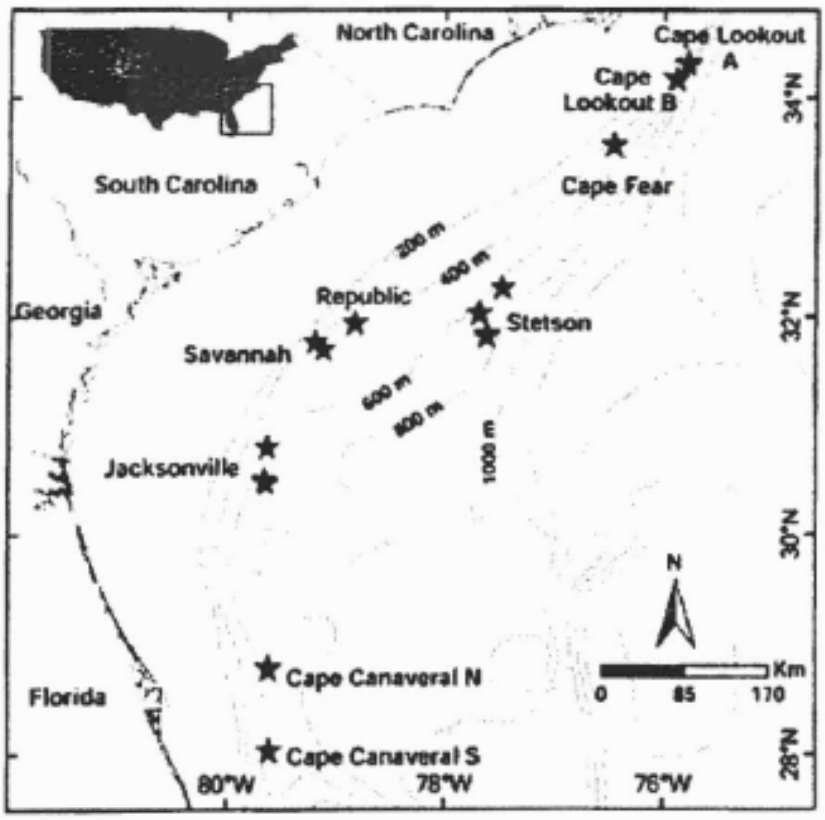


Fig. 1. Nine deep reef study sites along the southeastern United States slope, sampled by submersible and remotely operated vehicle from 2000 to 2005.

much as 100 m above the sea floor and exhibit slopes up to 60°. Cape Lookout A deep coral mounds are formed

temperatures for each dive ranged from 5.8 to 10.6 °C (± 0.0 SE) (Table 1).

Table 1. Data for nine deep reef locations along the southeastern United States slope sampled by submersible and ROV, 2000–2005.

	Cape Lookout A	Cape Lookout B	Cape Fear	*Republic* wreck	Stetson	Savannah	Jacksonville	North Cape Canaveral	South Cape Canaveral
depth range (m)	366–443	366–450	368–443	487–496	540–721	497–544	517–674	709–770	679–745
number of dives	17	9	9	5	9	7	8	4	2
total video time (h)	29.1	15.4	17.0	5.3	16.9	9.8	13.9	6.0	3.2
mean video time per dive (h) (±SE)	1.7 (0.1)	1.7 (0.2)	1.9 (0.1)	1.1 (0.2)	1.9 (0.1)	1.4 (0.2)	1.7 (0.1)	1.5 (0.2)	1.6 (0.0)
mean temp. range (°C)	6.3–11.0	5.8–10.6	8.0–11.7		7.6–12.2	7.4–9.2	7.3–10.5	6.6–6.8	6.3

Marine Ecology **30** (2009) 74–92 © 2008 The Authors. Journal compilation © 2008 Blackwell Publishing Ltd

Example 2:

A New Species of Hagfish (Myxinidae: *Eptatretus*) Associated with Deep-Sea Coral Habitat in the Western North Atlantic

Bo Fernholm[1] and Andrea M. Quattrini[2]

Location Info:
Sampling was conducted in deep coral bank study areas off North Carolina and South Carolina (Fig. 1) during annual (2000- 2006) summer- fall cruises. A series of deep coral banks, approximately 75 km off the coast of Cape Lookout, North Carolina (approximately 360-450 m depth), are the northernmost banks along the southeastern United States slope.

Otter trawls (4.9 m head rope, 38.1 mm mesh) were towed around the Cape Lookout coral banks for 29-45 min at approximately 2 knot (3.7 km/hr) ground speed. From the 31 otter trawls towed (356- 910 m) in reef and non-reef areas, one *E. lopheliae* specimen was collected during a tow in September 2006. This trawl was towed for 3 km, mainly between two coral mounds in 430-438 m depth.

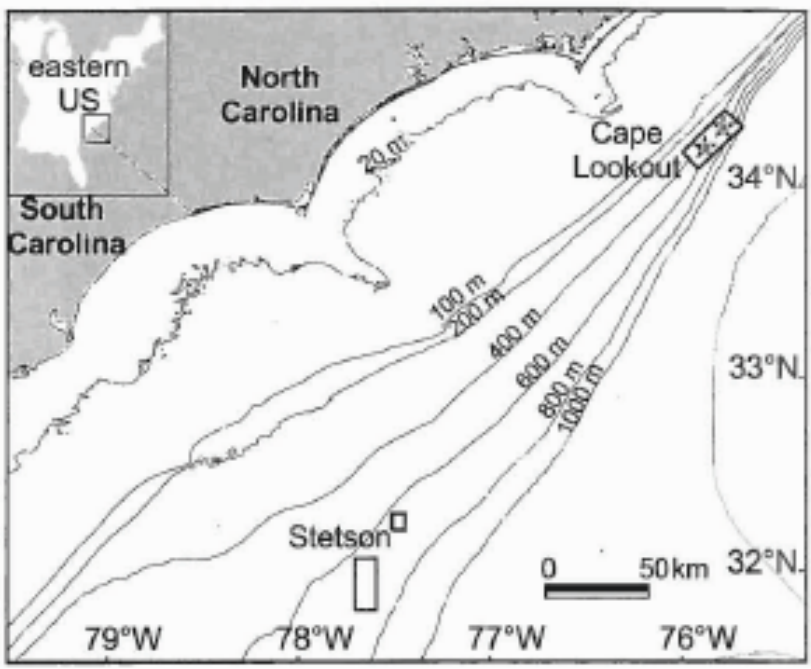


Fig. 1. Deep-sea coral habitat study areas (boxes) where *Eptatretus lopheliae* were observed and collected. Collections are denoted by stars.

Example 3:

Deep-water chaunacid and lophiid anglerfishes (Pisces: Lophiiformes) off the south-eastern United States
J. H. CARUSO, S. W. ROSS, K. J. SULAK, AND G. R. SEDBERRY

Location Info:

Lophiiform data were collected during research cruises investigating deep-reef community structure along the outer continental shelves and upper slopes of the northeastern and north-central Gulf of Mexico and the south-eastern U.S. (Fig. 1). Gulf of Mexico data resulted from a cruise using the RV Tommy Munro (6–19 August 2002) and one cruise using the RV Seward Johnson with the submersible Johnson-Sea-Link (JSL; Harbor Branch Oceanographic Institution, Fort Pierce, FL, U.S.A.; HBOI) (30 July–4 August 2004). Data from the south-eastern U.S. resulted from eight JSL submersible dives (20–29 July 2000, 18–28 September 2001, 5–15 August 2002, 3–13 and 17–26 August 2003, 9–21 June 2004, 21–31 August 2004 and 16 October - 3 November 2005), ranging from just north of Cape Hatteras, North Carolina, to east central Florida, and from one non-submersible cruise off North Carolina using the RV Cape Hatteras (22–30 August 2001).
Had table with lat/longs

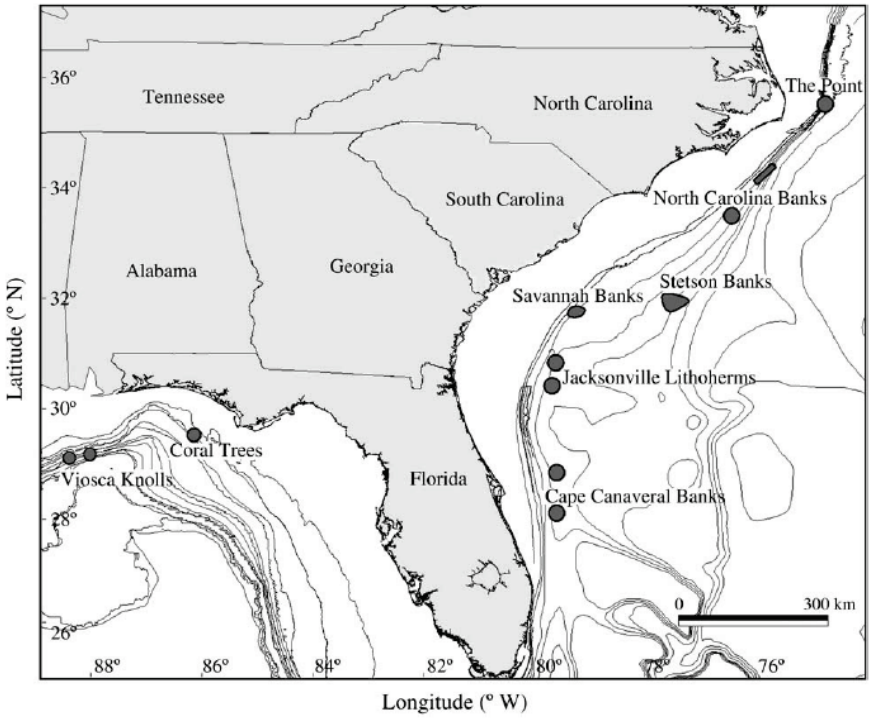


FIG. 1. South-eastern U.S. and northern Gulf of Mexico illustrating general areas (darkly shaded shapes) of submersible operations and surface ship collections related to lophiiform fishes, 2000–2005. 'The Point' is a rugged, muddy canyon; all other study areas are continental slope deep-sea coral habitats or other hard elevated substrata.

TABLE I. Chaunacid and lophiid anglerfishes collected from 2000 to 2004 with the JSL submersible, otter trawls (OT) and Tucker trawls (TT). Specimens were collected off the south-eastern U.S. and in the north-eastern and north-central Gulf of Mexico

Species	Catalogue number	L_S/L_T (mm)	Sex	Station number	Date	Start time	Start latitude (N)	Start longitude (W)	Depth (m)	Water temperature (° C)	Gear
Chaunax sp.	NCSM 41111	/6	Larval	EL-2000-058 LT	25 July 2000	2004	35°30·00′	74°46·20′	361–607	6·8*	TT
Chaunax stigmaeus	GMBL 01537	227/	F	JSL-2001-4369	28 September 2001	0808	31°43·42′	78°48·74′	522	15·9	JSL
Chaunax stigmaeus	GMBL 02788	122/		JSL2-2003-3417	12 August 2003	1538	31°23·94′	78°46·12′	533	14·2	JSL
Chaunax stigmaeus	NCSM 41116	255/305	F	JSL-2003-3426	21 August 2003	1636	33°34·38′	76°27·91′	392	9·3	JSL
Chaunax stigmaeus	NCSM 41115	95/113	M	JSL-2003-3420	17 August 2003	1618	32°02·01′	77°40·71′	627	9·9	JSL
Chaunax stigmaeus	NCSM 41121	150/181	M	JSL-2004-4696	17 June 2004	0831	33°34·37′	76°27·71′	402	9·12	JSL
Chaunax stigmaeus	NCSM 41122	195/250	F	JSL-2004-4697	17 June 2004	1642	33°34·57′	76°27·83′	411	11·98	JSL
Chaunax stigmaeus	NCSM 43306	140/183	M	JSL-2005-4891	17 October 2005	1629	34°19·49′	75°47·40′	380	8·4	JSL
Chaunax stigmaeus	NCSM 43307	221/283	F	JSL-2005-4893	18 October 2005	1630	34°14·00′	75°52·30′	375	9·3	JSL
Chaunax suttkusi	NCSM 41109	25/33	Juvenile	EL-2000-013 LT	20 July 2000	2221	35°31·19′	74°46·26′	161–340	11·3*	TT
Chaunax suttkusi	NCSM 39560	28/32	Juvenile	CH-2001-111	29 August 2001	1105	34°20·57′	75°47·69′	399–424	—	OT
Chaunax suttkusi	NCSM 32620	40/54	Juvenile	CH-2001-066	25 August 2001	2218	35°36·95′	74°47·94′	448–503	—	OT
Chaunax suttkusi	NCSM 41124	121/147	M	SJ-2004-043	21 June 2004	1256	28°05·24′	79°39·89′	549–560	...	OT
Chaunax suttkusi	TU 198058	107/145	Juvenile	JSL-2004-03-4754	4 August 2004	0832	29°26·93′	88°57·74′	694	6·01	JSL
Chaunax suttkusi	TU 198058	82/105	Juvenile	JSL-2004-03-4754	4 August 2004	0832	29°26·93′	88°57·74′	694	6·01	JSL
Lophiodes beroe	NCSM 41117	280/330	M	JSL-2003-3431	24 August 2003	0836	34°19·52′	75°47·04′	417	6·5	JSL
Lophiodes beroe	NCSM 41118	305/375	M	JSL-2003-3431	24 August 2003	0836	34°19·52′	75°47·04′	388	7·9	JSL
Lophiodes beroe	NCSM 41112	400/460	F	JSL-2001-4364	23 September 2001	1602	34°18·84′	75°47·01′	413	10·1	JSL
Lophiodes beroe	NCSM 37927	235/285	F	CH-2001-094	28 August 2001	0925	34°19·46′	75°47·84′	409–434	—	OT
Lophiodes beroe	NCSM 41119	280/333	M	JSL-2004-4693	15 June 2004	1620	34°19·44′	75°47·14′	407	9·12	JSL
Lophiodes beroe	NCSM 41123	350/441	F	JSL-2004-4699	18 June 2004	1659	31°50·89′	77°36·72′	721	10·94	JSL
Lophiodes beroe	NCSM 41119	290/364	M	JSL-2004-4694	16 June 2004	0829	34°11·28′	75°53·62′	390	10·6	JSL
Lophiodes monodi	NCSM 41113	325/380	M	JSL-2001-4364	23 September 2001	1602	34°18·84′	75°47·01′	407	10·2	JSL
Lophiodes reticulatus	NCSM 41110	8/11	Larval	EL-2000-040 UT	24 July 2000	0521	35°29·70′	74°46·10′	0–104	25·2*	TT
Lophiodes reticulatus	NCSM 41125	25/31	Juvenile	SJII-2001-060	25 September 2001	2058	33°11·41′	77°16·02′	153–187	—	OT
Lophiodes reticulatus	UF 158900	15/	Juvenile	TM-0201-3157	15 August 2002	0202	29°30·77′	86°08·56′	84	—	OT
Lophiodes reticulatus	UF 158901	31/	Juvenile	TM-0201-3159	15 August 2002	0413	29°30·69′	86°08·58′	86	18	OT
Lophiodes reticulatus	UF 158902	157/	M	TM-0201-3214	17 August 2002	0611	29°30·12′	86°09·06′	90	—	OT
Sladenia shaefersi	GMBL 5333	301/388		JSL2-3467	26 August 2004	1603	31°49·45′	77°31·34′	909	10·3	JSL

*Mean tow temperature.

L_S, standard length; L_T, total length.

Example 4:

Surficial Hydrocarbon Seep Infauna from the Blake Ridge (Atlantic Ocean, 2150 m) and the Gulf of Mexico (690-2240 m)

Christie A. Robinson, Joan M. Bernhard, Lisa A. Levin, Guillermo F. Mendoza & Jessica K. Blanks

Location Info:
Identified from five types of seep habitats and two adjacent non-seep habitats.

Collections were made with the deep submergence research vessel 'Alvin' from three areas of active seepage in the Gulf of Mexico (Alaminos Canyon [2220 m], Atwater Canyon [1930 m], and Green Canyon lease block 272 [700 m]) and on the Blake Ridge Diapir [2250 m], which is located off the southeastern coast of the United States.

The deep submergence research vessel 'Alvin', supported by RV 'Atlantis', was used to obtain all samples, which were 6.9-cm inner-diameter pushcores. Nine cores were collected at Blake Ridge Diapir from water depths of 2154–2158 m during 'Alvin' dives 3709–3712, which centered on Ocean Drilling Program (ODP) site 996 (32°30.5′ N, 76°11.5′ W; Fig. 1, Table 1). Five cores were collected from Alaminos Canyon from water depths ranging from 2215 to 2238 m during 'Alvin' dives 3624 and 3625, which centered around 26°21.2′ N, 94°29.5′ W. Three additional Gulf of Mexico cores were examined: two from ~700 m in Green Canyon 272 (27°41.151′ N, 91°32.293′ W; 'Alvin' dive 3627), and one from 1934 m in Atwater Canyon (27°34.748′ N, 88°30.625′ W; 'Alvin' dive 3633).

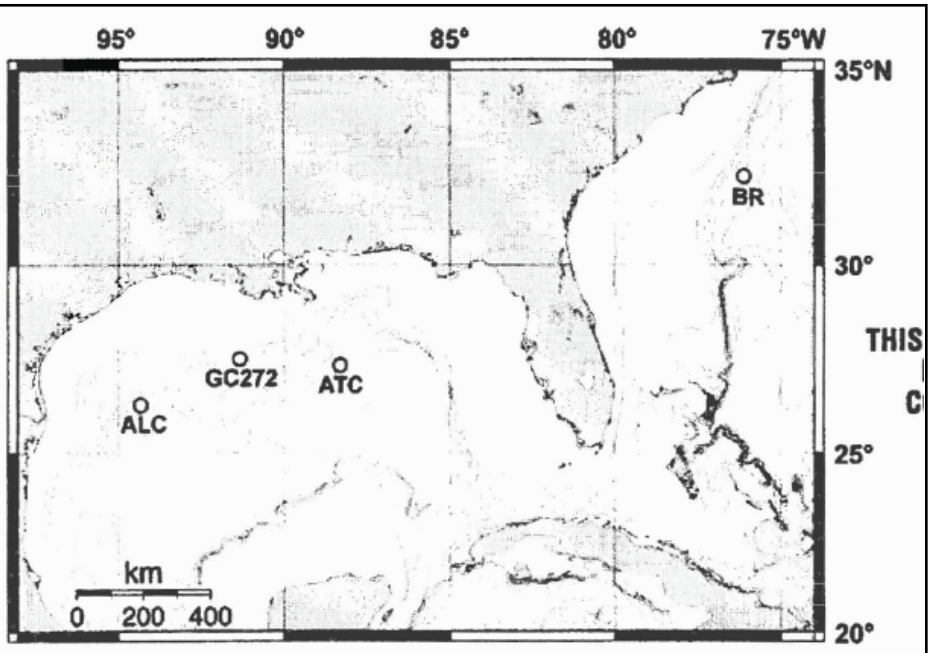


Fig. 1. Map showing locations of the sampling sites off the southeastern United States. ALC = Alaminos Canyon; GC272 = Green Canyon lease block 272; ATC = Atwater Canyon; BR = Blake Ridge. Contour interval = 500 m.

Example 5:

CHEMICAL COMPOSITION AND ENERGY CONTENT OF DEEP-SEA DEMERSAL FISHES FROM TROPICAL AND TEMPERATE REGIONS OF THE WESTERN NORTH ATLANTIC

Roy E. Crabtree

Extent Method: very gross polygon based on info available-Cape Hatteras to Cape Cod

Location Info:

Anglerfishes from deep (80-910 m) reef habitats along: the outer continental shelves and upper slopes of the northeastern and north-central Gulf of Mexico, and b.) the southeastern U.S. including Blake Plateau off South Carolina, and just north of Cape Hatteras, North Carolina, to east-central Florida.

Attachment 2
Extracted Figure Examples

A

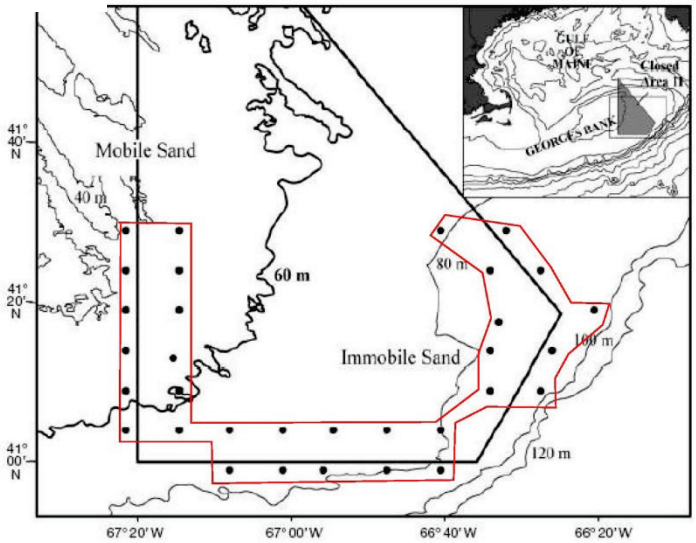
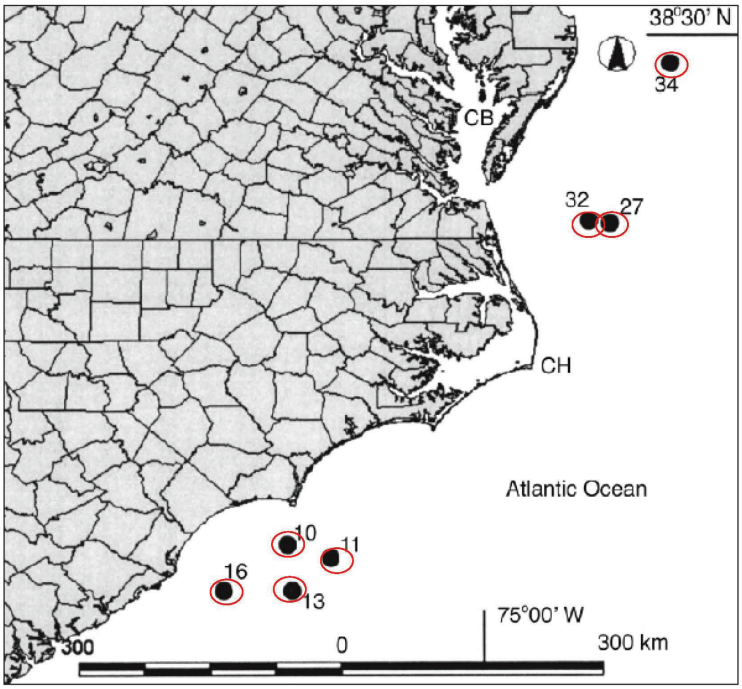
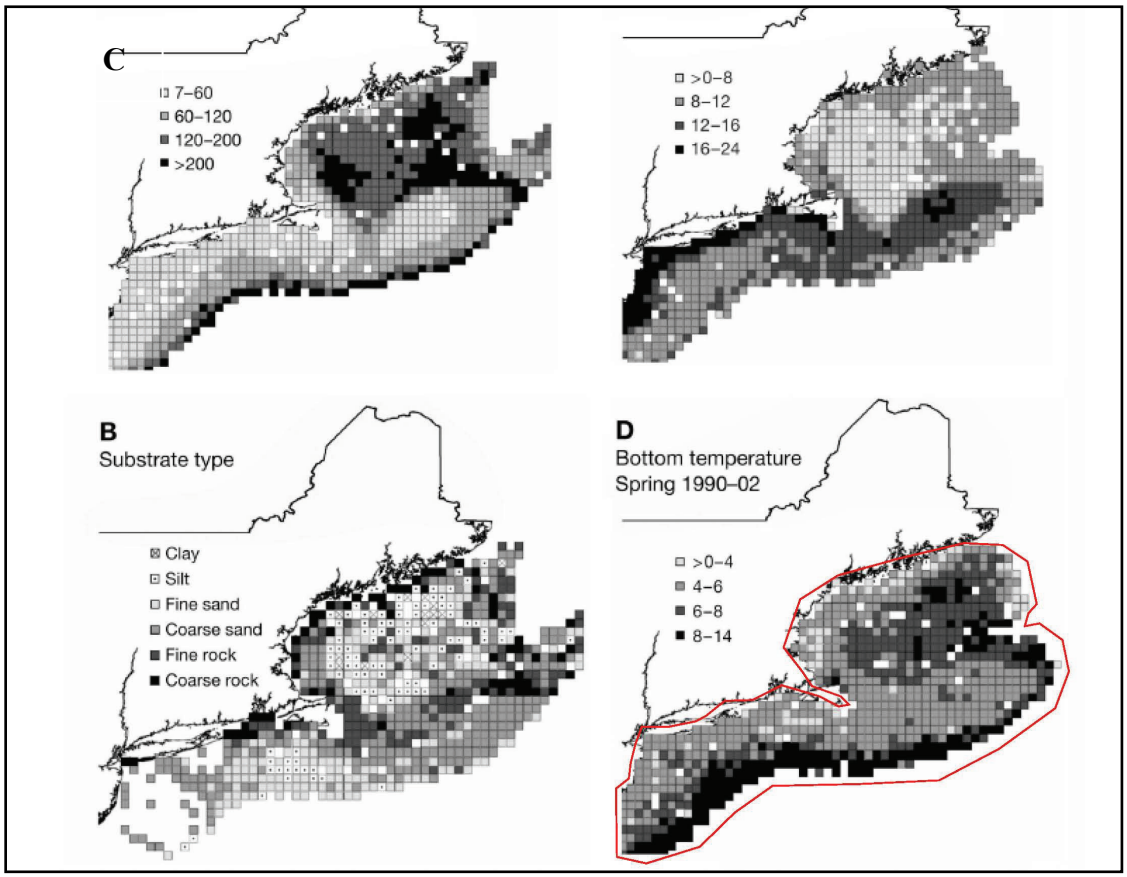


Fig. 1. Map of Closed Area II on Georges Bank illustrating the location of 32 sampling stations (16 inside the closure and 16 outside). Microhabitats in mobile sand occurred in <60 m water depth (**bold** isobath) while immobile sand occurred at depths >60 m

B

Figure 1. Map of 14 sites within the Northwestern Atlantic Ocean during January (2005). For reference, Chesapeake Bay (CB) and Cape Hatteras, NC (CH) are labeled.





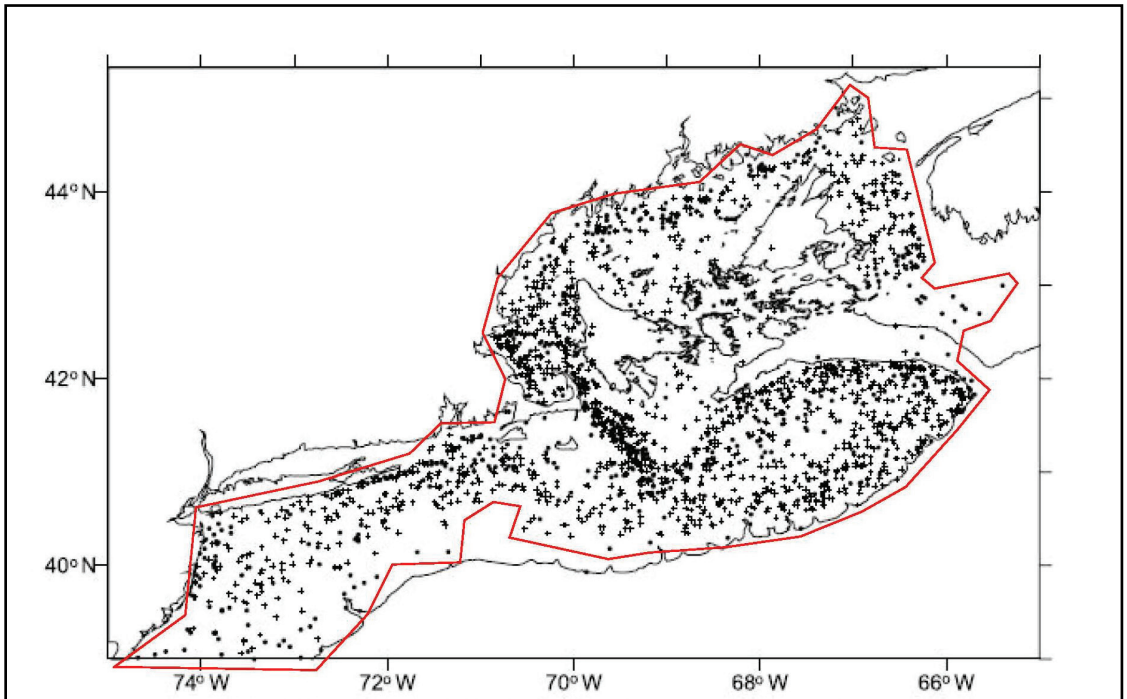


Figure 6. Occurrence of sea raven (crosses) and the significant hangs (black dots).

D

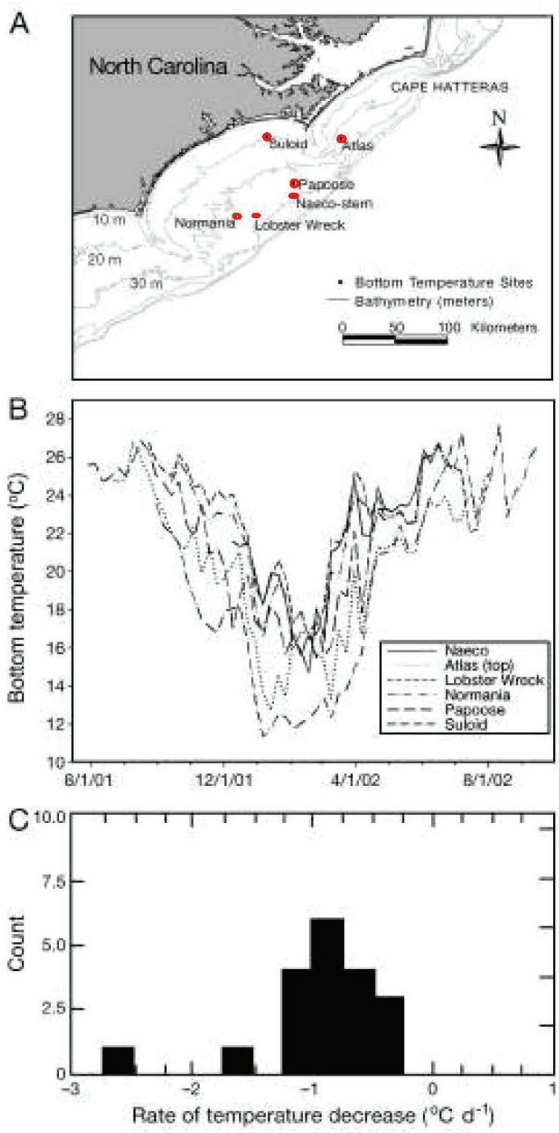


Fig. 1. (A) Location of shipwrecks along North Carolina coast where temperature loggers were deployed; Bathymetry shown to 60 m. Only 10, 20, and 30 m isobaths are labeled. Lionfish have been observed at all sites except the Suloid. (B) Bottom temperatures recorded at each wreck site in (A) during winter of 2001 to 2002. (C) Rate of temperature decline for 19 cold events recorded from sites in (A)

E

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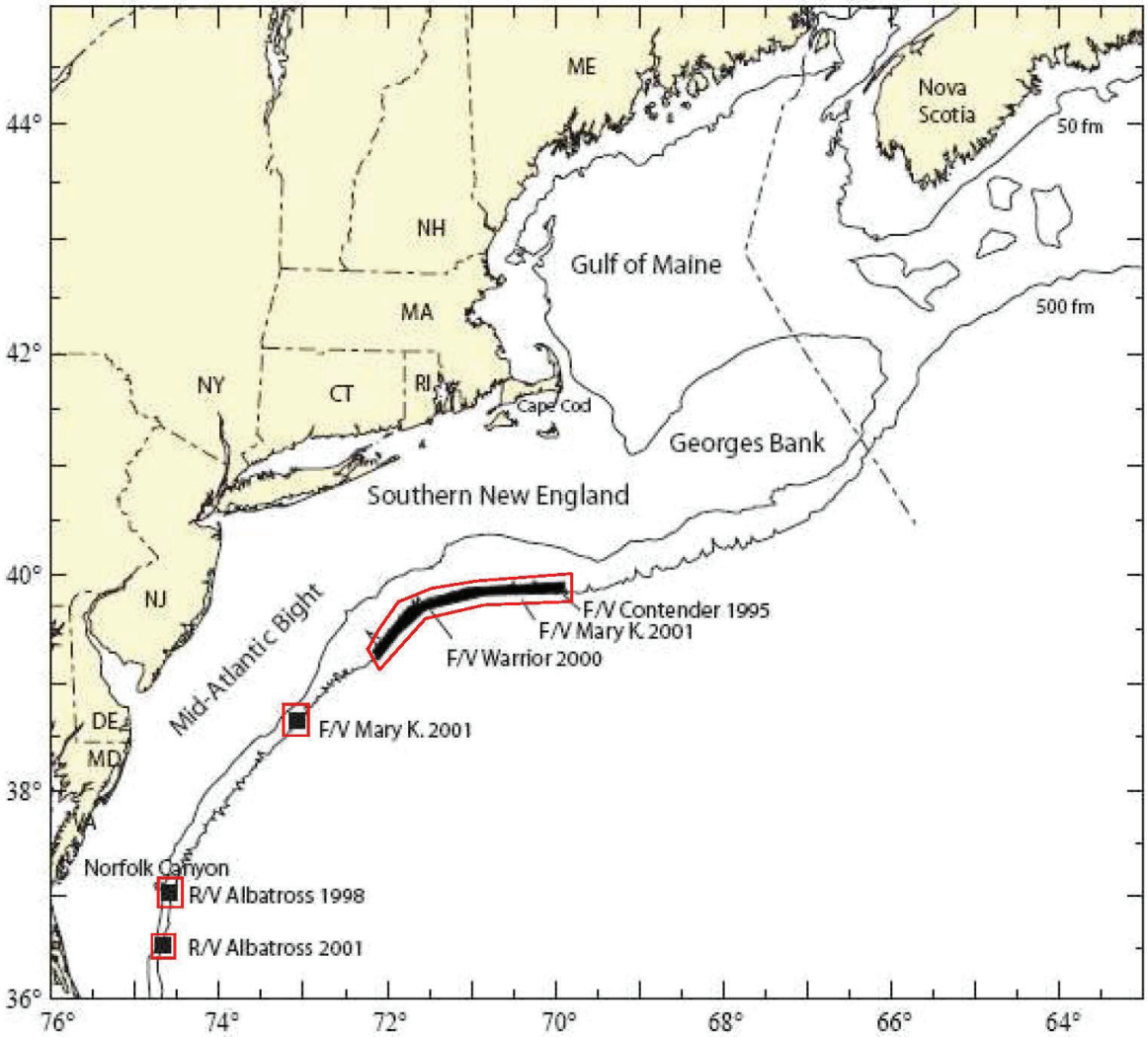


Fig. 1. Continental shelf and slope areas along the northeast coast of the United States, with deep-water sampling areas indicated in solid polygons.

F

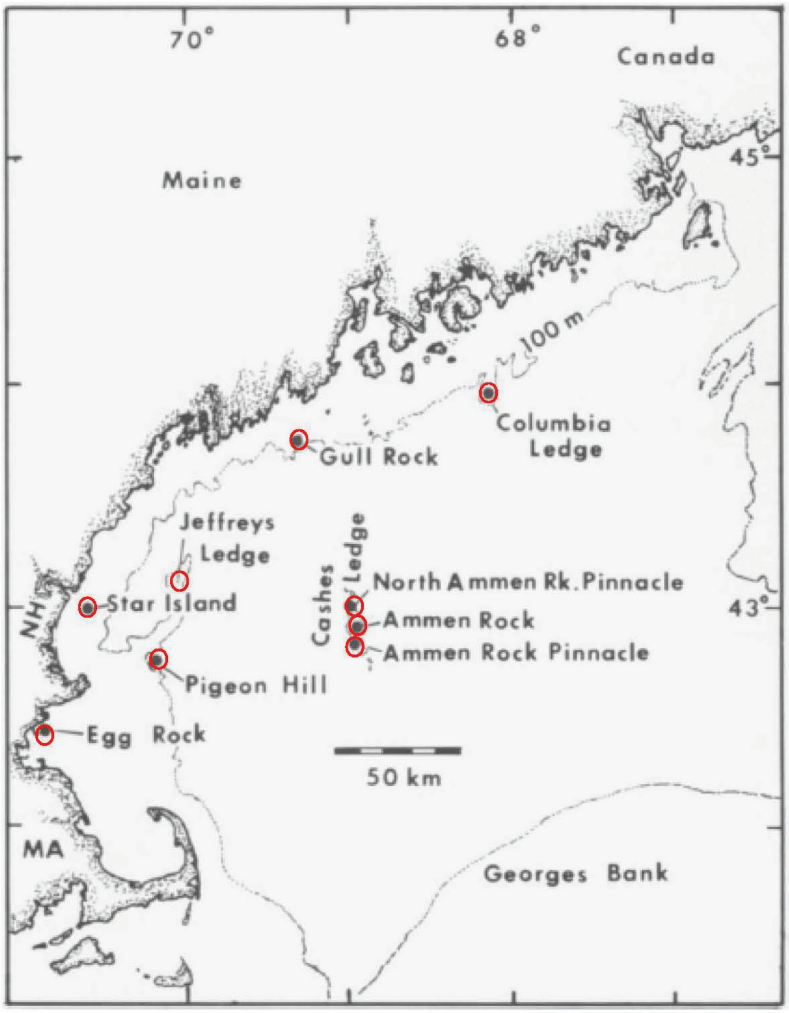


Fig. 1. Map of the Gulf of Maine showing the location of rocky subtidal sites where the predation intensity experiments and photographic estimates of fish abundance were conducted. Dotted line represents the 100 m isobath delineating coastal and offshore regions

G

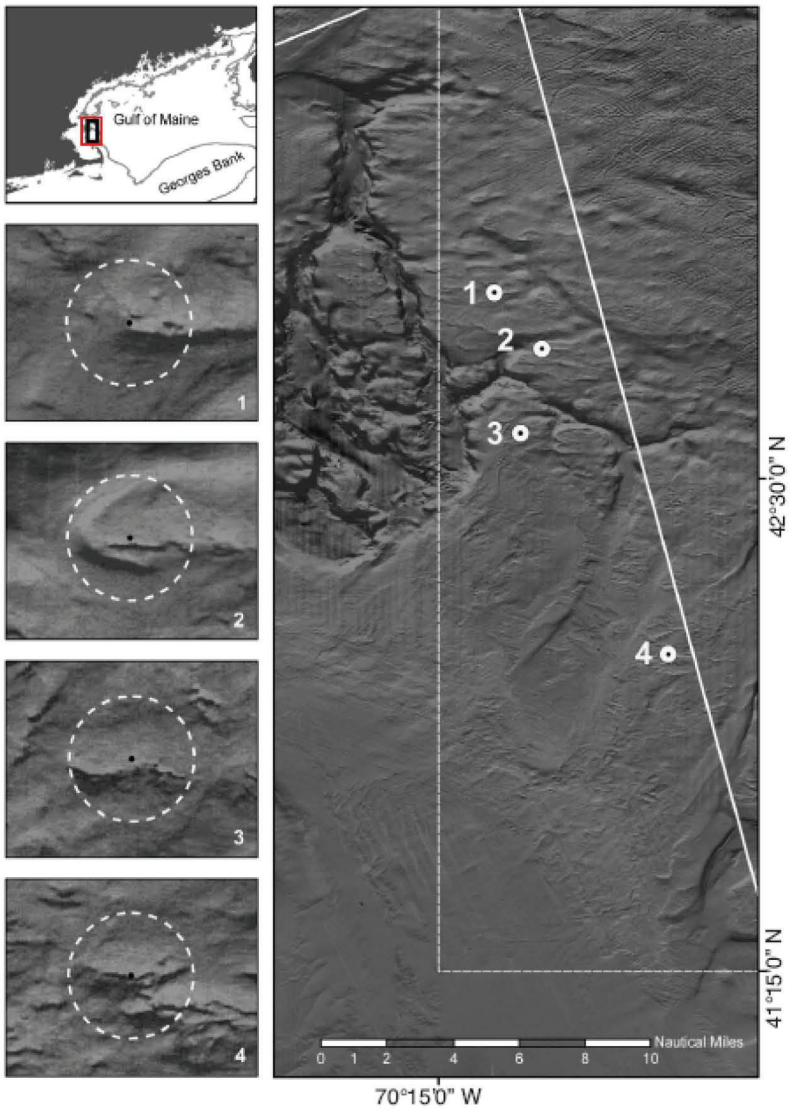
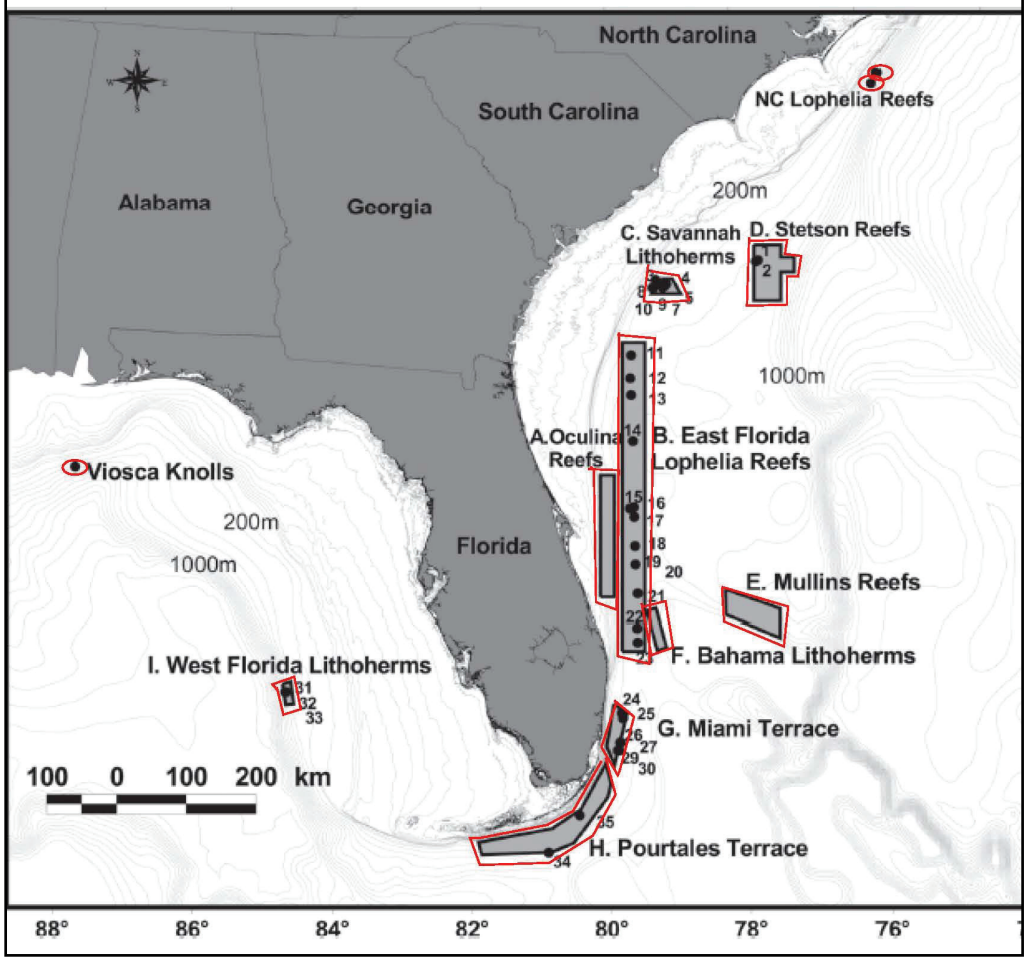


Fig. 1. Sun-illuminated and acoustic backscatter intensity map of the study area in the western Gulf of Maine, USA, including the location of each acoustic receiver (1 to 4) deployed at a deep boulder reef, a 400 m radius of detection around each receiver (dashed circles in small panels), and the boundaries of the western Gulf of Maine closed area and the Stellwagen Bank National Marine Sanctuary (dashed and solid lines, respectively, in large panel)

H

REED ET AL.: FAUNA OF DEEP-WATER *LOPHELIA* REEFS OFF SE USA



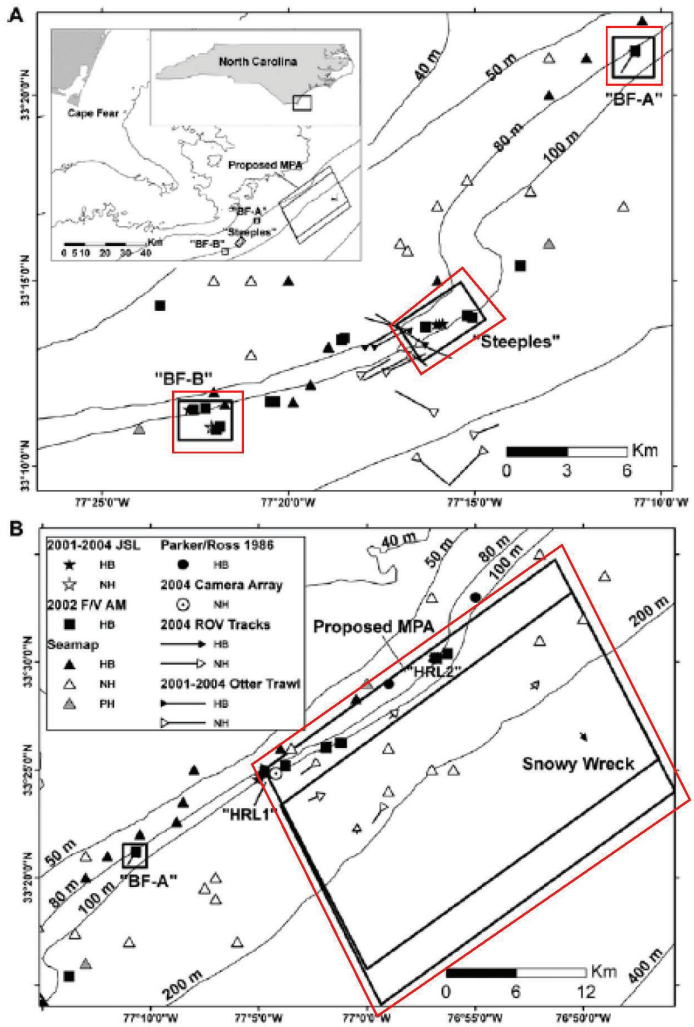


Figure 1. Stations (A) south of the proposed marine protected area (p-MPA) and (B) within the p-MPA off southern North Carolina. The South Atlantic Fishery Management Council proposed the two boundary options for this MPA. Parker and Ross (1986) and SEAMAP-SA (2001) stations are shown. ROV = remotely operated vehicle, JSL = JOHNSON-SEA-LINK, F/V AM = fishing vessel, HB = hardbottom, PH = probable hardbottom, NH = no hardbottom, BF = boulder field, HRL = high relief ledge.

J

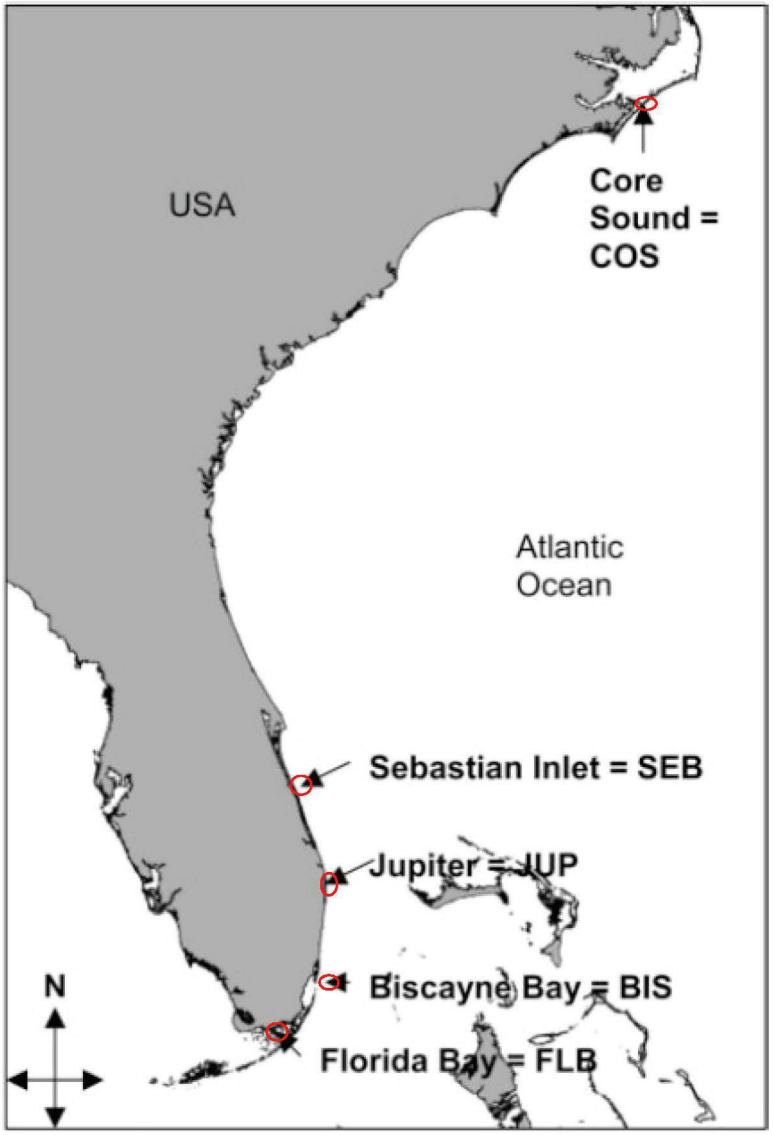
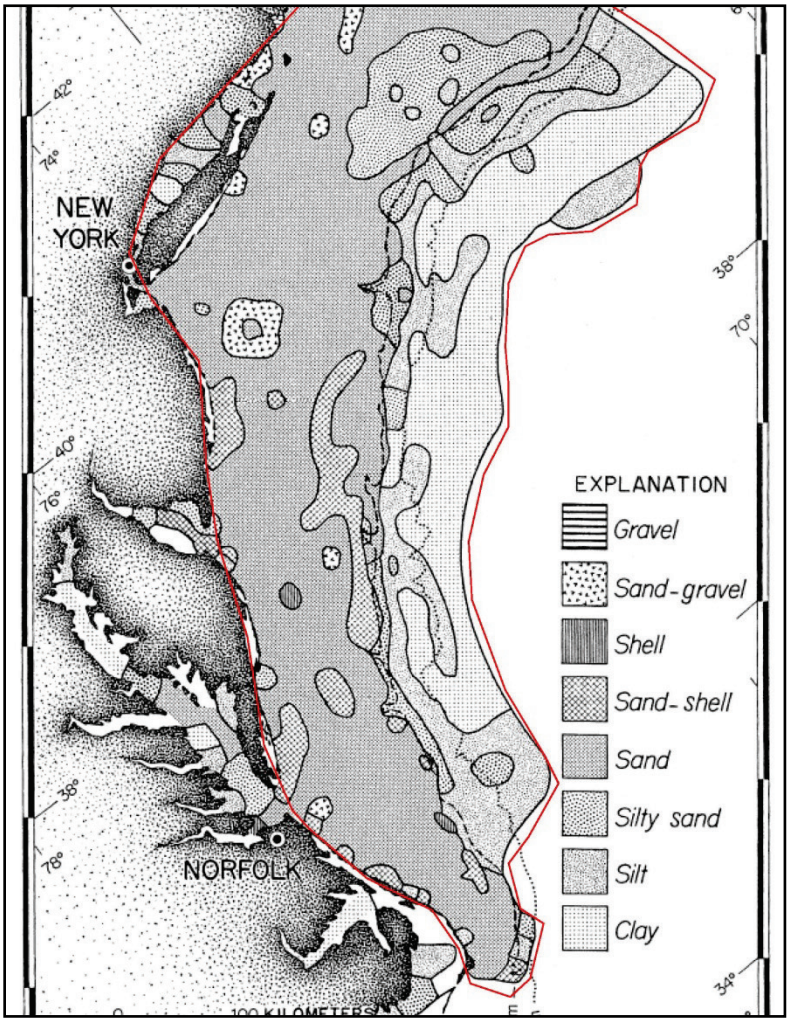


FIGURE 1.—Map of the southeastern United States indicating the five study sites by name and abbreviation.


NEW YORK
NORFOLK
42°
74°
40°
76°
38°
78°
38°
70°
34°
EXPLANATION
Gravel
Sand-gravel
Shell
Sand-shell
Sand
Silty sand
Silt
Clay

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

The Bureau of Ocean Energy Management Mission

The Bureau of Ocean Energy Management (BOEM) works to manage the exploration and development of the nation's offshore resources in a way that appropriately balances economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.