



GoMMAPPS



Gulf of Mexico Marine Assessment Program
for Protected Species

Planning, Outreach and Education Support

Presented By: Tim Marcella and Cherie Jarvis

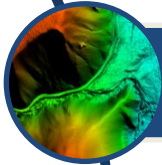




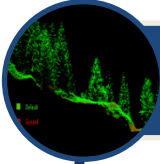
Quantum Spatial



Data Acquisition (lidar, imagery, thermal, hyperspectral, etc.)



Data Processing, Migration & Integration



Data Analysis, Mapping & Analytics



GIS Solutions and App. Development



Onsite Technical Support Services





Quantum Spatial's Role

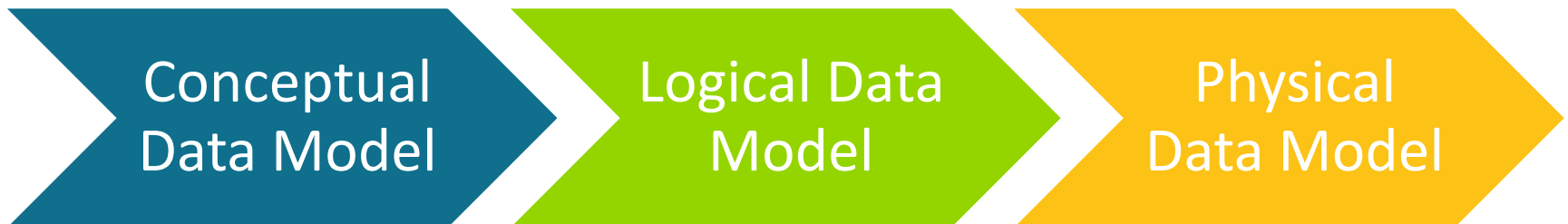
Planning and Outreach Support

- 1. Create a Historical Data Inventory/Gaps Analysis**
- 2. Recommend a Data Management Framework and Draft Data Model**
- 3. Outreach and Educational Materials**
- 4. Support and Facilitate Stakeholders Collaboration**



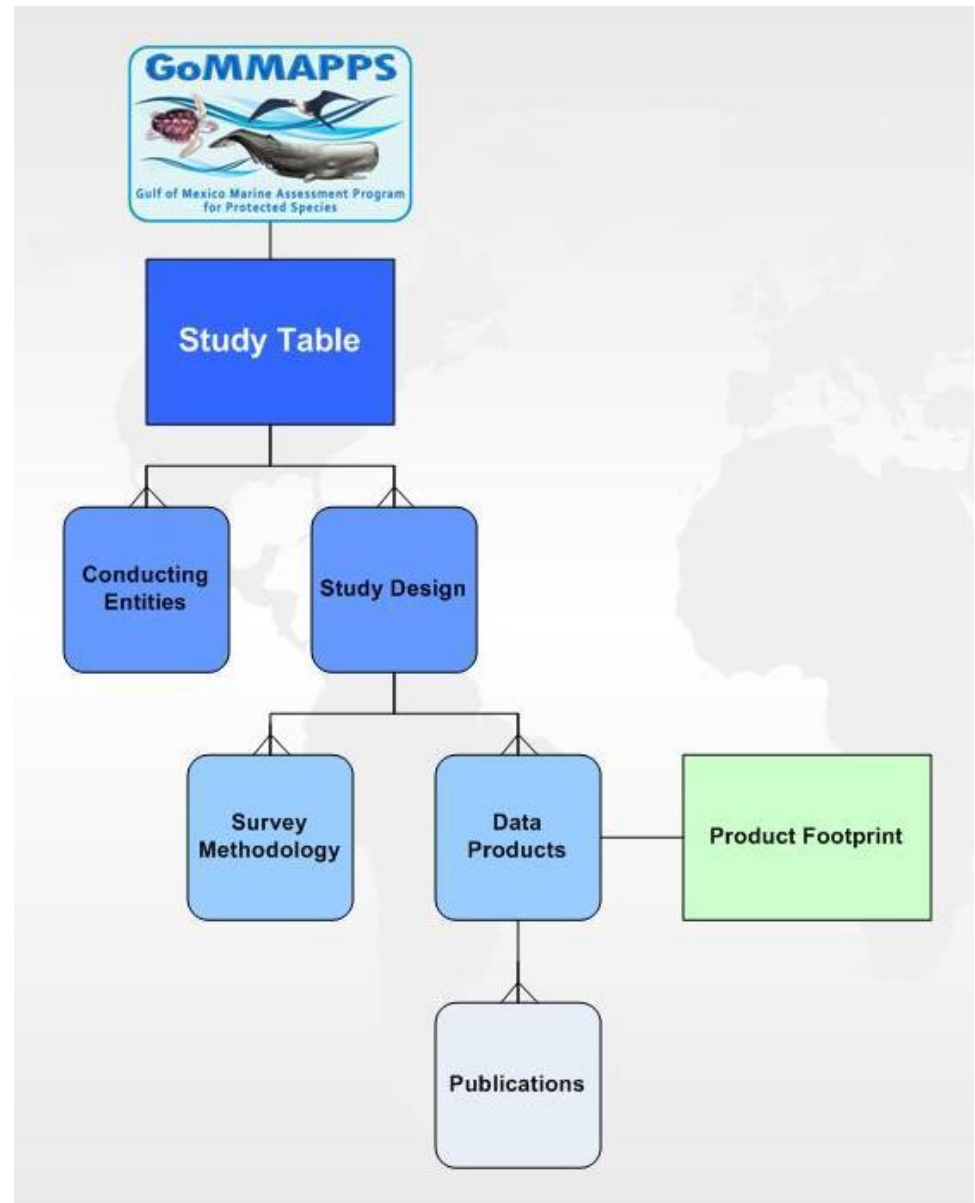
1. Data Inventory/Gaps Analysis

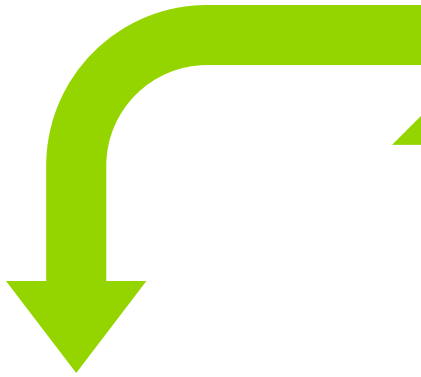
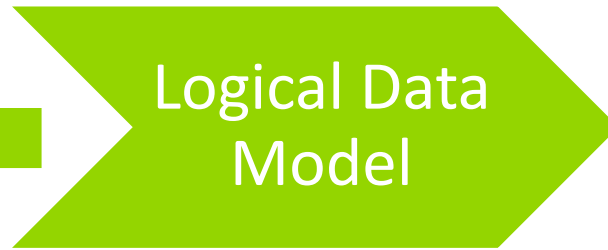
- **Compile a metadata repository**
- **Identify geographic extent of survey effort**
- **Identify Data Gaps – seasonal and spatial**
- **Document Assessment – white paper**



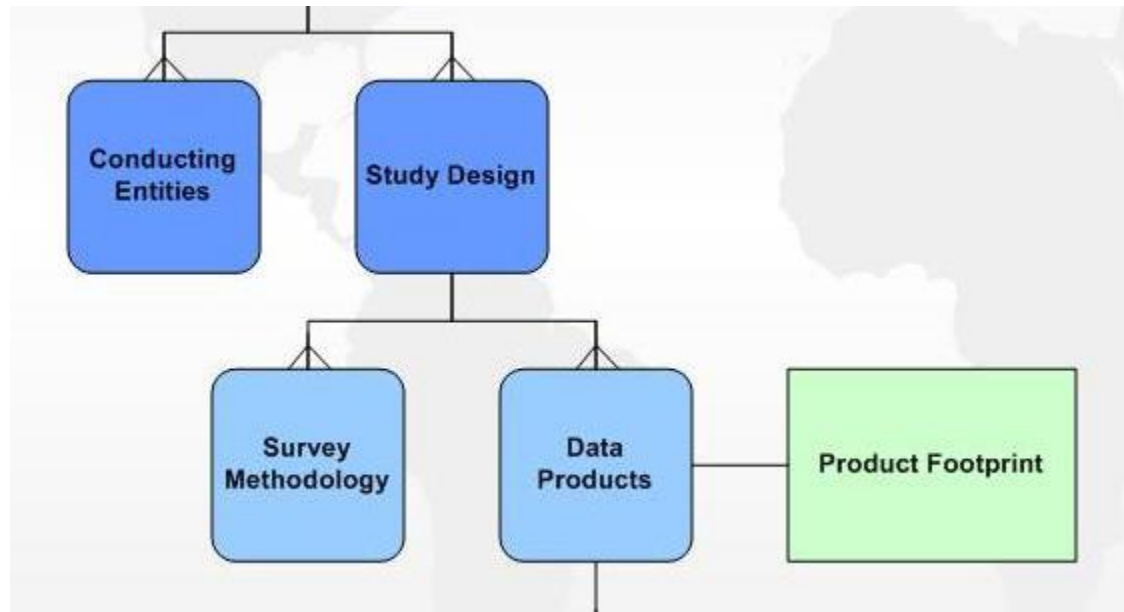
Conceptual Data Model

Designed to capture data on past/current and future Gulf of Mexico research projects





Further define attributes within each table/layer





Logical Data Model

Further define attributes within each table/layer

Example: Survey Methodology

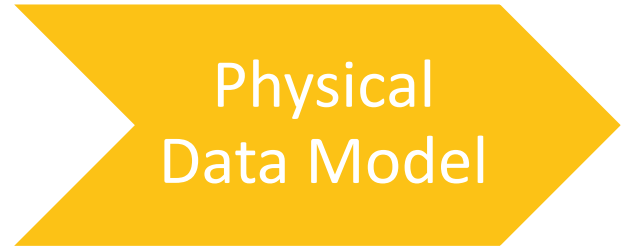
- Survey Type
- Survey Platform
- Survey Extent
 - ...



Physical
Data Model

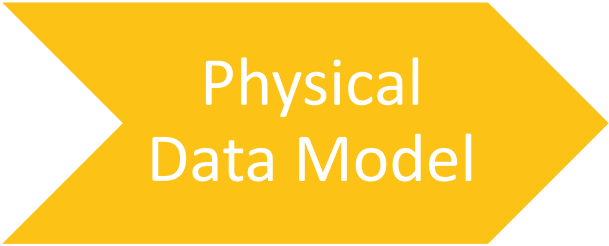
An access database will be constructed





Populated with the metadata information

ContractsID	StudiesID	FieldComponent	Keywords	ProjectStartDate	ProjectEndDate	ContractCost	Category	InstrumentType	SampleType
-235	283	<input checked="" type="checkbox"/>	Trace Metals, Hyc	7/28/1997	12/31/2001	221271	Fates and Effects	Van Veen grab, gravity core, spectrom	surficial sediment, sediment core, trace element
1	600	<input checked="" type="checkbox"/>	Sand Resources,	8/6/2003	3/31/2005	176663.85	Marine Minerals		environmental impacts
2	402	<input checked="" type="checkbox"/>	cANIMIDA, Beauf	5/3/2004	5/8/2009	319173	Fates and Effects	peristaltic pump, ice auger, YSI sonde	water depth, water temperature, suspended so
3	9166	<input checked="" type="checkbox"/>	North Atlantic, M	9/1/1980	7/1/1982	954068	Fates and Effects	drifter, weather tape, oil spill simulat	oil spill site, current, long term net transport reg
4	13326	<input checked="" type="checkbox"/>	Hope Basin, Chuk	9/1/1984	9/1/1988	775855	Endangered Species	de Havilland Twin Otter aircraft, glob	species count, density, weather condition, ice co
5	321	<input checked="" type="checkbox"/>	Radio Frequency	6/3/2005	5/31/2008	257540	Endangered Species	RFID ear tag, Mantis II RFID tag reader	bear movement, count, den site, tag retention,
6	323	<input checked="" type="checkbox"/>	Satellite Teleme	6/20/2007	10/31/2009	9735	Biology		
7	317	<input checked="" type="checkbox"/>	Bowhead Whale	5/10/2004	12/18/2005	22781	Endangered Species		date, time, coordinates, tag type, boat type, tag
8	581	<input checked="" type="checkbox"/>	Gulf of Mexico, E	9/17/2002	2/29/2004	166899	Socioeconomics		
9	9006	<input checked="" type="checkbox"/>	North Atlantic, M	1/1/1980	8/1/1983	4651777	Biology	sediment trap, towed-camera sled, su	zooplankton, suspended sediment, anemone sp
10	584	<input checked="" type="checkbox"/>	Sand resources, C	9/22/2002	5/22/2004	123326	Other	literature review, questionnaire	
11	386	<input checked="" type="checkbox"/>	Polar Bears, Feec	5/8/2002	10/30/2006	226767	Endangered Species	Leica Televiud 77 spotting scope, Leitz	bear, count, age, sex, behavior, habitat use
12	600	<input checked="" type="checkbox"/>	Sand Resources,	8/6/2003	3/31/2005	176663.85	Other		environmental impact
13	393	<input checked="" type="checkbox"/>	Beaufort Sea, Chi	9/22/2003	5/30/2006	400081	Physical Oceanography	USCGC Healy, AVHRR imager, SAR ima	observations, lead size measurements
14	217	<input checked="" type="checkbox"/>	Gulf of Mexico, S	9/24/2003	6/30/2008	548455	Socioeconomics	remotely operated underwater vehicl	shipwreck, archaeological area, culture, sedime
15	221	<input checked="" type="checkbox"/>	Branching Deep \	7/28/2003	5/31/2006	51914	Biology	Johnson Sea-Link submersible vehicle	bathymetry, video, visual data
16	233	<input checked="" type="checkbox"/>	Hypoxia, Product	9/1/2004	3/31/2005	22575	Fates and Effects		
17	101	<input checked="" type="checkbox"/>	Gulf of Mexico, C	9/2/2004	12/31/2007	66385	Socioeconomics		
18	249	<input checked="" type="checkbox"/>	Hurricanes, Wave	6/1/2006	6/30/2008	547544	Physical Oceanography	satellite, surface buoy, acoustic Dopp	satellite altimetry observation, wind data, wave
19	135	<input checked="" type="checkbox"/>	Navigation, Chan	4/4/2001	3/31/2004	702500	Biology		
20	143	<input checked="" type="checkbox"/>	Gulf of Mexico, C	6/30/1998	3/30/2000	341844	Other		
21	97	<input checked="" type="checkbox"/>	Western Gulf, Bu	7/29/2003	10/31/2006	297645	Biology	Klein model, side-scan sonar, BioSon	sonar image, acoustic data, video
22	15063	<input checked="" type="checkbox"/>	Meteorological C	1/1/2006	7/31/2008	50000	Air Quality		
23	12238	<input checked="" type="checkbox"/>	Yakutat Bay, Sea	10/1/1994	1/1/1998		Biology	interview, Grumman Goose aircraft, C	respondant, distribution survey, observation, co
24	10243	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	6/1/1973	1/1/1975	28404	Socioeconomics	literature review	
26	9232	<input checked="" type="checkbox"/>	North Atlantic, M	1/1/1973	12/31/1975	201824	Socioeconomics		
27	14301	<input checked="" type="checkbox"/>	Eastern Gulf, Mis	1/1/1974	3/1/1974	3000	Workshop		
28	14326	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	5/1/1974	4/1/1978	961278	Baseline	long range navigation (LORAN) A and	sediment, infauna, epifauna, turbidity, benthic,
29	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	10/1/1973	6/1/1977	3872317	Baseline	Niskin bottle, stepped oblique trawl,	suspended matter, zooplankton, neuston, trace
30	9001	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	1/1/1974	1/31/1976	52830	Biology	R/V Alaminos, Nansen bottle, Niskin	benthic, ocean temperature, salinity, oxygen, st
31	14303	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	6/1/1974	8/1/1975	25991	Baseline	atomic absorption spectrophotometri	bottom sediment, dissolved oxygen, suspended
32	14306	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	6/1/1974	7/15/1975	174040	Physical Oceanography		
33	9221	<input checked="" type="checkbox"/>	Zooplankton, Sec	10/29/1975	11/10/1976		Biology	mass spectrometer, gas chromatograp	sediment, benthic fauna, zooplankton, aliphatic
34	14312	<input checked="" type="checkbox"/>	Western Gulf, Ba	10/1/1974	1/1/1976	465450	Biology	SYMAP computer program, winch, EG	depth record, side scan record, sediment, rock, f
35	14304	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	3/1/1975	9/1/1975	22063	Baseline	multivariate analysis	salinity, temperature, station depth, zooplankt
36	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	1/1/1975	6/1/1977	3872317	Baseline	Niskin bottle, stepped oblique trawl,	suspended matter, zooplankton, neuston, trace
37	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	1/1/1975	6/1/1977	3872317	Physical Oceanography	Niskin bottle, stepped oblique trawl,	suspended matter, zooplankton, neuston, trace
38	9213	<input checked="" type="checkbox"/>	Mid-Atlantic, Ne	6/17/1975	8/1/1977	1873138	Baseline	acoustic release-transponder, acrylic	air temperature, atmospheric pressure, cloud co
39	14311	<input checked="" type="checkbox"/>	Eastern Gulf, Mis	6/1/1975	2/1/1976	9216	Baseline	mortar and pestle, Virtis homogenize	sponge, hydrozoan, anthozoan corals, bivalve, re
40	9002	<input checked="" type="checkbox"/>	Gulf of Maine, Irr	7/1/1975	12/31/1975	48311	Biology		



Physical Data Model

Spatial layer will be linked – similar to ESPIS

All Access O

Search...

- LU_AwardType
- LU_Criteria
- LU_CSEstyle
- LU_DataDelivery
- LU_DataSources
- LU_DocumentType
- LU_FundingEntit
- LU_SurveyTypes
- QAQC_Conduct
- QAQC_Contract
- QAQC_DataProd
- QAQC_Document
- QAQC_ESP_App
- QAQC_Publicat
- QAQC_Spreads
- QAQC_Studies
- QAQC_Umbrella
- UserInfo

Queries

- Find duplicates
- Find duplicates
- Find duplicates
- Find StudiesID
- GeoFootprints
- OngoingStudies
- QAQC_Conduct
- qyDataProducts
- qyPublications
- qyPublications_FinalReports
- qySeaTurtleStudies
- qyStudyDocuments
- qyStudyPublications
- Quest

Sea Turtle Behavior Relative To Offshore Structures In The West And Central Gulf Of Mexico

Gulf of Mexico | Start Of: 1977 - Jan 01, 1994 | Biology

ABSTRACT

The Kemp's ridley turtle synopsis was originally written for presentation at the Western Atlantic Turtle Symposium held at Mayaguez, Puerto Rico, October 12-16, 1987. This version was requested by the organizing committee, particularly Fred Barry, as a contribution from the Instituto Nacional de la Pesca (INP). However, for diverse reasons, it was never published. The RAD style synopsis have the distinction of being documents arising from consultation at the request of government agencies charged with managing fishery resources. These synopses are summaries of published research on the biology of these species, and are made available to resource managers. Bi-national meetings between Mexico and the United States (MEXUS-GULFI) were initiated in 1973 in order to promote research on species of mutual interest and it was agreed to publish the results on the joint work undertaken at Rancho Nuevo, Tamaulipas. In the 1985 MEXUS-GULFI meeting it was decided to publish some of the research results accumulated by updating the 1987 synopsis. A proposal was made through the U.S. Fish & Wildlife Service (FWS) and the U.S. Minerals Management Service (MMS) to work with INP on this project. However, in spite of the great interest shown, financial support was not available and the work could not be completed. It was towards the end of 1991 that through the U.S. National Marine Fisheries Service (NMFS) and the aforementioned agencies that the project was re-activated. At present, the Kemp's ridley population is considered endangered because of its restricted distribution and because it has only one nesting area in the Gulf of Mexico, which covers only 100 km of coastline. Fortunately, up to now, human habitation is sparse on this beach. Among the marine turtles, the Kemp's ridley is the most vulnerable to man's actions, for which reason the Mexican government has given it the greatest attention. In 1966, a research and conservation program was initiated and has continued uninterrupted to date. Starting in 1978, a joint program (MEXUS-GULFI) has been in place for research and conservation at the rancho Nuevo nesting beach. This beach was declared the first natural reserve for marine turtles in Mexico, July 4, 1977.

STUDY FOOTPRINT

STUDY INFORMATION

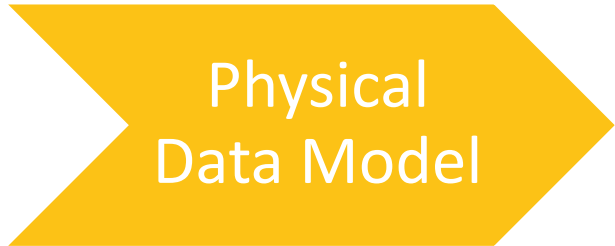
PROJECT DATES	October 01, 1977 - January 01, 1984
REGION	Gulf of Mexico
CONDUCTING ENTITY	National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center
DISCIPLINE	Biology
KEYWORDS	Lepidochelys kempi, Kemp's ridley turtle, Galapagos Island, Mediterranean Sea

BOEM STUDY REPORTS AND DOCUMENTS

Final Report	Synopsis of Biological Status on the Kemp's ridley turtle, Lepidochelys kempi (Garman, 1860)		
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ESPIS – BOEM/NOAA partnership product

id	number	checked	name	start	end	baseline	description
36	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	1/1/1975	6/1/1977	3872317	Baseline
37	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen	1/1/1975	6/1/1977	3872317	Physical Oceanography
38	9213	<input checked="" type="checkbox"/>	Mid-Atlantic, Ne	6/17/1975	8/1/1977	1873138	Baseline
39	14311	<input type="checkbox"/>	Eastern Gulf, Mis	6/1/1975	2/1/1976	9216	Baseline
40	9002	<input type="checkbox"/>	Gulf of Maine, Im	7/1/1975	12/31/1975	48311	Biology



Physical Data Model

Resulting Product

- Spatially and seasonally registered database
- Information relevant to survey design and effort
 - Links to relevant publications and products
- Document outlining research gaps in the Gulf

The screenshot shows a web application interface. On the left is a sidebar titled 'All Access Objects' with a search bar and two sections: 'Tables' and 'Queries'. The 'Tables' section lists various data tables like 'LU_AwardType', 'LU_Criteria', 'LU_CSEStyle', etc. The 'Queries' section lists 'Find duplicates' and 'Find StudiesID'. The main area shows a map and a 'RELATED PUBLICATIONS' section with a search icon and a message 'There are no publications available at this time.' Below this is a table with columns for ID, Name, Date, and Description.

ID	Name	Date	Description
36	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen
37	14325	<input checked="" type="checkbox"/>	Eastern Gulf, Cen
38	9213	<input checked="" type="checkbox"/>	Mid-Atlantic, Ne
39	14311	<input type="checkbox"/>	Eastern Gulf, Mis
40	9002	<input type="checkbox"/>	Gulf of Maine, Im

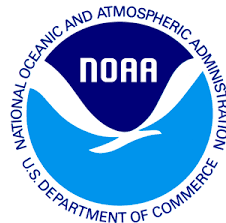


2. Data Management Recommendations

Tiers of Data Management

- Research Study Level
- GoMMAPPS Project Level – Shared Resources
- Public Level

Reviewing AMAPPS data models





3. Outreach/Education

Marine Cadastre

- NOAA/BOEM

Story Maps

- Descriptive/visual format for displaying spatial data

GoMMAPPS Webpage

- Support content and updates as project progresses



3. Outreach/Education – Marine Cadastre

MarineCadastre.gov

[Maps](#) [Data](#) [Uses](#) [Tools](#) [News](#) [About](#)

An Ocean of Information

A joint BOEM and NOAA initiative providing authoritative data to meet the needs of the offshore energy and marine planning communities.

Click for Map Products



Maps

Data

Uses

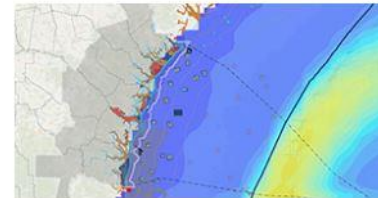
Features



Aquaculture



Tropical Cyclone Exposure in the United States



Georgia Coastal and Marine Planner

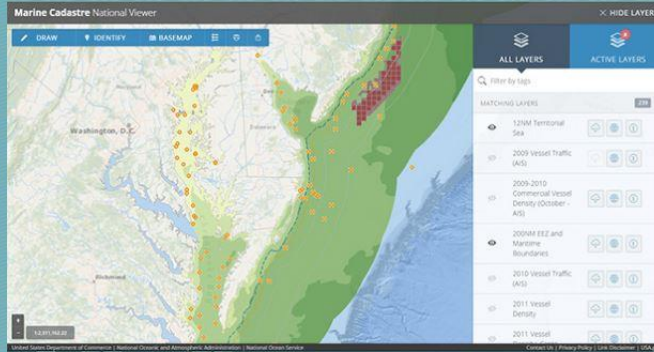


3. Outreach/Education – Marine Cadastre

Ma

MarineCadastre.gov

Maps Data Uses Tools News About



Maps

MarineCadastre.gov data can be viewed a number of ways: through a national viewer, regional and thematic maps, and story maps. Additional maps can be found within the marine cadastre group on ArcGIS.com.

National Viewer v3.0

The MarineCadastre.gov National Viewer contains most of the data in the registry and also some custom tools, such as adding coordinates.

National Viewer

Regional Maps

Regional Web maps have been developed in ArcGIS Online to focus on ocean planning data at the regional level.



South Atlantic Bight Marine Assessment
MarineCadastre.gov map features data published by The Nature Conservancy relating to the South Atlantic Bight Marine Assessment.



Northwest Atlantic Marine Ecological Assessment
This MarineCadastre.gov map features the Nature Conservancy's Northwest Atlantic Marine Ecoregional Assessment data.

Thematic Maps

Thematic Web maps have been developed in ArcGIS Online and include data that focus on a specific theme.



US Atlantic Coast Fishing Atlas
Digital version of the Anglers' Guide to the United States Atlantic Coast.



Human Uses of the Ocean
This MarineCadastre.gov map features ocean uses data gathered from use experts through participatory GIS methods offer spatial representations for a wide range of uses.

Story Maps

Story maps combine data and textual information to explain how ocean data can be used and why it is important.



Tropical Cyclone Exposure in the United States
This MarineCadastre.gov story map illustrates modeled exposure of U.S. marine and coastal waters to winds associated with tropical cyclones.



North Carolina Offshore Wind Turbine Simulation
Simulation depicting offshore wind facilities at different locations along the North Carolina coastline.

Fea

the United States

Planner





3. Outreach/Education – Marine Cadastre

Ma

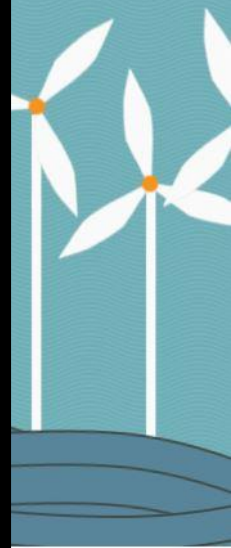
MarineCadastre.gov Maps Data Uses Tools News About

The screenshot displays the MarineCadastre.gov website interface. The main map shows the North Atlantic Ocean with a heatmap overlay indicating biological richness. The heatmap is color-coded from blue (low) to red (high), with the highest values concentrated along the eastern coast of North America. The map includes labels for various oceanographic features: Labrador Sea, Labrador Basin, Newfoundland Basin, North Atlantic Ocean, Solum Plain, North American Basin, Hatteras Plain, Sargasso Sea, and Mid-Atlantic Ridge. Depth contours are marked with values such as 1536, 6022, and 8201. The sidebar on the right, titled 'Filter by tags', lists several biological and oceanographic metrics, each with an eye icon, a refresh icon, a globe icon, and a count icon (1). The visible tags are: Richness, Avian Species Richness, Avian Total Relative Abundance, Bathymetric Contours, Benthic Cover, Biologically Important Areas for Cetaceans - Feeding, Biologically Important Areas for Cetaceans - Migratory Corridor, and Biologically Important Areas for Cetaceans - Reproduction.

Tag	Eye Icon	Refresh Icon	Globe Icon	Count Icon
Richness				1
Avian Species Richness				1
Avian Total Relative Abundance				1
Bathymetric Contours				1
Benthic Cover				1
Biologically Important Areas for Cetaceans - Feeding				1
Biologically Important Areas for Cetaceans - Migratory Corridor				1
Biologically Important Areas for Cetaceans - Reproduction				1

the United States

Planner



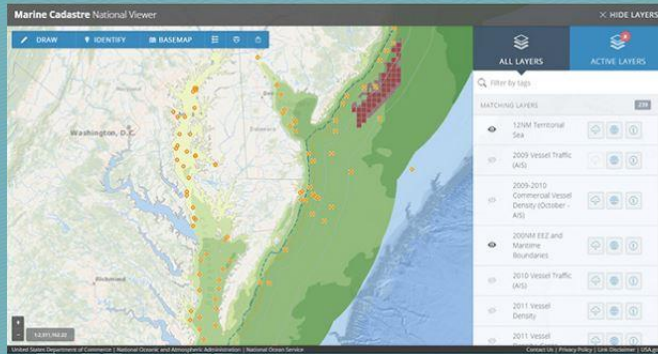


3. Outreach/Education – Story Maps

Ma

MarineCadastr.gov

Maps Data Uses Tools News About



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Story Maps

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- North Carolina Offshore Wind Turbine Simulation**
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- Considering Atlantic Shipwrecks when Planning Offshore Energy**
Atlantic Shipwreck Database density analysis of coordinate locations compiled in the Outer Continental Shelf.
- Understanding Ocean Wind Energy**
Check out how MarineCadastr.gov is being used to assist in Ocean Wind Energy planning.
- MAPPING Human Uses of the Ocean**
Informing Marine Spatial Planning Through Participatory GIS a MarineCadastr.gov Story Map.
- Predicting Cetacean Density with Geospatial Models**
This MarineCadastr.gov story map details the development of models that map cetacean, and specifically marine mammal, distribution.
- Finding Safe Anchor: Employing Vessel Traffic Data in Jacksonville, Florida**
Click within the maps to learn more about the data.

Close

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MarineCadastr.gov data published by the National Oceanic and Atmospheric Administration's Atlantic Bight Ecoregional Assessment.

Northwest Marine Energy Assessment
This MarineCadastr.gov story map features the Northwest Atlantic Ecoregional Assessment.

South Carolina Renewable Energy Planning
This MarineCadastr.gov story map features data on wind energy potential in South Carolina.

View All

OEM Ocean Energy Management NOAA

National Ocean Service | Privacy Policy | Link Disclaimer | Contact Us



3. Outreach/Education – Story Maps

marinecadastre.gov



Predicting Cetacean Density with Geospatial Models

Why do we need cetacean data?

Whales, dolphins, and porpoises are collectively named [cetaceans](#). These [marine mammals](#) inhabit many riverine, estuarine, coastal, and marine areas. Many were hunted during the whaling era, and their populations are still recovering. Although commercial whaling has not occurred in U.S. waters in decades, humans continue to increase their use of the ocean and its resources in other ways.

The [Marine Mammal Protection Act](#) prohibits activities that would harm or disturb cetaceans, and other marine mammals, and impact their populations. To evaluate possible impacts, managers and stakeholders need to know how cetaceans are distributed geographically, how their distributions change with the seasons, what behaviors they are engaged in, and how many individuals exist in each area. With this knowledge, managers can do their best to avoid causing harm. The National Oceanic and Atmospheric Administration (NOAA) is the federal agency with responsibility for collecting information on where these marine protected species live. Recently, a group of scientists used data collected by NOAA, state agencies, and academic institutions to produce detailed maps of cetacean distributions along the East Coast and Gulf of Mexico by analyzing and modeling how sightings of cetaceans relate to environmental conditions such as water temperature and ocean currents. Explore this interactive story map to dig deeper into the process of creating these maps.

Collecting Cetacean Sightings

Because cetaceans live mainly underwater, coming to the surface only to breathe or rest, they are hard to see. They cannot be detected from satellites (except for the largest whales, and only in ideal

Predicting Cetacean Density with Geospatial Models



Stellwagen Bank National Marine Sanctuary: Photo taken under NOAA Fisheries Permit #605-1904



MarineCadastre.gov





3. Outreach/Education – Story Maps

marinecadastre.gov



Predicting Cetacean Density with Geospatial Models

Collecting Cetacean Sightings

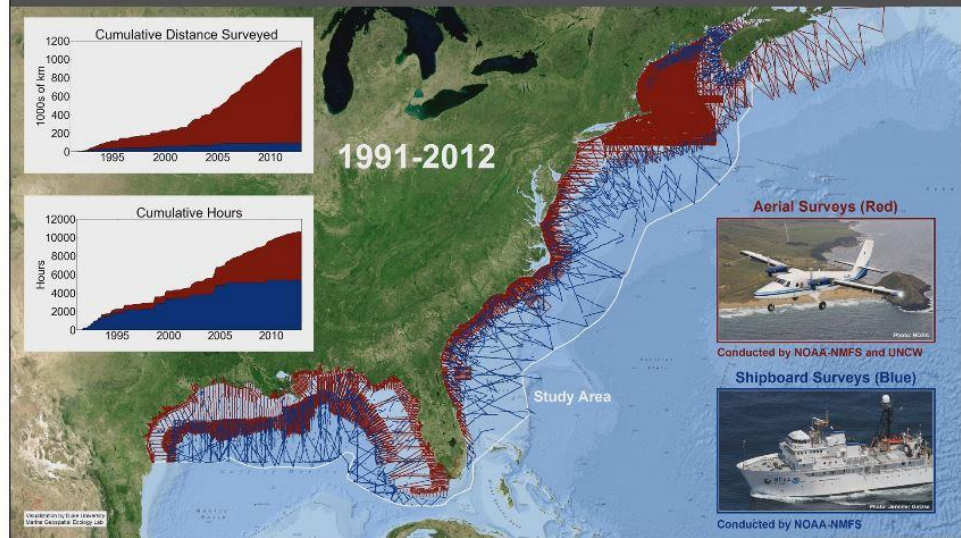
Because cetaceans live mainly underwater, coming to the surface only to breathe or rest, they are hard to see. They cannot be detected from satellites (except for the largest whales, and only in ideal conditions). While it is possible to continually monitor the positions of individual animals with electronic tags, it is not practical or cost effective to monitor an entire population this way. Because of these difficulties, scientists must build models that predict cetacean distributions from limited observations, similar to how meteorologists predict the weather.

Scientists start the process by surveying the ocean for cetaceans, using a methodology called *visual line-transect surveying*. Research vessels and low-flying aircraft carry specially trained observers along carefully planned, zig-zagging routes over the ocean. The observers carefully chart the exact locations, times, species names, and numbers of animals spotted along the route. They also maintain a continuous record of environmental conditions, including the roughness of the sea, the weather, the presence of glare from the sun, and other factors that affect their ability to detect animals, so that they may account for these factors when the data are analyzed. Survey teams repeat routes during different seasons and years, and plan new routes, to try to fill in seasonal and geographic gaps in survey coverage.

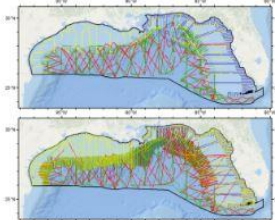


Aggregated Survey Data

1991-2012

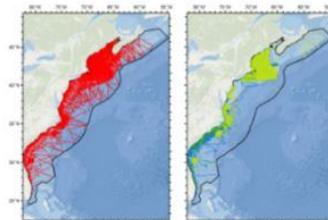


Gulf of Mexico Study Area



Top: 1998-2009 – 62,000 linear km
Bottom: 1992-2009 – 195,000 linear km

East Coast Study Area



Summer: 340,000 linear km
Fall, Winter, Spring: 722,000 linear km

Spring
Summer
Fall
Winter

4. Support/Facilitate Stakeholder Engagement



February 6-9, 2017
Hyatt Regency Hotel, New Orleans



Thank You for your Attention

Project Team

- **Cherie Jarvis, P.M.P. – Senior Project Manager**
- **Tim Marcella, M.S. - Technical Lead/SME**
- **Alexa Ramirez, M.S., GISP – Data Manager**
- **Local Subject Matter Expert(s) – defined by the needs of the project.**

