

# GAME – Evaluating Available Data for the Gulf of Mexico through Experts' Opinions

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# Outline

GAME project overview

Qualitative gap analysis

Quantitative gap analysis:

Survey

Analysis

Results

Next steps

# Gulf GAME: Objectives

The aim of the GAME project is to develop an inventory of existing coastal and marine information within the Gulf of Mexico. This will serve as a foundation to develop a spatial framework for Coastal and Marine Spatial Planning.

The data inventory has both a regional and local scope and focuses on gathering data and mapping coastal habitats from the estuaries onshore to the edge of the continental shelf offshore.

# Qualitative Gap Analysis

“Gap analysis” refers to the identification of gaps in information.

Information gaps need to be identified before management practices, such as CMSP, can be implemented.

The word “qualitative” denotes the effort to produce maps showing presence/absence of data.

The qualitative gap analysis products are just a snapshot taken at a specific time.

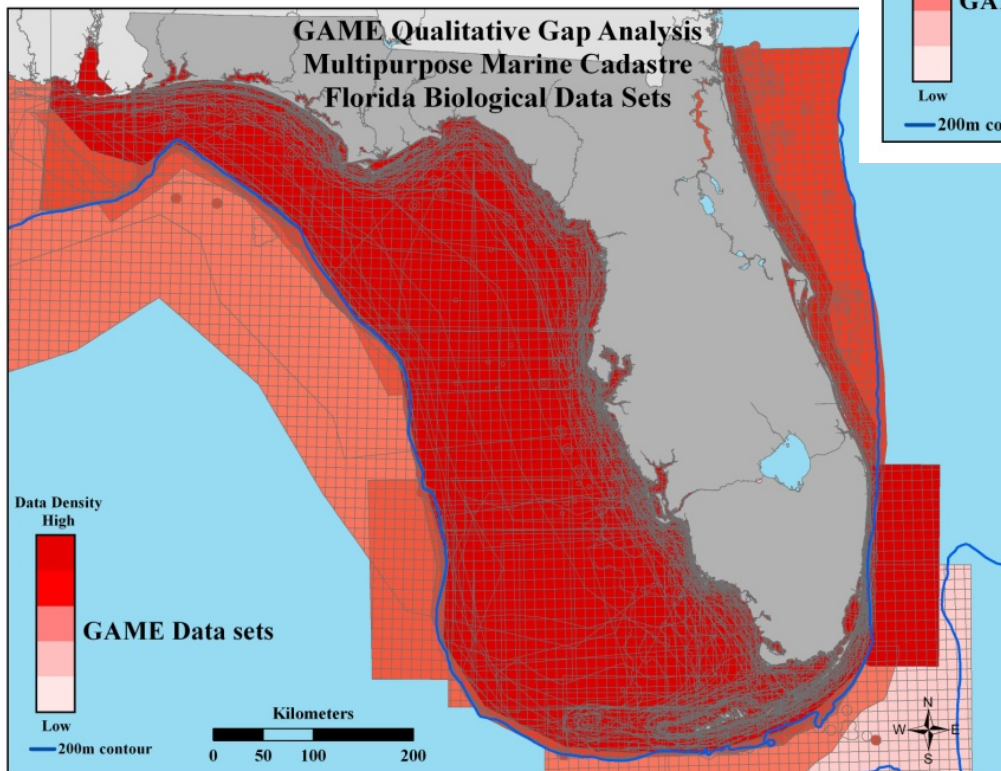
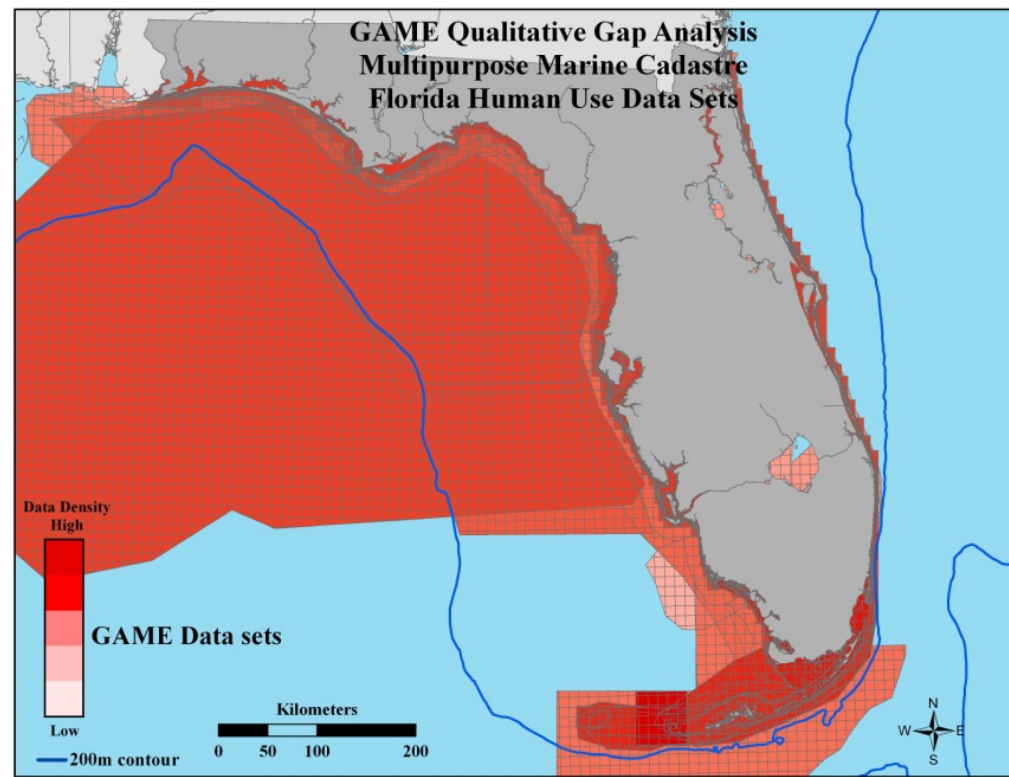
# Methodology

The data used to create and display gap maps were obtained from the GAME Catalog.

The projection was set to Albers, North American Datum of 1983.

Gap maps were created for each U.S. Gulf State and aggregated according to the GAME Classes (Biological, Chemical, Geological, Human Uses Activities, and Physical).

# Example of qualitative gap analysis results for Florida



# Gap Analysis: Qualitative versus Quantitative

The word “qualitative” denotes the effort to produce maps showing presence/absence of data.

A more detailed “quantitative” gap analysis allows to assign a value to available data sets based on experts’ opinions.

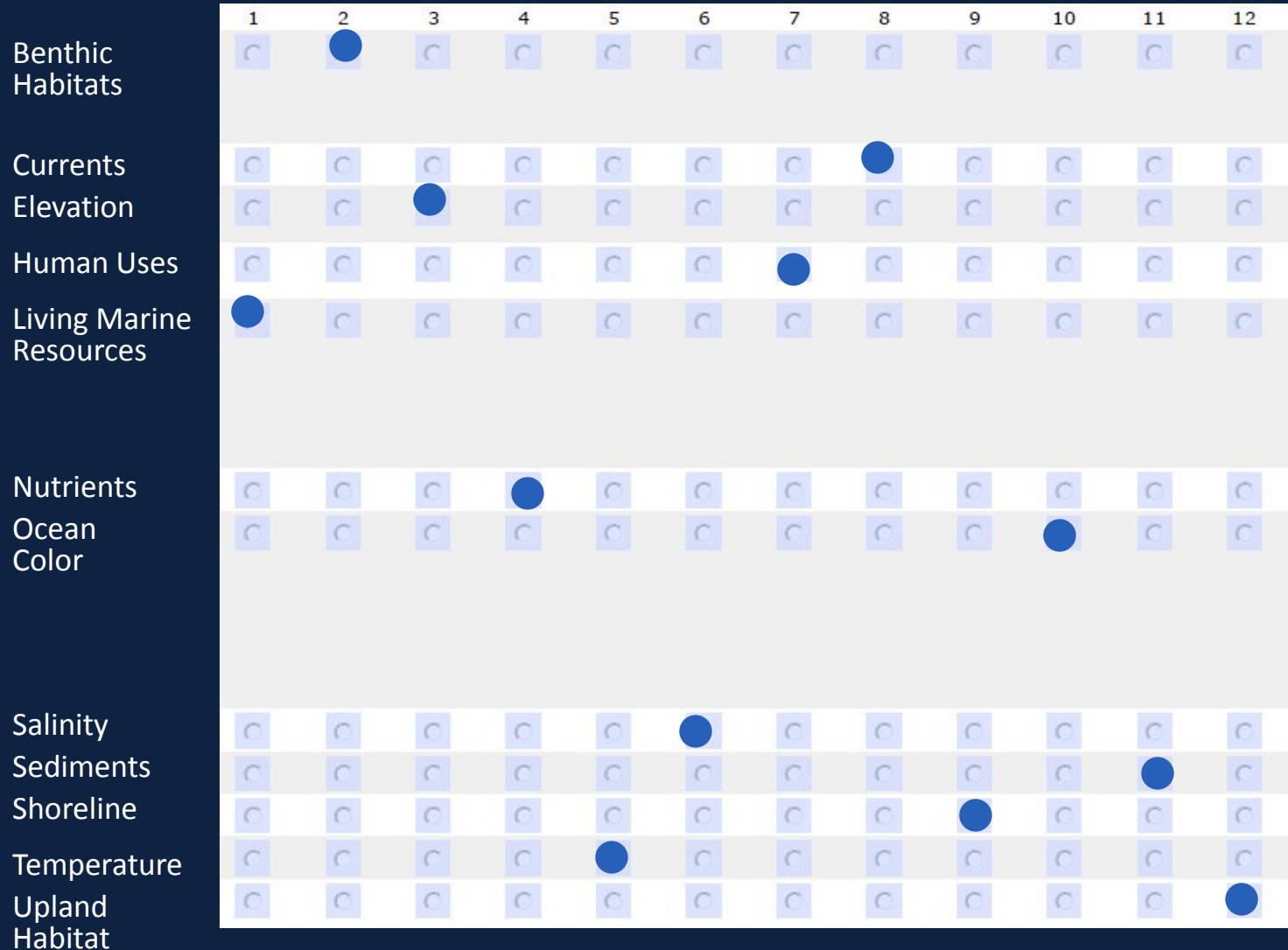
# Methodology

## Survey:

- Questions 1-3: respondent's personal information;
- Question 4: rank 12 data categories;
- Question 5: score 4 qualifiers (temporal resolution, spatial resolution, age, and level of details);
- Questions 6-8: select the ideal range for the qualifiers.

# Survey: Question 4

Please rank the following categories of data; 1 = most important.



# Survey: Question 5

For each category of data, please, score each qualifier on a scale of 1-5

	Temporal Resolution	Spatial Resolution	Age of Data	Level of Detail
Benthic Habitats	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Currents	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Elevation	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Human Uses	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Living Marine Resources	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Nutrients	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Ocean Color	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Salinity	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sediments	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Shoreline	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Temperature	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>



# Responses

Affiliation	Returned Surveys	%
Academia	105	30.35
Federal Government	82	23.70
State Government	64	18.50
Local Government	31	8.96
Private Sector	27	7.80
NGOs	16	4.62
Partnership Federal Government/Academia	10	2.89
Partnership Federal/State Government	4	1.15
Independent/No affiliation	3	0.87
Other partnerships	3	0.87
United Nations	1	0.29
	=346	= 100

Area of Expertise	Respondents	%
Biology	26	7.52
Chemistry	11	3.18
Ecology	64	18.50
Education and Outreach	8	2.31
Engineering	8	2.31
Fisheries	40	11.56
Geology	16	4.62
GIS and Mapping	26	7.52
Management	38	10.98
Marine Science	26	7.52
Physical Oceanography	16	4.62
Water Quality	8	2.31
Other	59	17.05
	= 346	= 100

# Analysis

$$V_i = R_i \cdot Q_i$$

$$Q_i = \sum_j W_{ij} \cdot S_{ij}$$

$i$  = data category type (ex.: benthic habitats, currents, elevation...);

$j$  = qualifier (age, temporal resolution, spatial resolution);

$V_i$  = relative value of a data layer;

$R_i$  = relative weight of importance;

$Q_i$  = quality of information;

$W_{ij}$  = relative weight of significance for qualifier  $j$  of data category  $i$ ;

$S_{ij}$  = scale of qualifier  $j$  of data category  $i$ .

# Relative Weights of Importance ( $R_i$ )

Data Category	Adjusted Weight
Benthic Habitats	0.195173267
Currents	0.062532134
Elevation	0.078313661
Human Uses	0.076043307
Living Marine Resources	0.161541459
Nutrients	0.123455537
Ocean Color	0.001353012
Salinity	0.078333956
Sediments	0.071418714
Shoreline	0.044449135
Temperature	0.046197226
Upland Habitat Land Use	0.061188594

# Relative Weights of Significance ( $W_{ij}$ )

Data Category	Age	Spatial Resolution	Temporal Resolution
Benthic Habitats	0.323	0.373	0.303
Currents	0.311	0.336	0.352
Elevation	0.308	0.405	0.287
Human Uses	0.352	0.326	0.323
Living Marine Resources	0.329	0.335	0.336
Nutrients	0.328	0.323	0.348
Ocean Color	0.334	0.329	0.337
Salinity	0.322	0.330	0.348
Sediments	0.327	0.356	0.318
Shoreline	0.331	0.354	0.314
Temperature	0.331	0.316	0.353
Upland Habitat Land Use	0.328	0.353	0.319

# Coefficients ( $S_{ij}$ ) – Example for age of data qualifier

Data Category	Less than 1 month	1 month to 1 year	1 year to 5 years	5 years to 10 years	Greater than 10 years
Benthic Habitats	1	1	1	0.5	0
Currents	1	1	0.5	0	0
Elevation	1	1	1	0.5	0
Human Uses	1	1	1	0.5	0
LMR	1	1	0.5	0	0
Nutrients	1	1	0.5	0	0
Ocean Color	1	1	0.5	0	0
Salinity	1	1	0.5	0	0
Sediments	1	1	1	0.5	0
Shoreline	1	1	1	0.5	0
Temperature	1	0.5	0	0	0
Upland Habitat	1	1	1	0.5	0

# Example

$$V_i = R_i \cdot Q_i$$
$$Q_i = \sum W_{ij} \cdot S_{ij}$$

GAME Data set ID # 36: USGS – Tampa Bay Sonar Bathymetry

$$Q = \underset{\text{age}}{0.308} * 0.5 + \underset{\text{spatial res}}{0.405} * 1 + \underset{\text{temporal res}}{0.287} * 0.5 = 0.7025$$

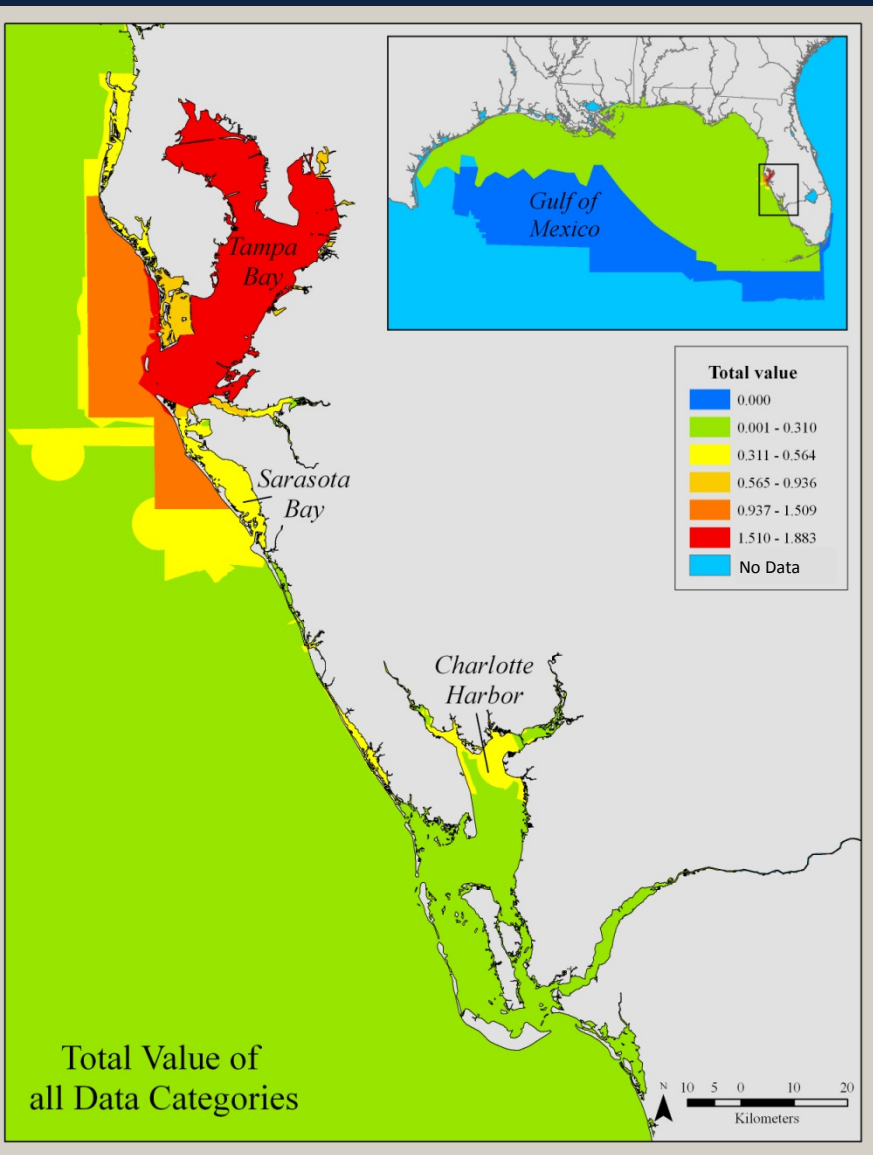
$$V = 0.078313661 * 0.7025 = 0.055015$$

Age: 7 years old (2004)

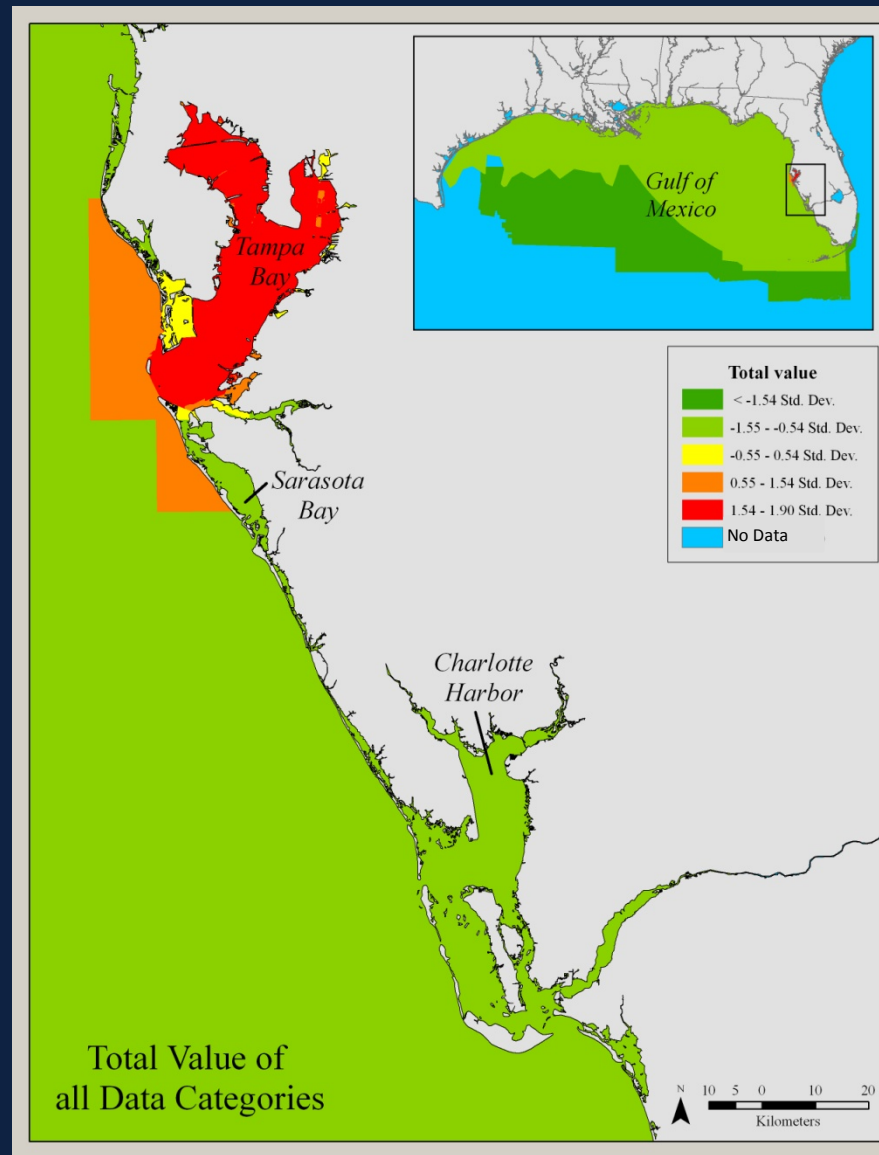
Spatial resolution: 1 m

Temporal resolution (or update frequency): as needed

# Results

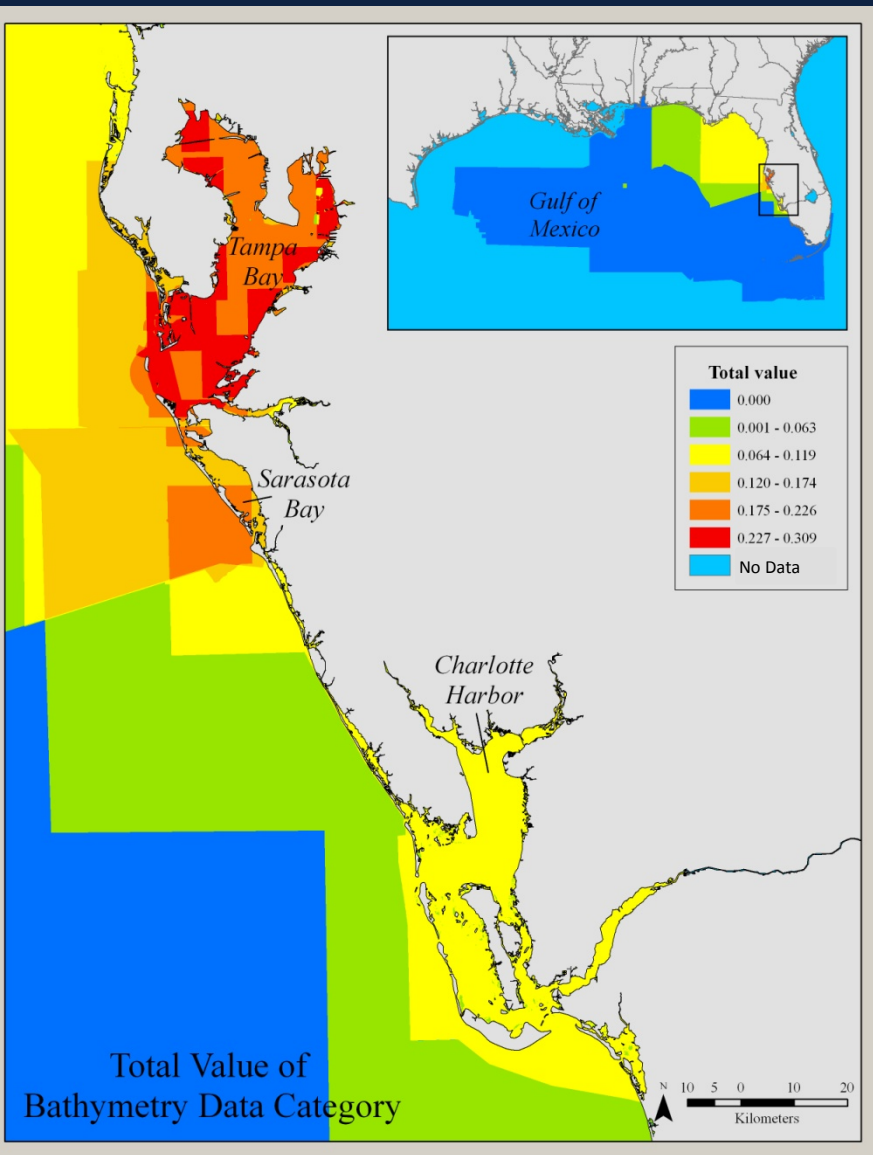


Natural Breaks

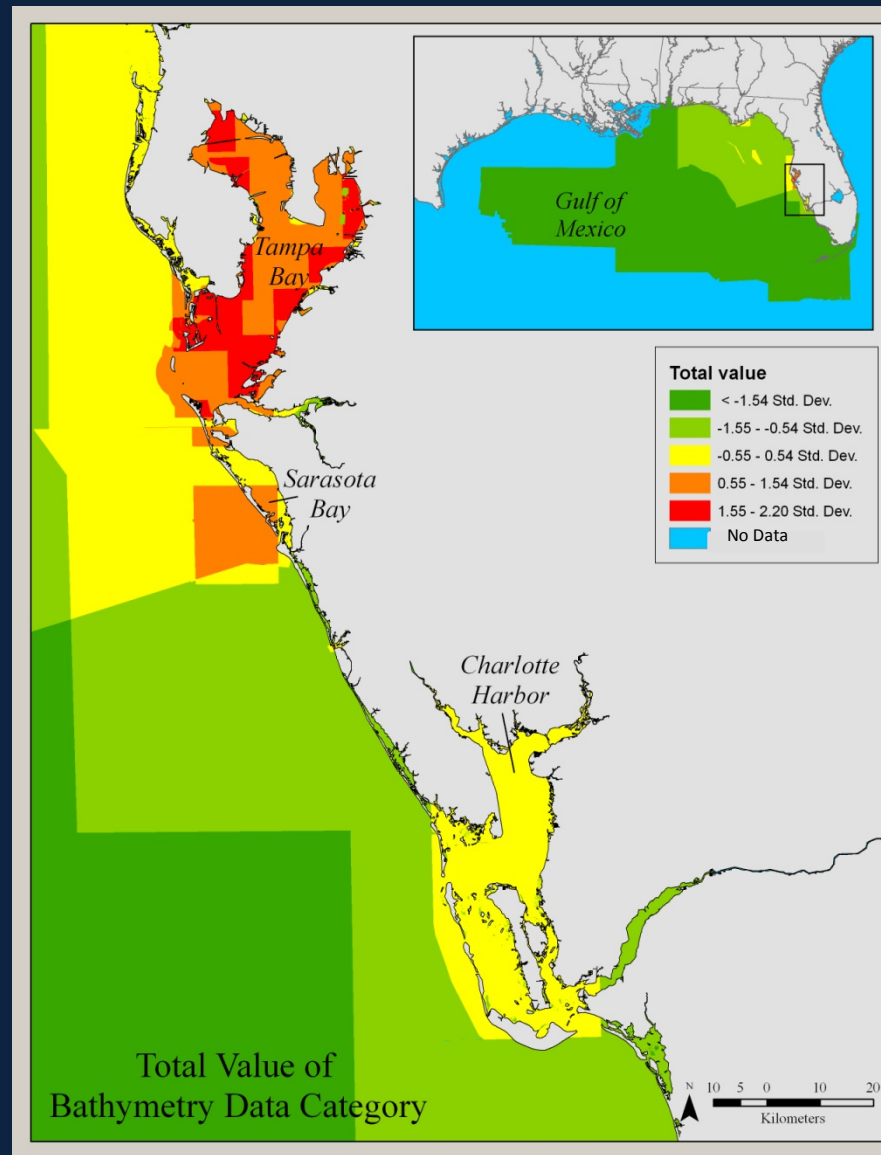


Standard Deviation

# Results

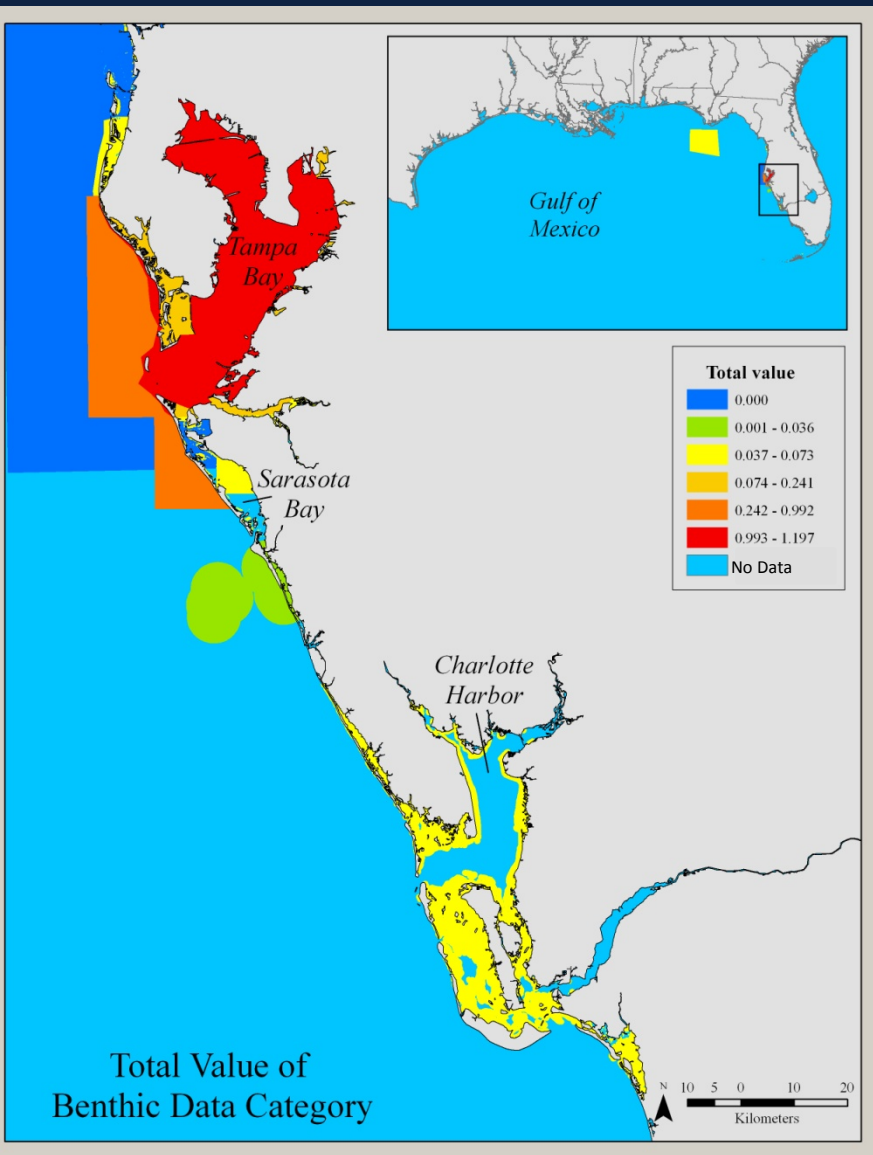


Natural Breaks

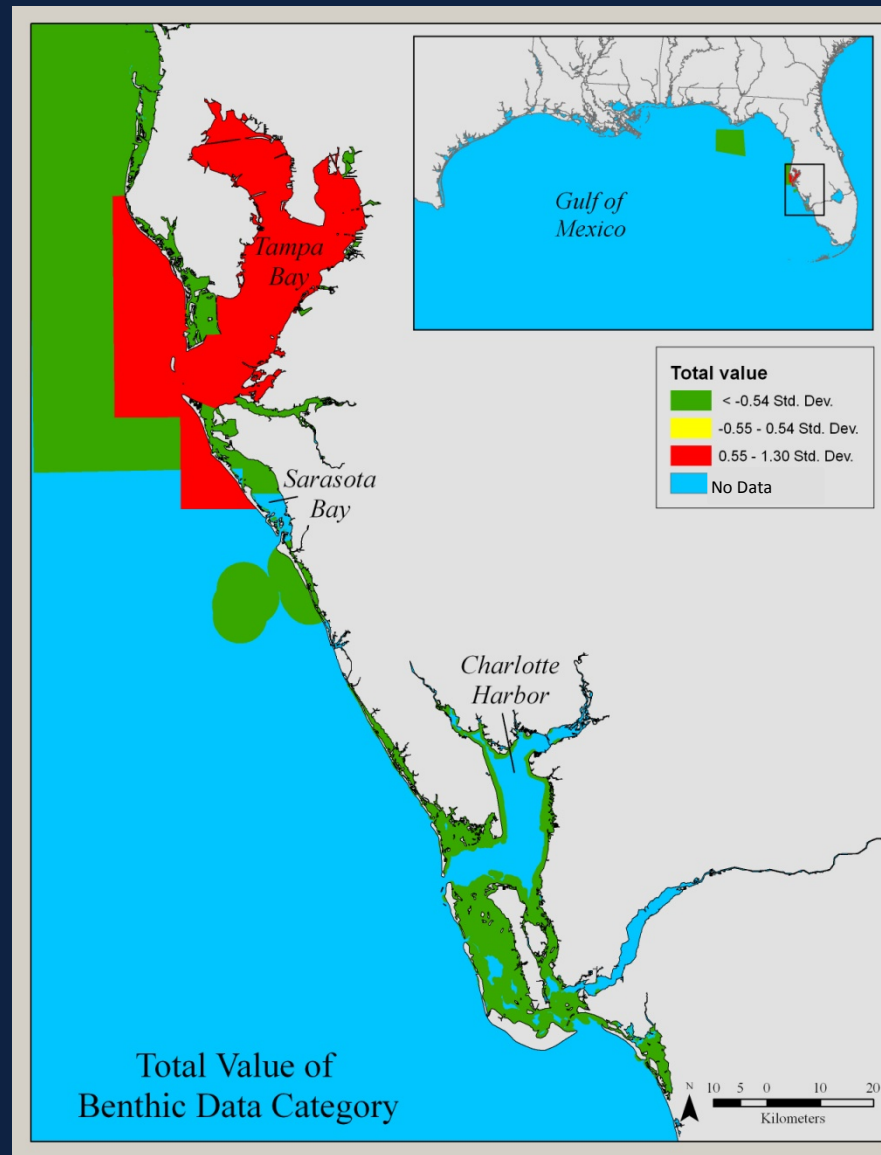


Standard Deviation

# Results



Natural Breaks



Standard Deviation

# Next Steps

Include more data sets in the analysis:

Create a footprint for each data set;

Evaluate the relative value ( $V_i$ ) of each available data set;

Assign the calculated value ( $V_i$ ) to each footprint.

Develop a new method to display the results.

# Acknowledgments



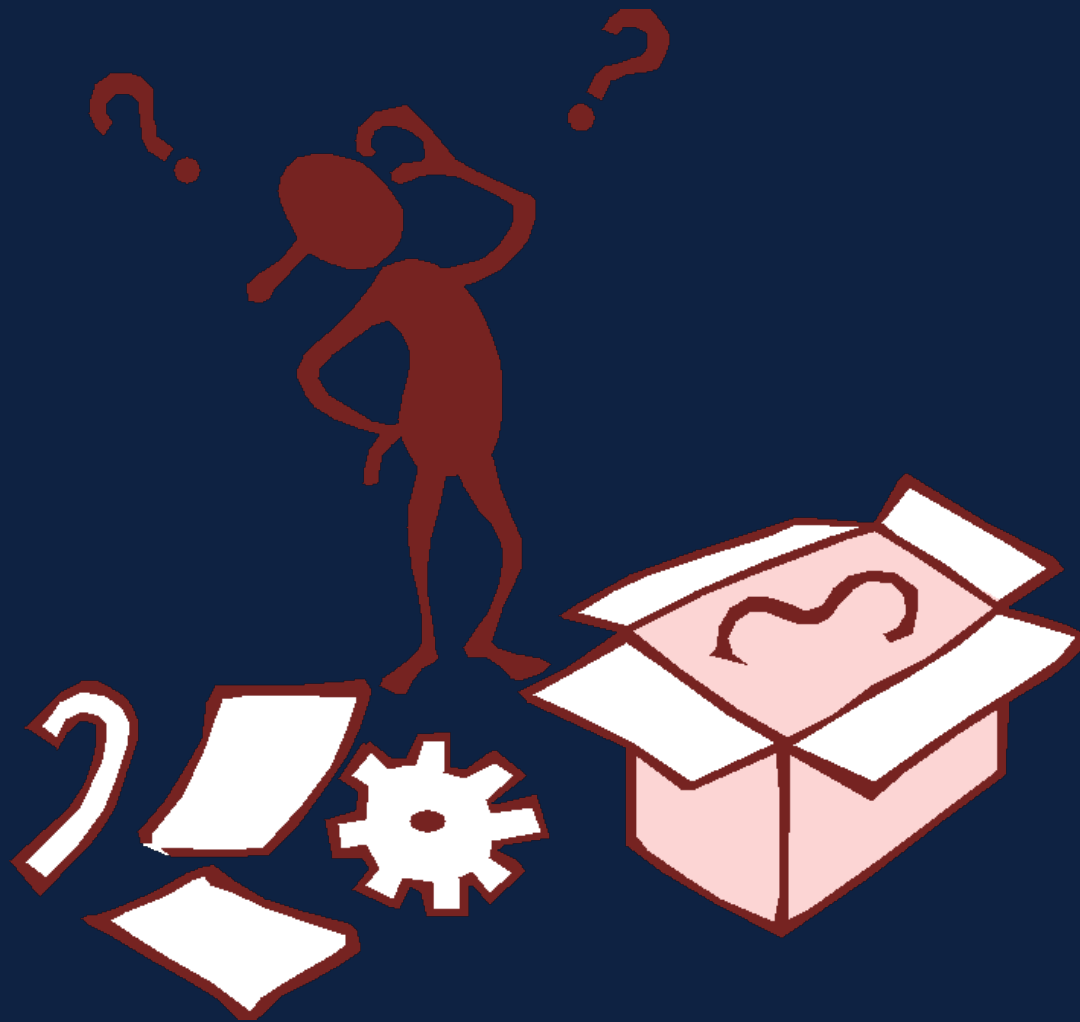
NOAA Gulf Coast Services Center



U.S. EPA Gulf of Mexico Program



Florida Institute of Oceanography



**Thank you**