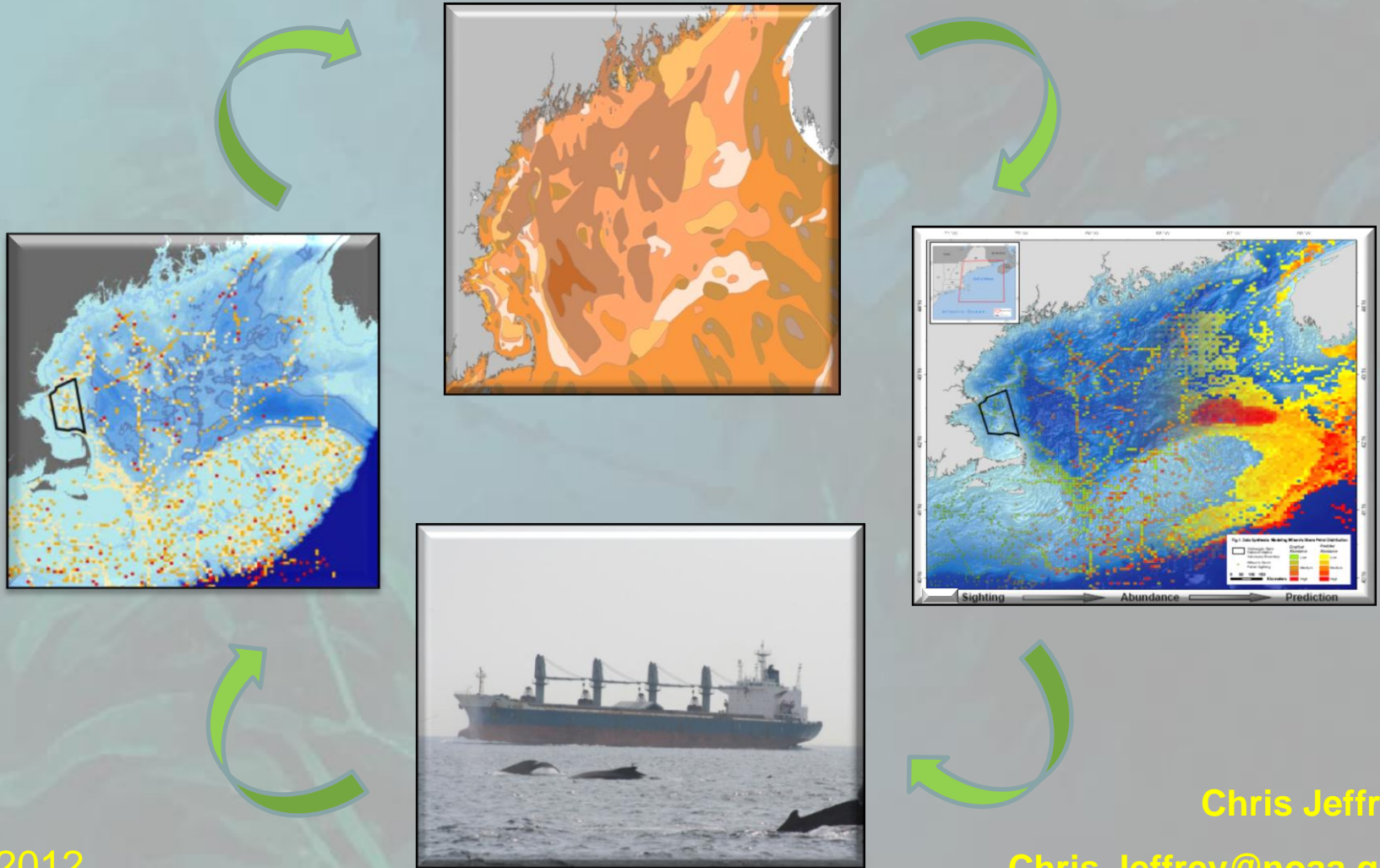


Biogeographic Assessments to Meet Local & Regional Management Needs



August 2012

Chris Jeffrey

Chris.Jeffrey@noaa.gov



NOAA / NOS / NCCOS /
Center for Coastal Monitoring and Assessment
Center for Coastal Fisheries and Habitat Research

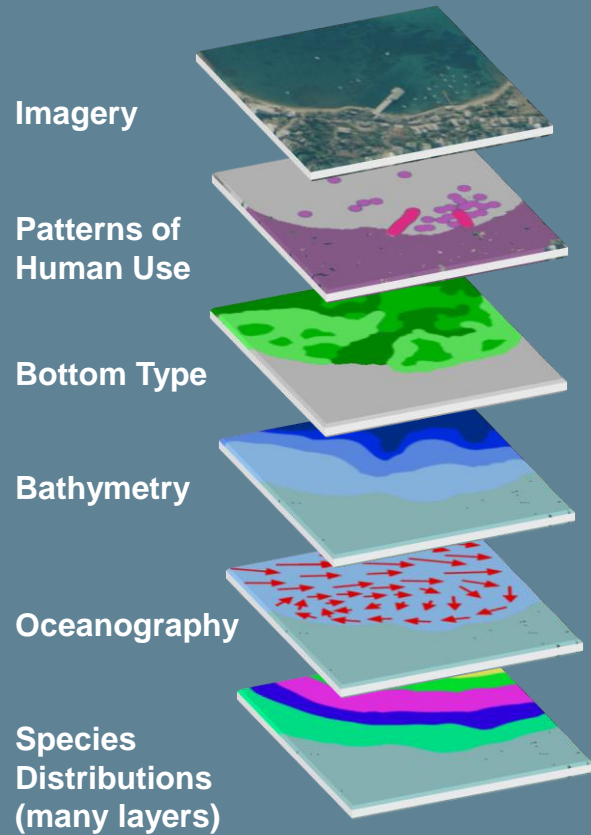
Presentation Outline

- **Overview of the Biogeographic Assessment Approach and Process**
- **Overview of the Florida Coral Reef Tract Biogeographic Assessment**



The Biogeographic Assessment Approach

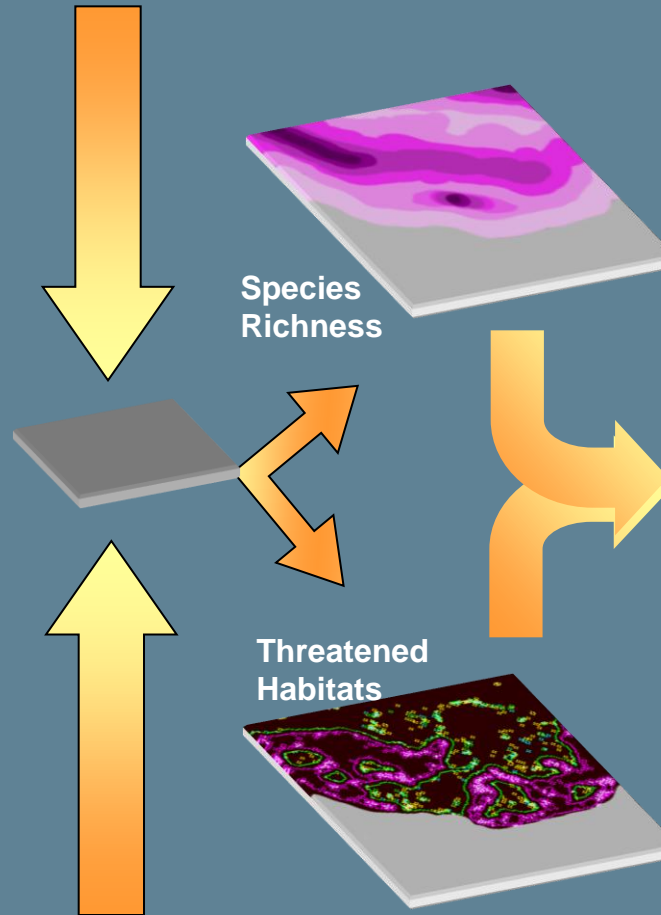
Biogeographic Data Layers



Combine Biogeographic Layers for Analysis

Example Integrated Biogeographic Analyses*

* Specific analyses targeted to management needs

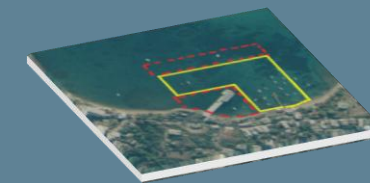


Products to Aid Management

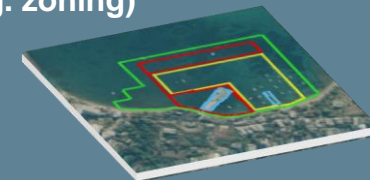
Defining and analyzing existing conditions



Defining and analyzing future conditions



Evaluate alternative management strategies (e.g. zoning)

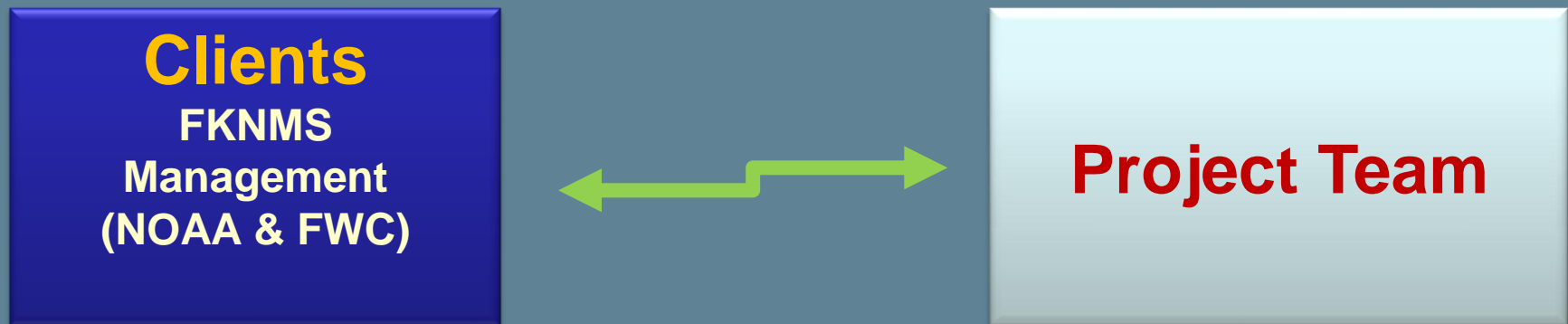


Analytical Products to Meet Management Objectives



Overview of the Assessment Process

1. Identify relevant management issues and questions



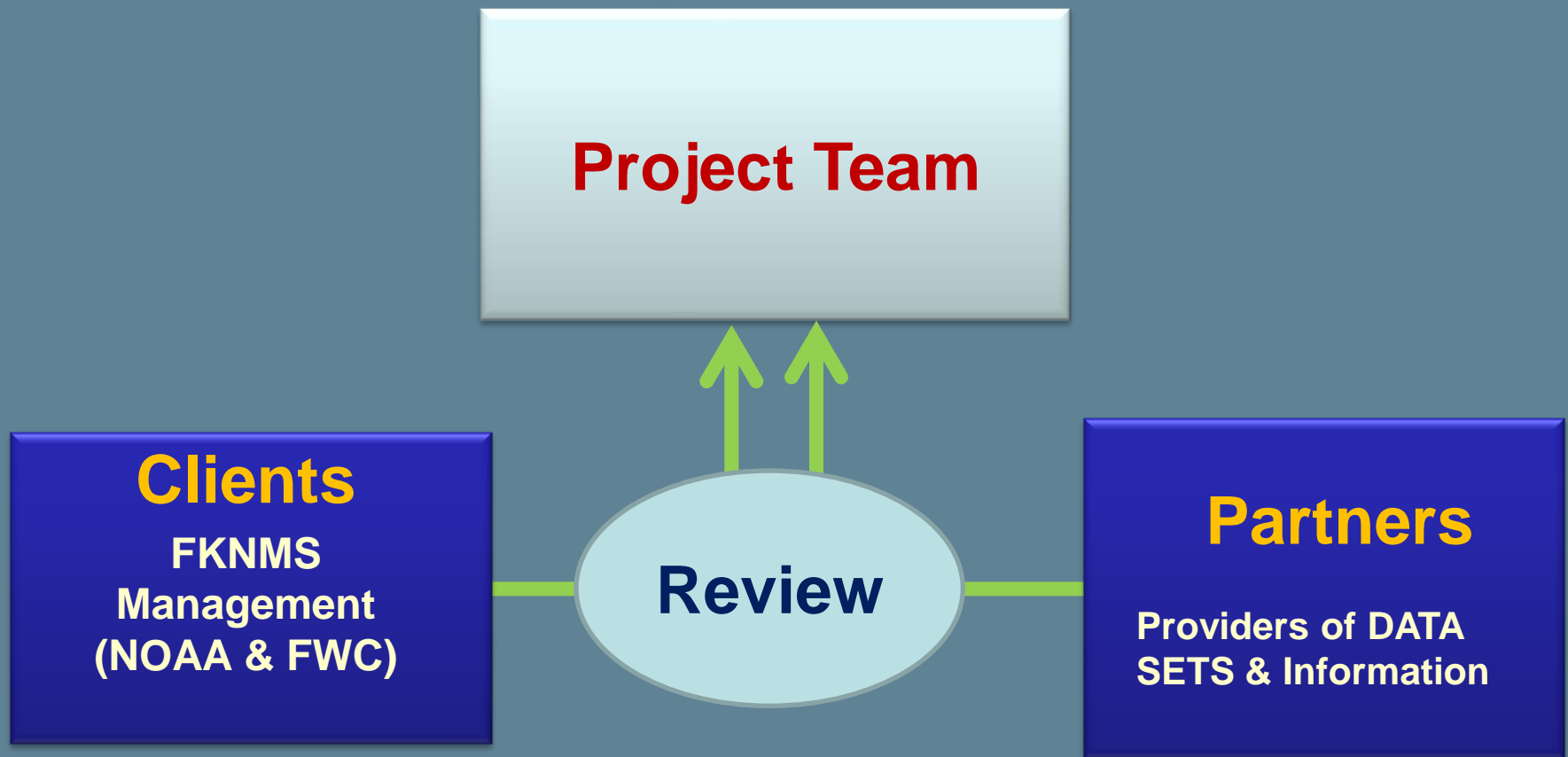
Overview of the Assessment Process

2. Data compilation and review



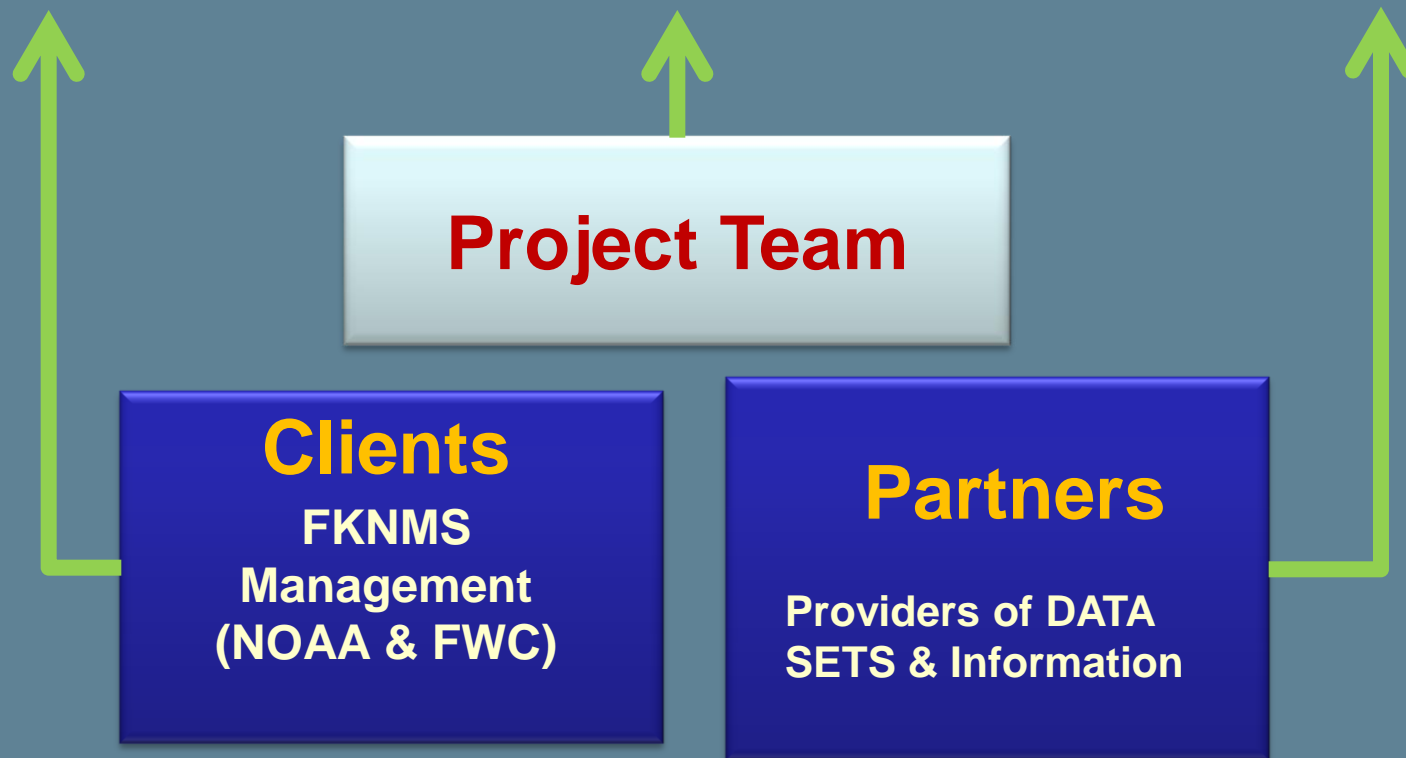
Overview of the Assessment Process

3. Data Integration & analysis

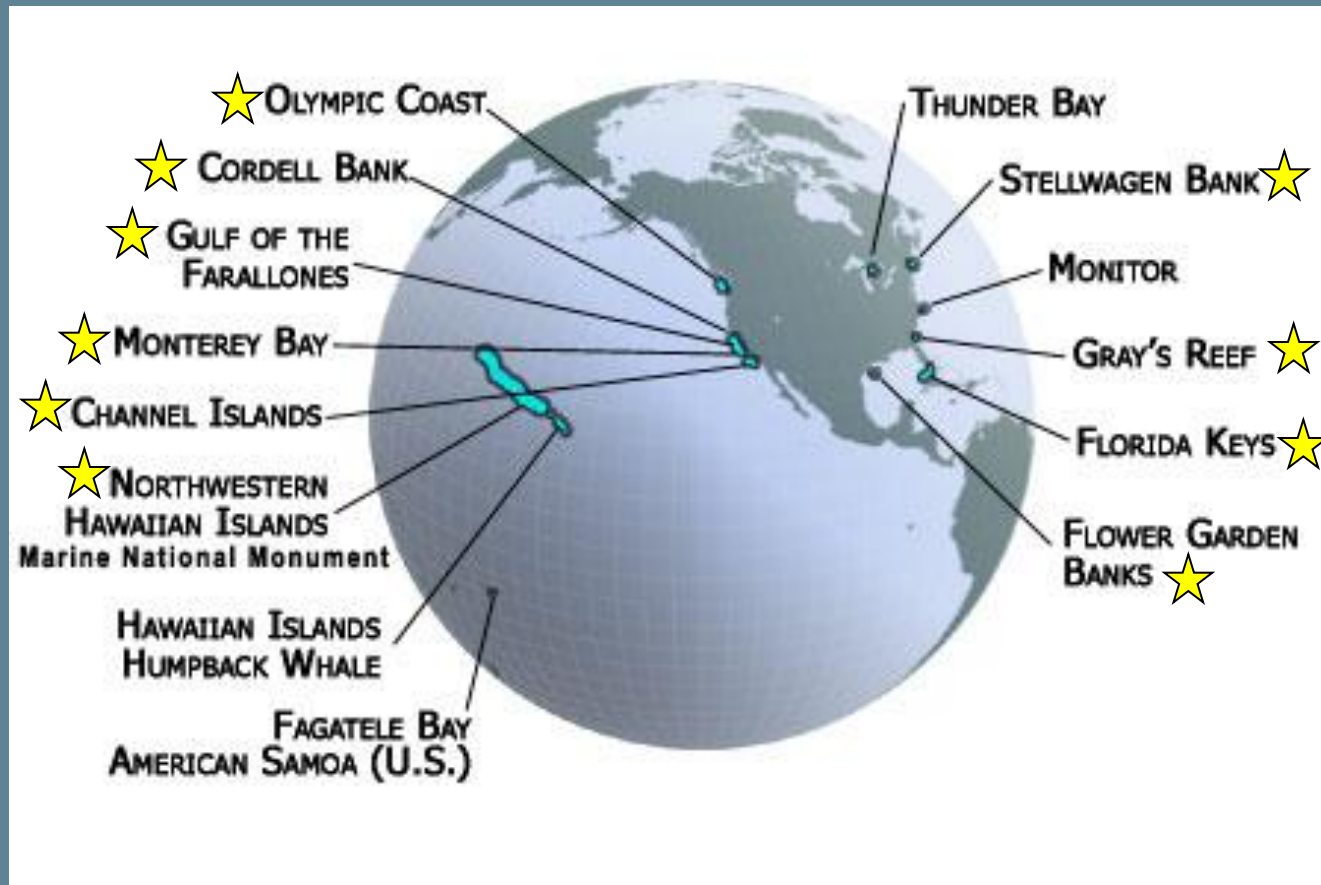


Overview of the Assessment Process

4. Product creation, roll-out, dissemination, and support

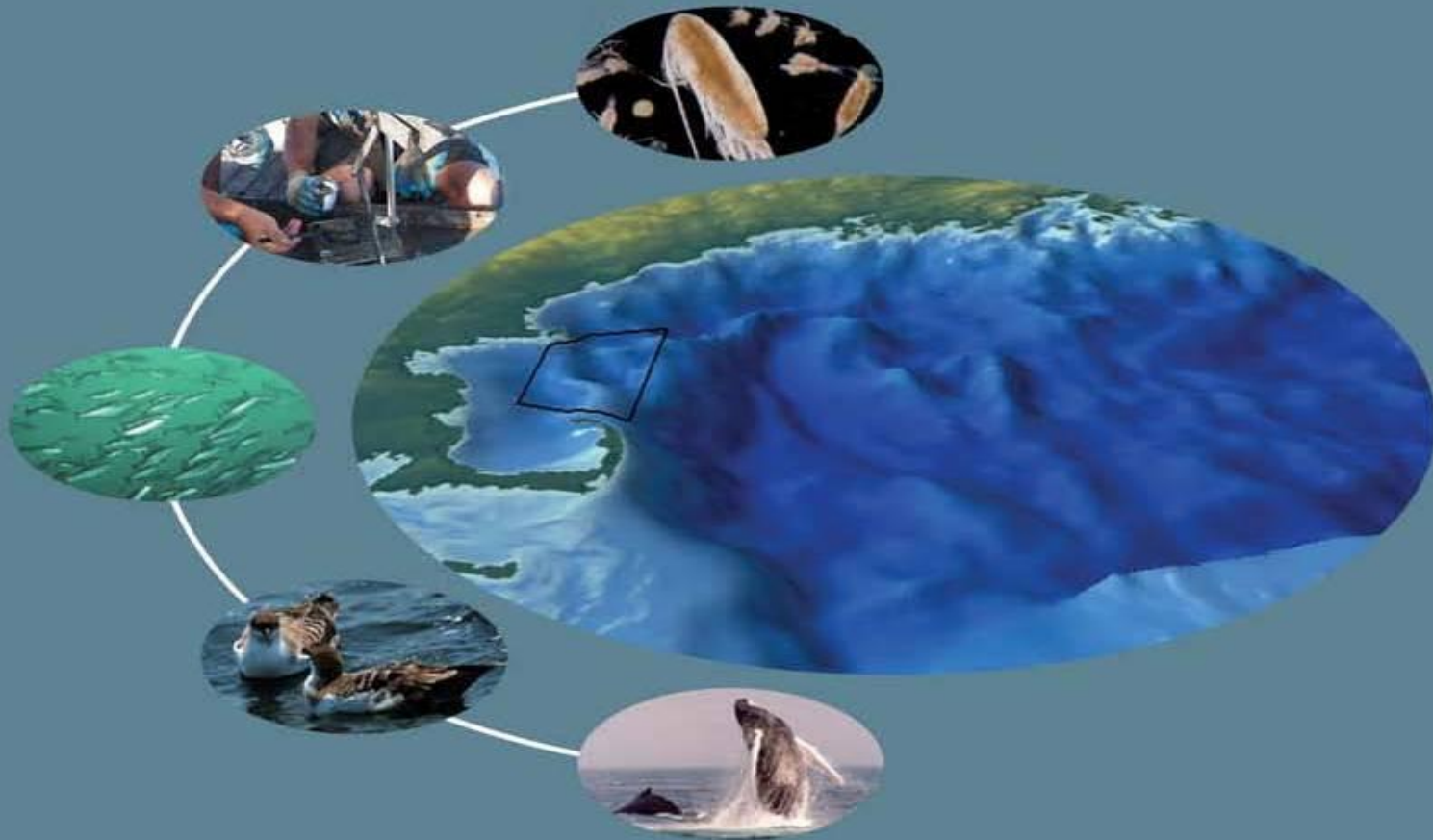


Biogeographic Assessments of National Marine Sanctuaries



**SELECTED EXAMPLES OF
BIOGEOGRAPHIC ASSESSMENTS &
PRODUCTS**

Assessment: Stellwagen Bank, MA

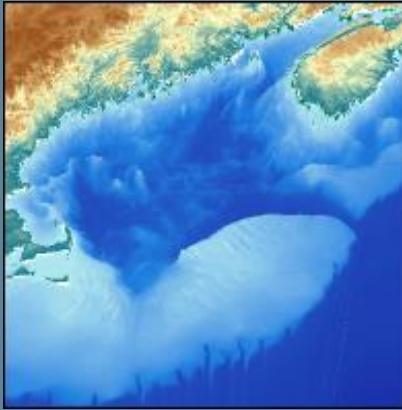


Objective: To synthesize and integrate ecological data to support management plan review process. To provide spatial models of resource distribution to inform MA Ocean Plan. *Balancing needs of shipping community and conservation*

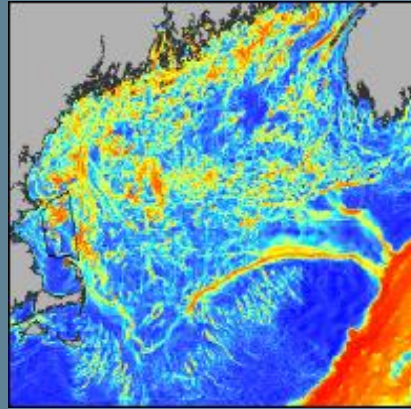


Abiotic: Spatio-Temporal Data

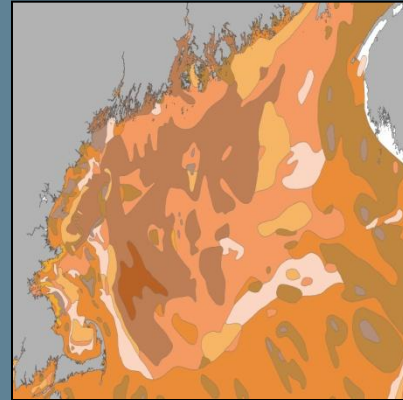
STATIC VARIABLES



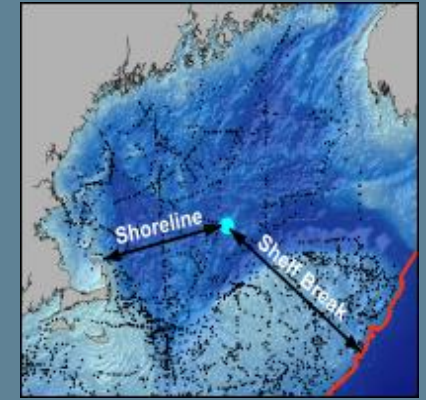
Bathymetry



Slope

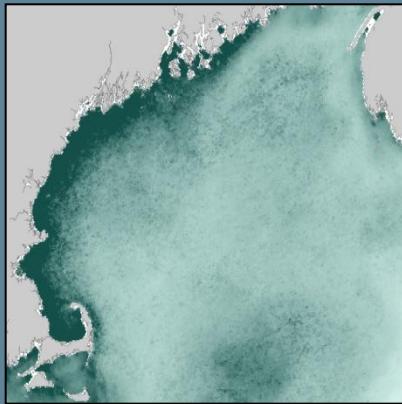


Substrate

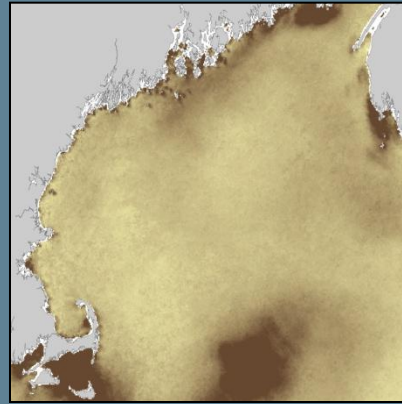


Distance to Features

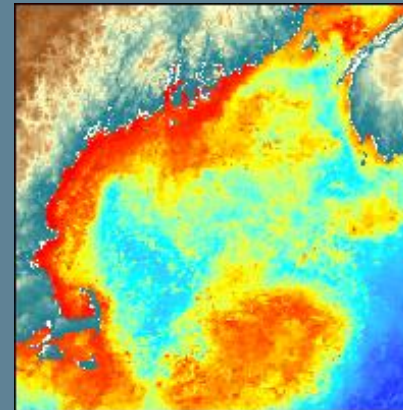
DYNAMIC VARIABLES



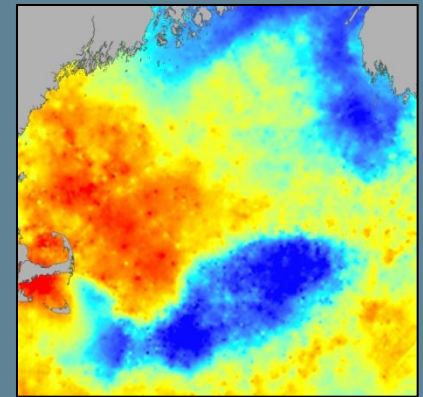
Chlorophyll a



Turbidity



Sea Surface Temp.



Seasonal Water Stratification

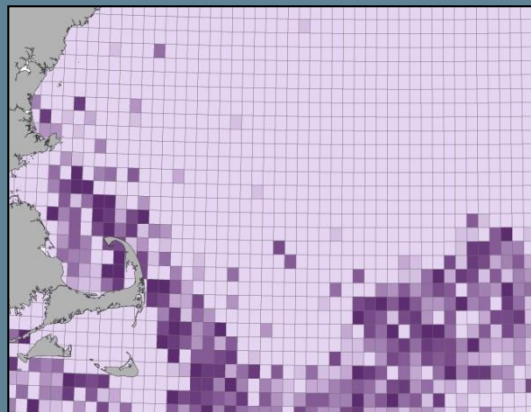


Biotic: Spatio-Temporal Data

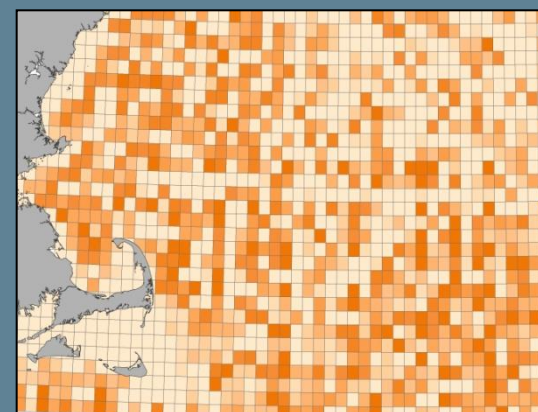
CETACEAN ABUNDANCES
PREY ABUNDANCES



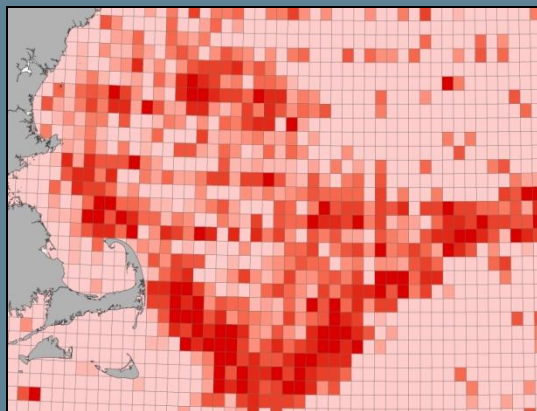
Atlantic Mackerel



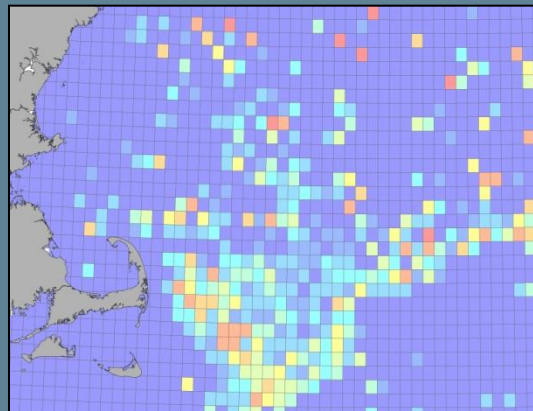
Northern Sand Lance



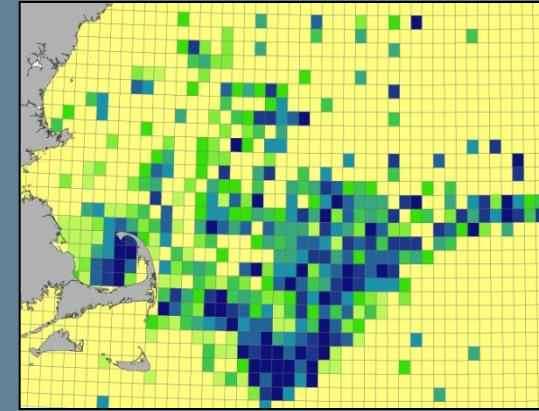
Zooplankton



Mysticeti
(Baleen Whales)



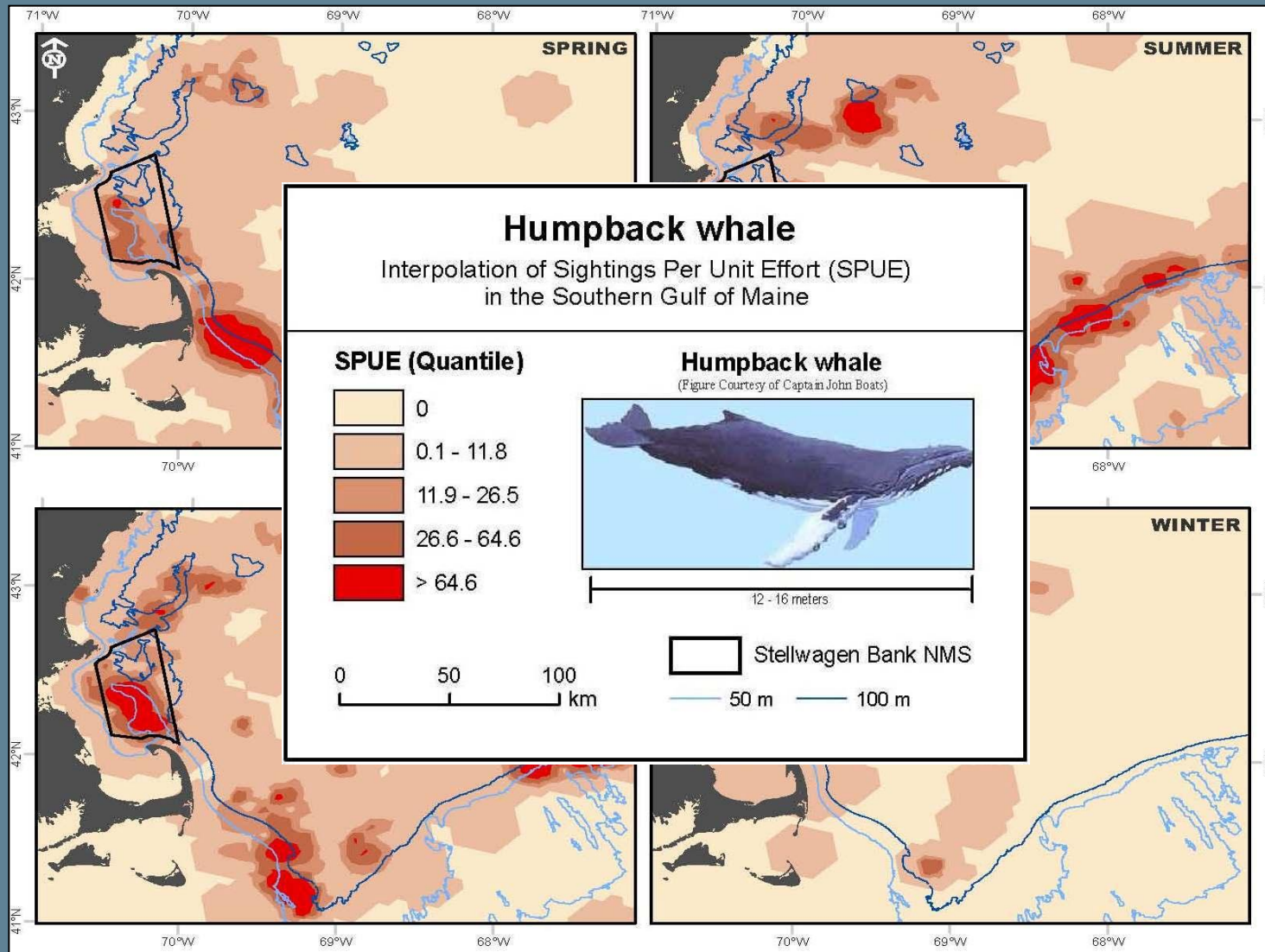
Atlantic White-Sided
Dolphin



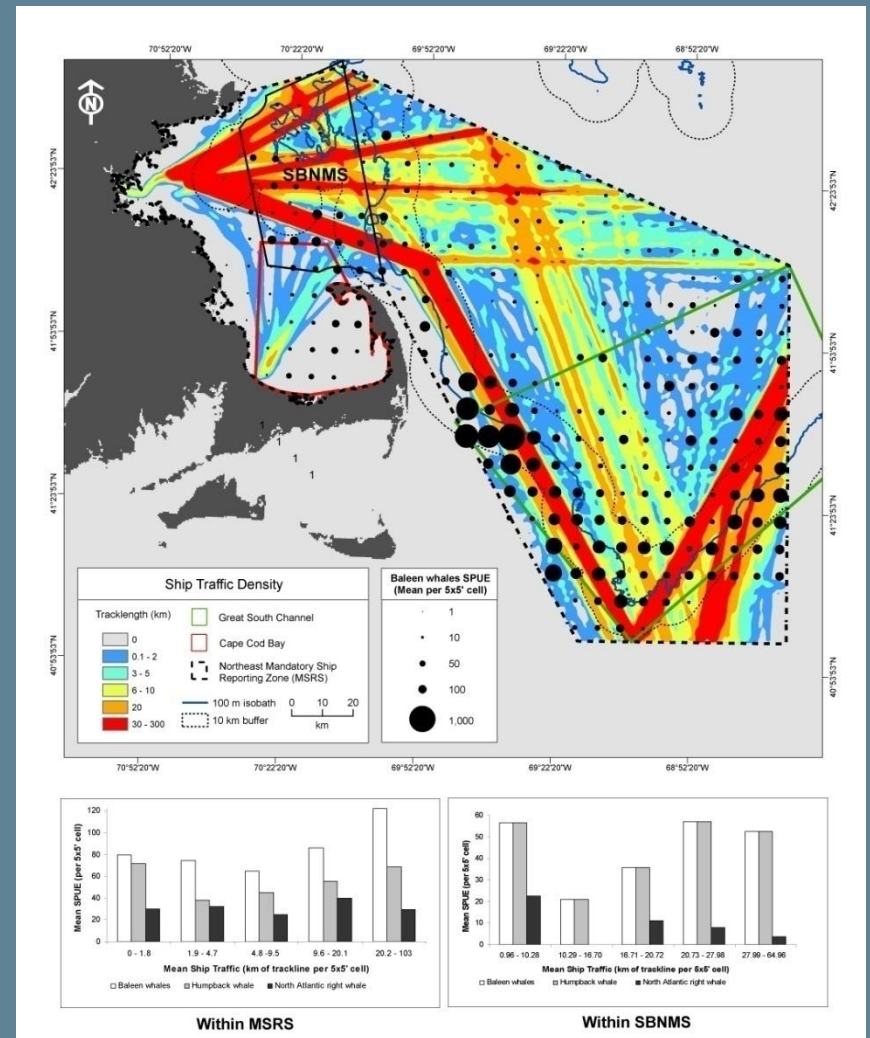
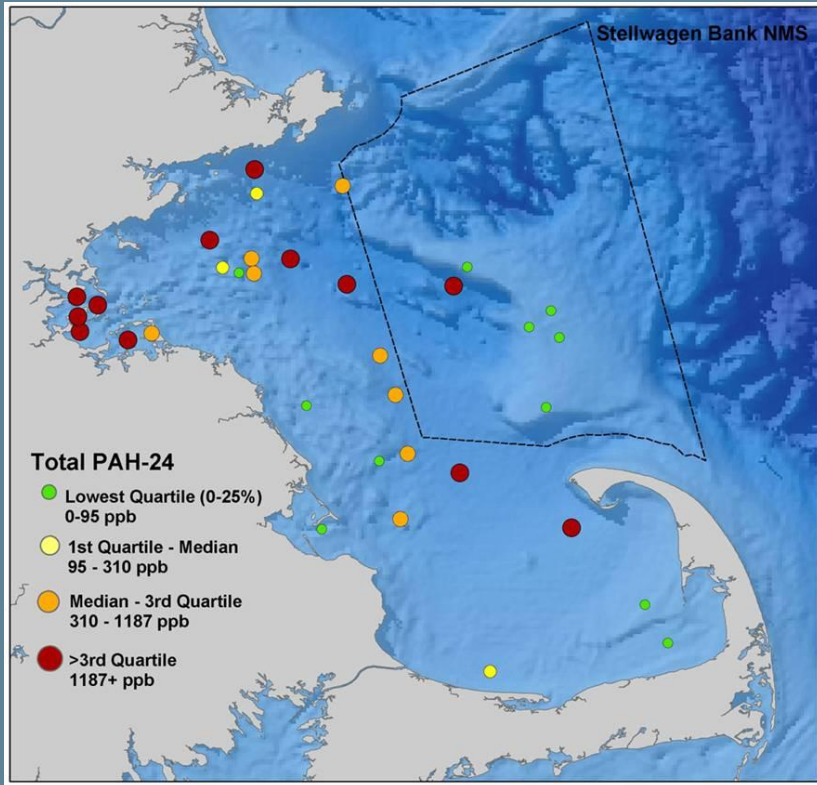
Northern Atlantic
Right Whales



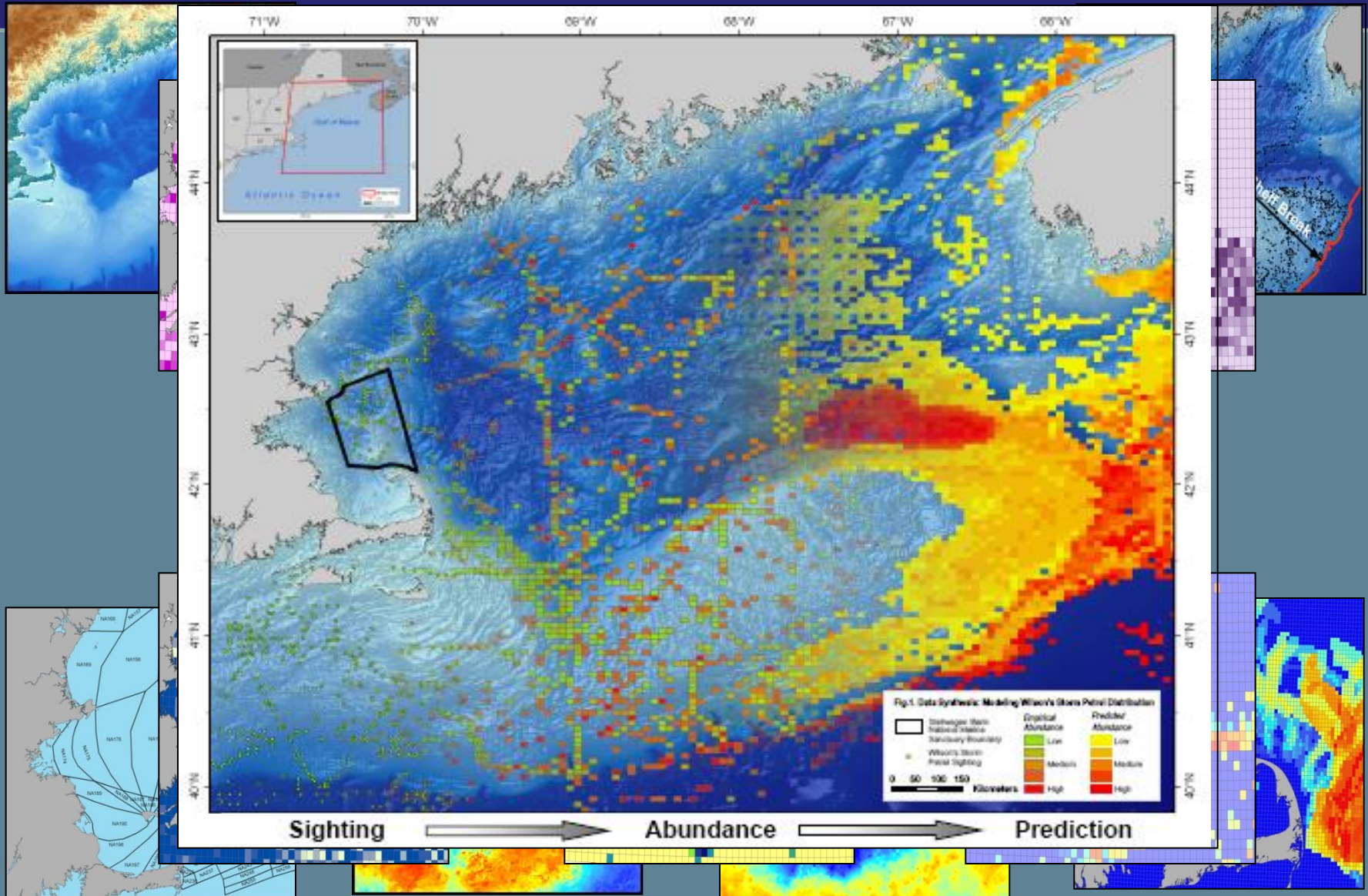
Results: Cetacean Distributions



Applications

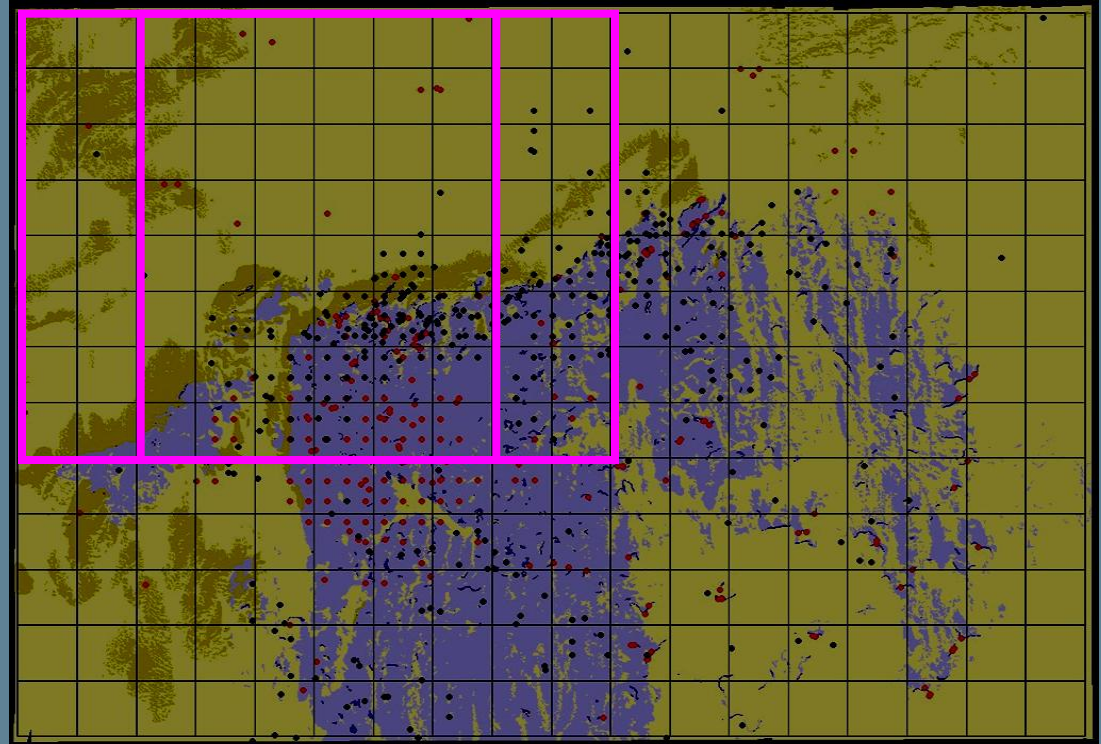


Data Compilation & Integration



Assessment: Gray's Reef NMS, GA

Opt. #	# High ledges	Area H ledges	# Boats	# Res. Sites
--------	---------------	---------------	---------	--------------

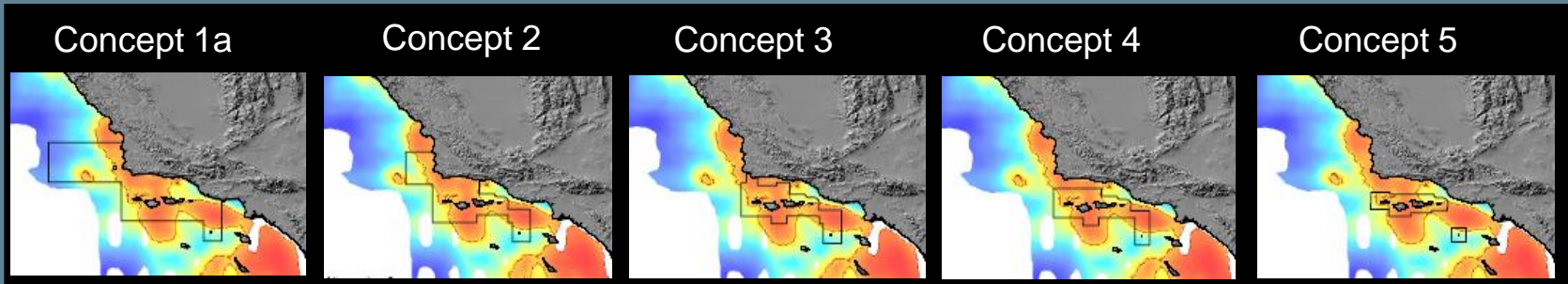


Resulted in 31,135 options!

Objective: To measure the benefits and impacts of potential management zoning actions: *Balancing needs of recreational boaters, fishermen, researchers, conservation*



Assessment: Southern California Bight, CA



Concept	Area (km ²)	Mean Bird Diversity	High Diversity Area (km ²)	Δ Area (%)	Δ Mean Diversity (%)	Δ High Diversity Area (%)	Mean Bird Diversity OAI (relative)	High Diversity Area OAI (absolute)
NAA	3745	1.485	2284	-	-	-	-	-
5	4536	1.487	2812	21	0.13	23.12	0.00638	1.094
4	7981	1.523	5507	113	2.56	141.11	0.02262	1.248
3	9044	1.53	6421	141	3.03	181.13	0.02141	1.28
2	13736	1.502	8791	267	1.14	284.89	0.00429	1.006
1a	22591	1.372	10391	503	-7.61	354.95	-0.01512	0.705
1	22613	1.375	10401	504	-7.41	355.39	-0.0147	0.705
SA	17093	1.489	9914	356	0.27	334.06	0.00076	0.937

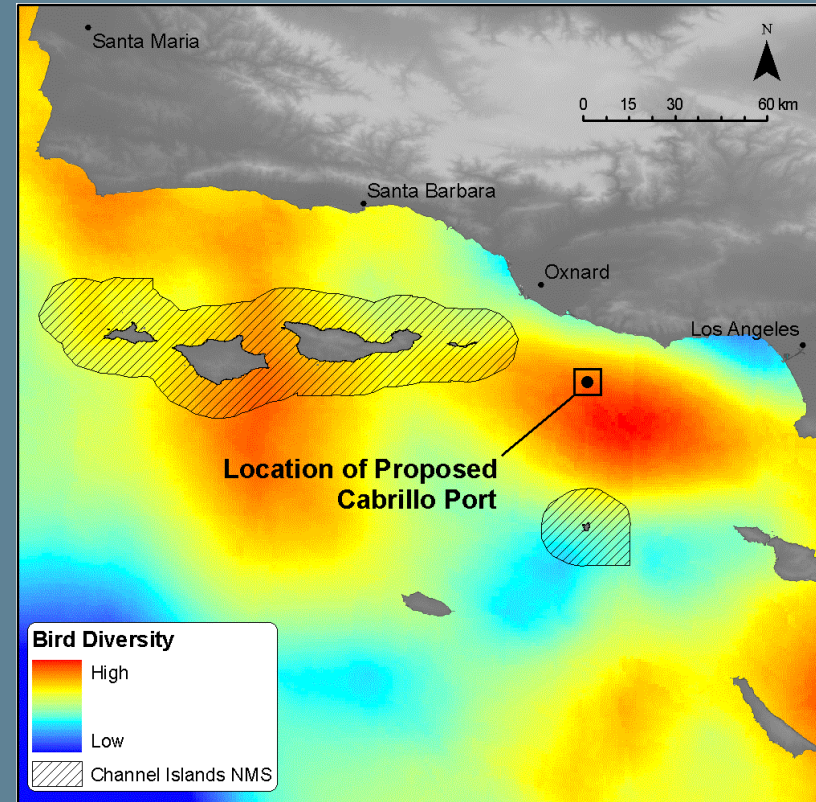
Objective: To evaluate alternative boundary concepts proposed for the Channel Islands National Marine Sanctuary: *Balancing needs of local stakeholders*



Assessment: Southern California Bight, CA



Map of proposed site



Subsequent uses: MLPA, CCC. The California Coastal Commission used predictive models of seabird distribution to identify potential ecological impacts of placing a liquid natural gas storage facility offshore of LA



Biogeographic Assessment of Florida's Coral Reef Tract

An analytical process to inform:

A) FKNMS Management Plan Review and Zoning

B) SEFCRI Management Options Identification Process

NOAA CRCP

(Funding)

Project Team

Chris Jeffrey

Theresa Goedeke

Shay Viehman

Moe Nelson

Angela Orthmeyer

Matt Kendall

Dana Wusinich-Mendez

Benjamin Ruttenberg

Rene Baumstark

Clients

FKNMS Management
(NOAA & FWC)

SEFCRI Process
Planning Team

Partners

Providers of DATA
SETS & Information

FCRT Project: Project Status

1. Identification of relevant management issues and questions
2. Data compilation
3. Data Integration, analysis, & review
4. Product creation, roll-out, dissemination, and support



FCRT Project: Identification of Management Issues and Questions

- **Manager workshops hosted in July 2011**
- **Draft Summary of Management Priorities and Data/Analytic Needs**
 - **Geographies of Interest**
 - **Habitats of Interest**
 - **Regulatory, Legal & Management Layers**
 - **Social, Economic & Human Use Layers**
 - **Species-Specific Priorities**
 - **Types of Data Needed**
 - **Types of Analysis Requested**



FCRT Project: Overarching Goal

1. Describe the distribution of resource species and benthic composition
2. Couple social, economic and human use data to observed spatial patterns along the reef tract
3. Integrate data on ecological and human use patterns so that development of coastal management and spatial planning would be based on the best available science



FCRT Project: Proposed Outputs & Products

- A geodatabase with GIS layers showing the spatial distribution of marine resources and human uses
- Maps and analyses characterizing spatial consistency and variation in regulations and managed activities across the FCRT
- A spatial bibliography on commercially and recreationally important species and their governing regulations, policies, and jurisdictional authorities
- Products will be tailored to meet the needs of each region (e.g., SEFCRI and Florida Keys)




Social Science: Social, Economic & Human Use Data

- **Human Demographic Information**
- **Legal and Regulatory Boundaries/Zones**
- **Coastal Development and Land Use**
- **Legal and Regulatory Compliance**
- **Watercraft Related Infrastructure**
- **Human Use Activities—Spatial Use Patterns**



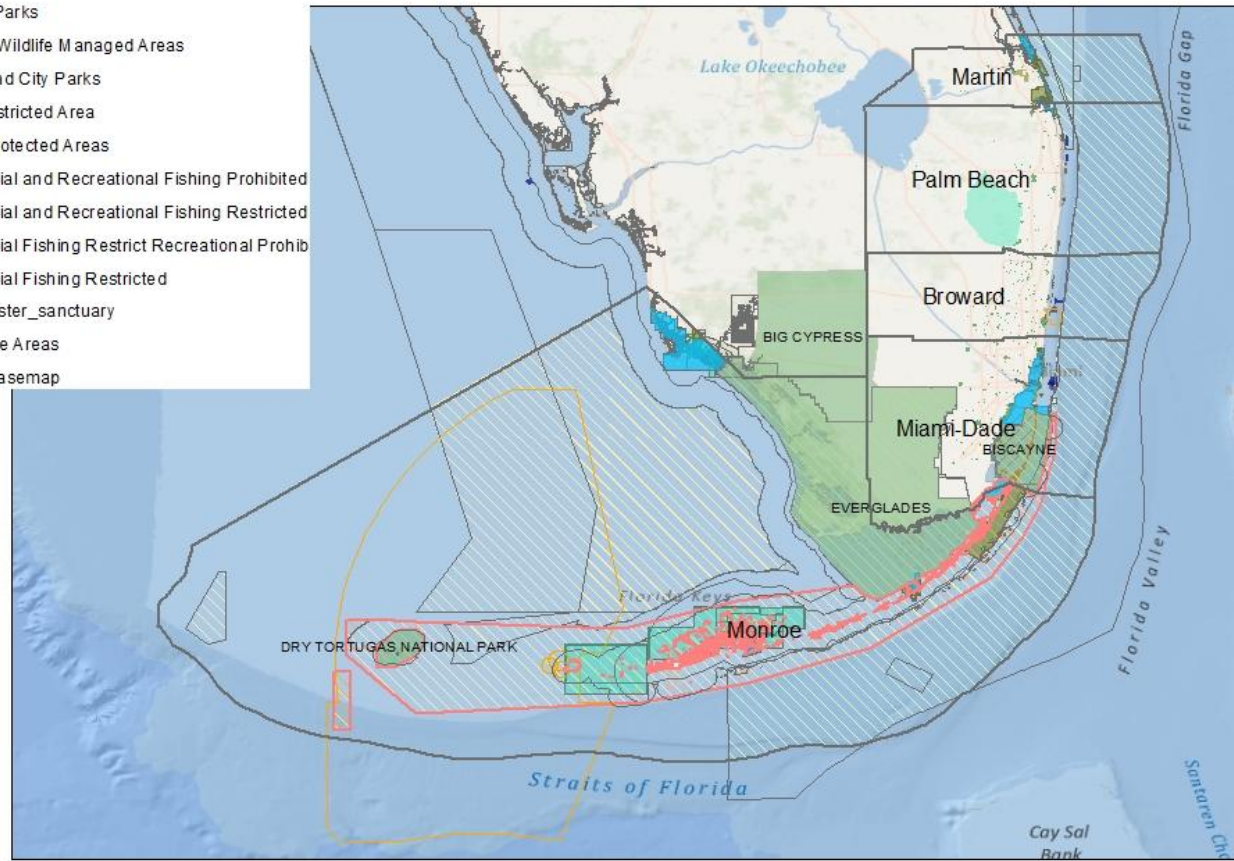
Social Component: Social, Economic & Human Use Layers

Legend

-  Florida Biogeographic Assessment Study Area
-  Florida Keys National Marine Sanctuary
-  Aquatic Preserves
-  State Parks
-  National Parks
-  Fish and Wildlife Managed Areas
-  County and City Parks
-  Naval Restricted Area
-  Marine Protected Areas
-  Commercial and Recreational Fishing Prohibited
-  Commercial and Recreational Fishing Restricted
-  Commercial Fishing Restrict Recreational Prohib
-  Commercial Fishing Restrict d
-  spiny_lobster_sanctuary
-  Anchorage Areas
-  Ocean_Basemap

Florida Reef Tract Biogeographic Assessment Social Component

0 15 30 60 90 120 Miles

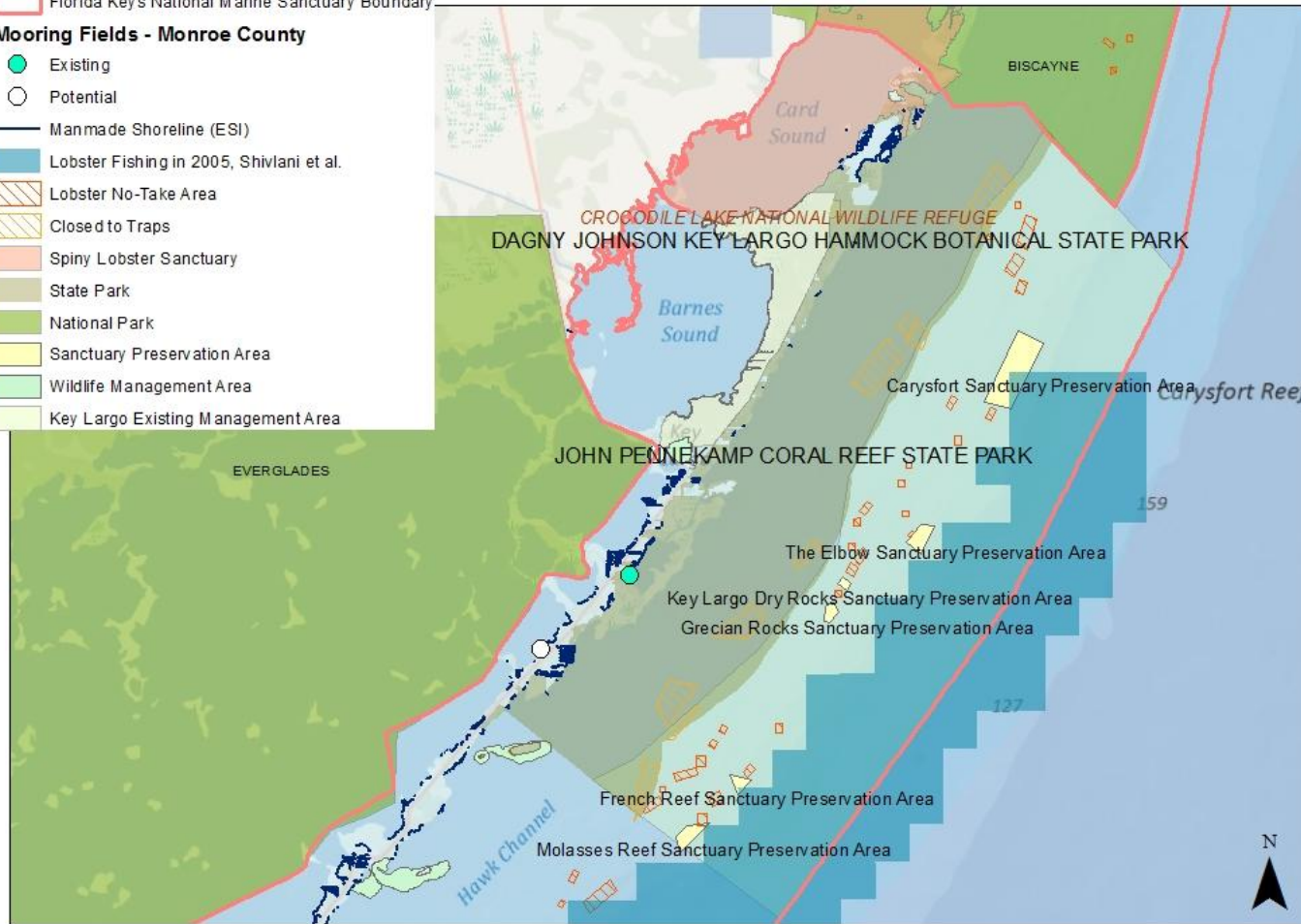


Social Component: Social, Economic & Human Use Layers

Florida Reef Tract Biogeographic Assessment
Social Component

Legend

- Florida Keys National Marine Sanctuary Boundary
- Mooring Fields - Monroe County**
- Existing
- Potential
- Manmade Shoreline (ESI)
- Lobster Fishing in 2005, Shivlani et al.
- Lobster No-Take Area
- Closed to Traps
- Spiny Lobster Sanctuary
- State Park
- National Park
- Sanctuary Preservation Area
- Wildlife Management Area
- Key Largo Existing Management Area



0 1.75 3.5 7 10.5 14 Miles

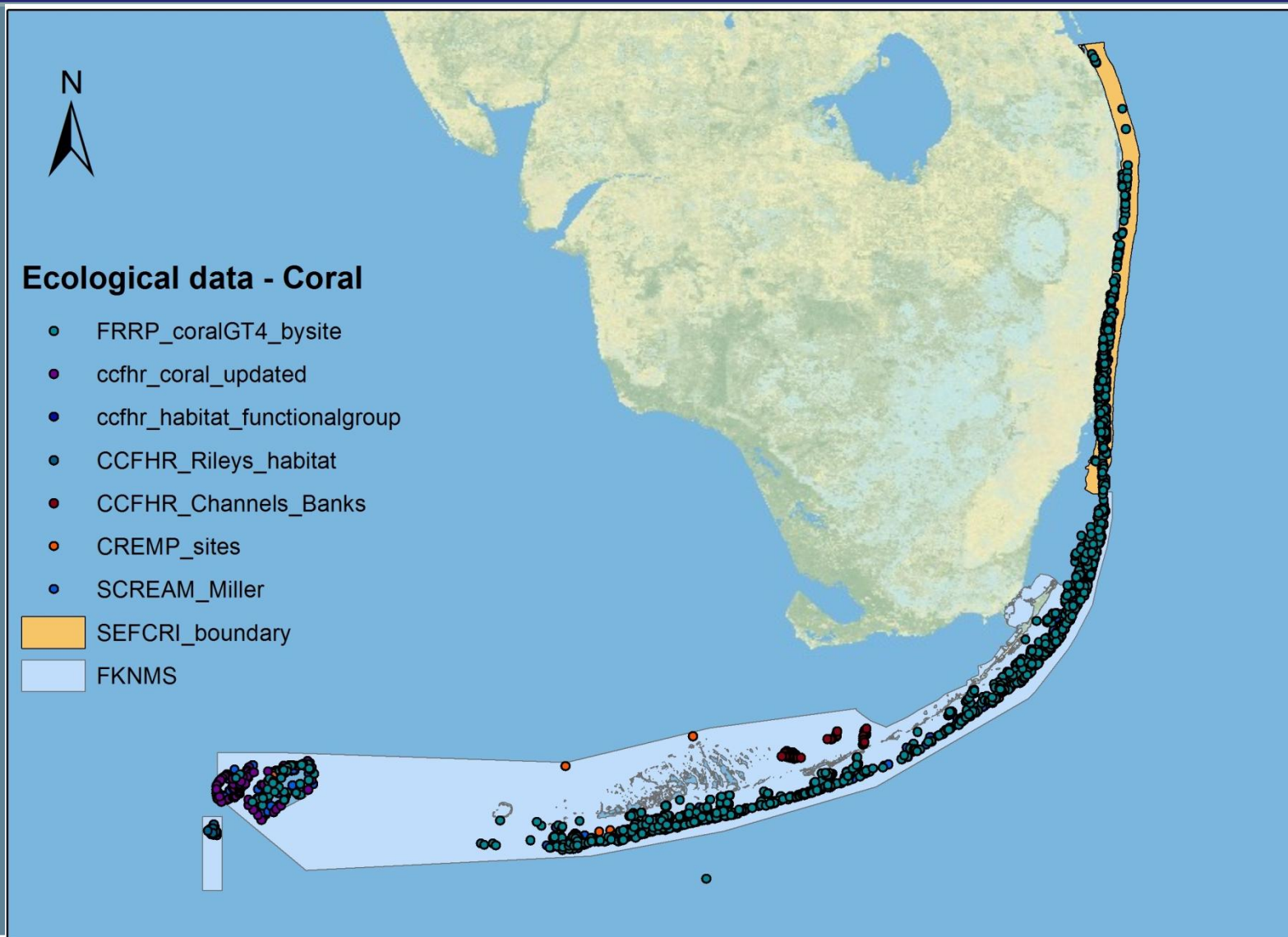


Ecological: biological resources

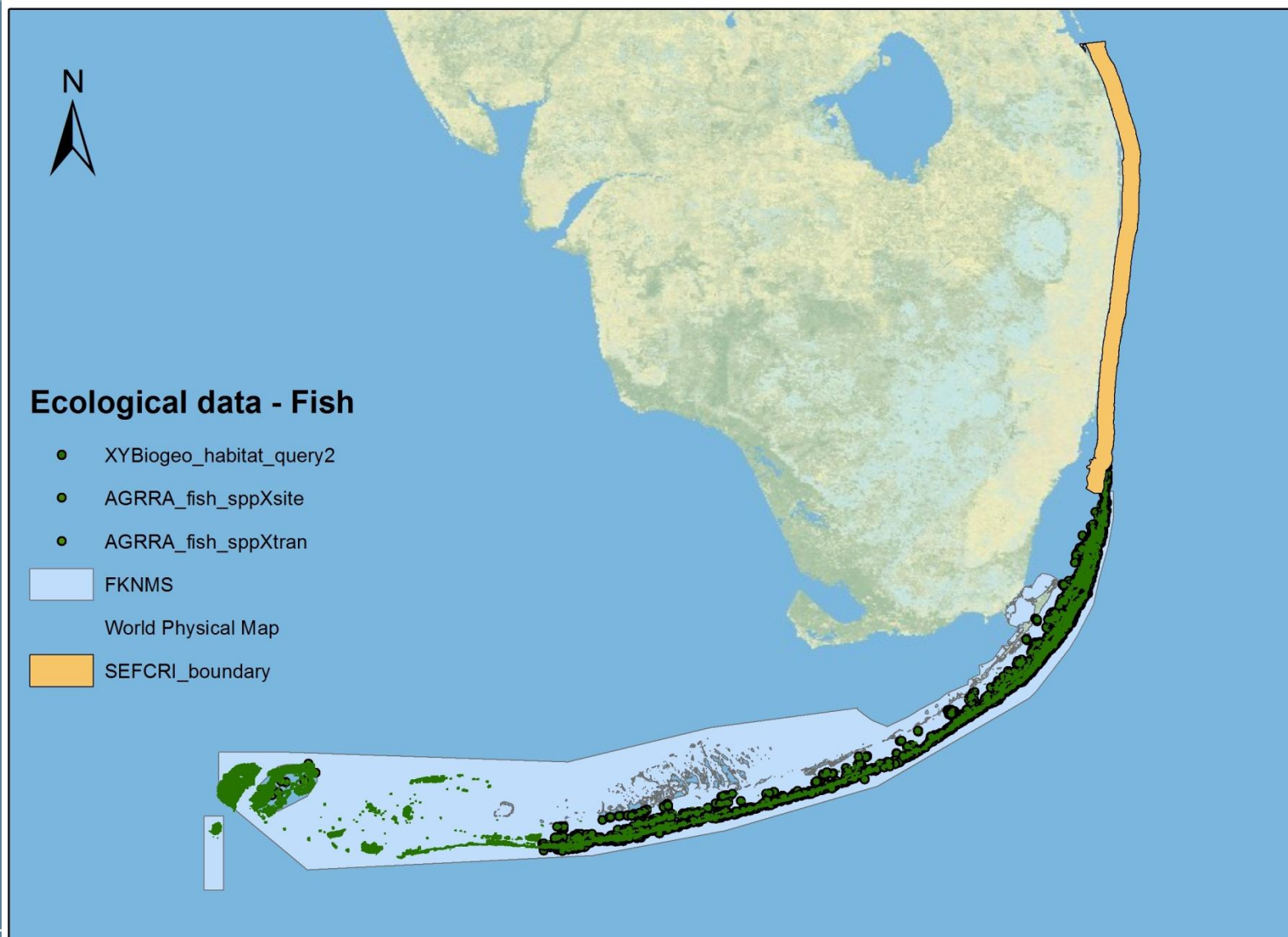
- **Fishery (e.g., reef fish, tarpon, lobster) & non-fishery species**
- **Coral & other reef-associated benthic organisms**
- **Seagrass & other soft - bottom communities**
- **Crabs & Lobsters**
- **Others?**



Ecological data on living resources



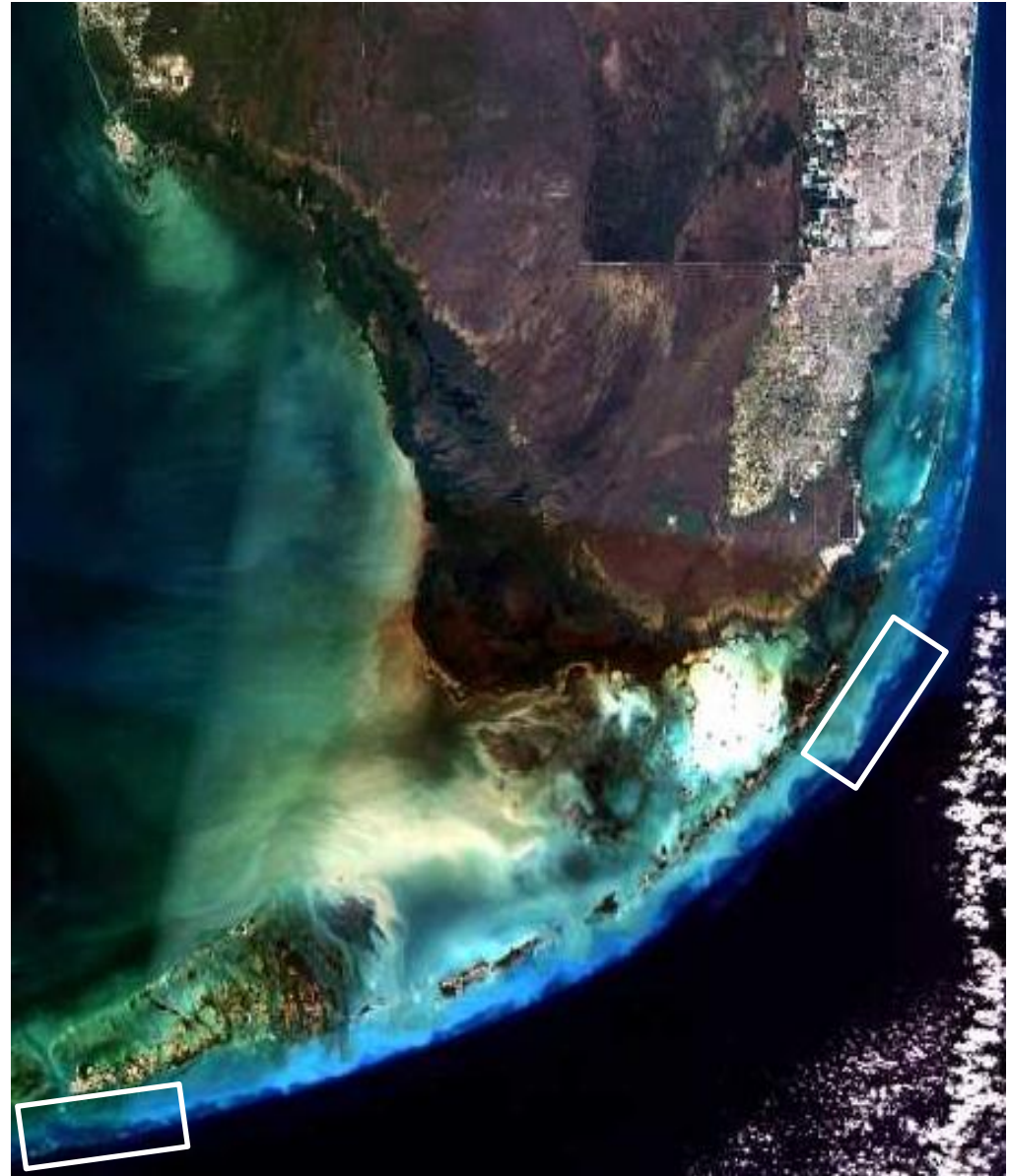
Ecological data on living resources



Fish spawning aggregation research

Assess reef fish utilization of identified historical spawning sites

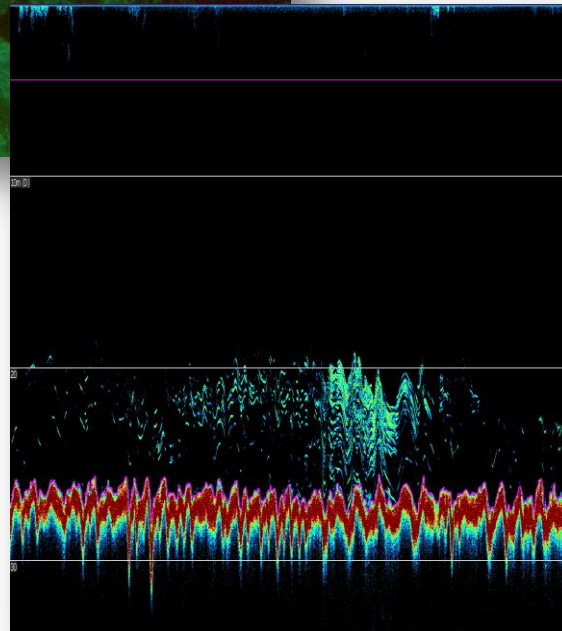
- Split-beam sonar surveys
- Diver surveys
- Upper Keys (off Key Largo)
 - Initiated in 2007
 - Methodology development
 - FSA sites previously “fished out”
- Lower Keys (off Key West)
 - Initiated in 2009
 - Methodology transfer
 - Status of FSA sites unknown
- SEFSC-CCFHR-FWCC partnership





Detect fish aggregation using fish finder

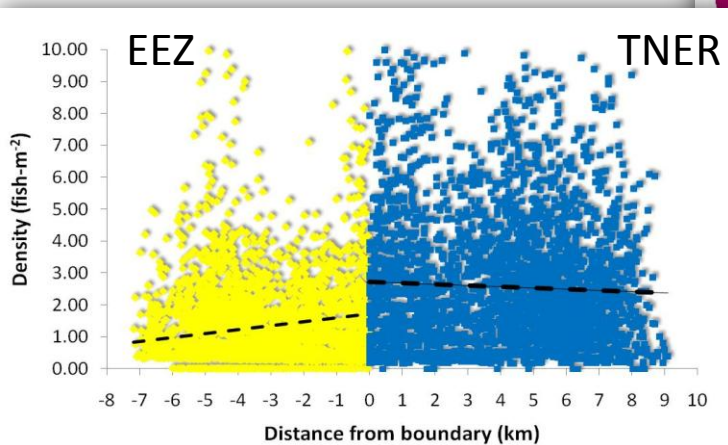
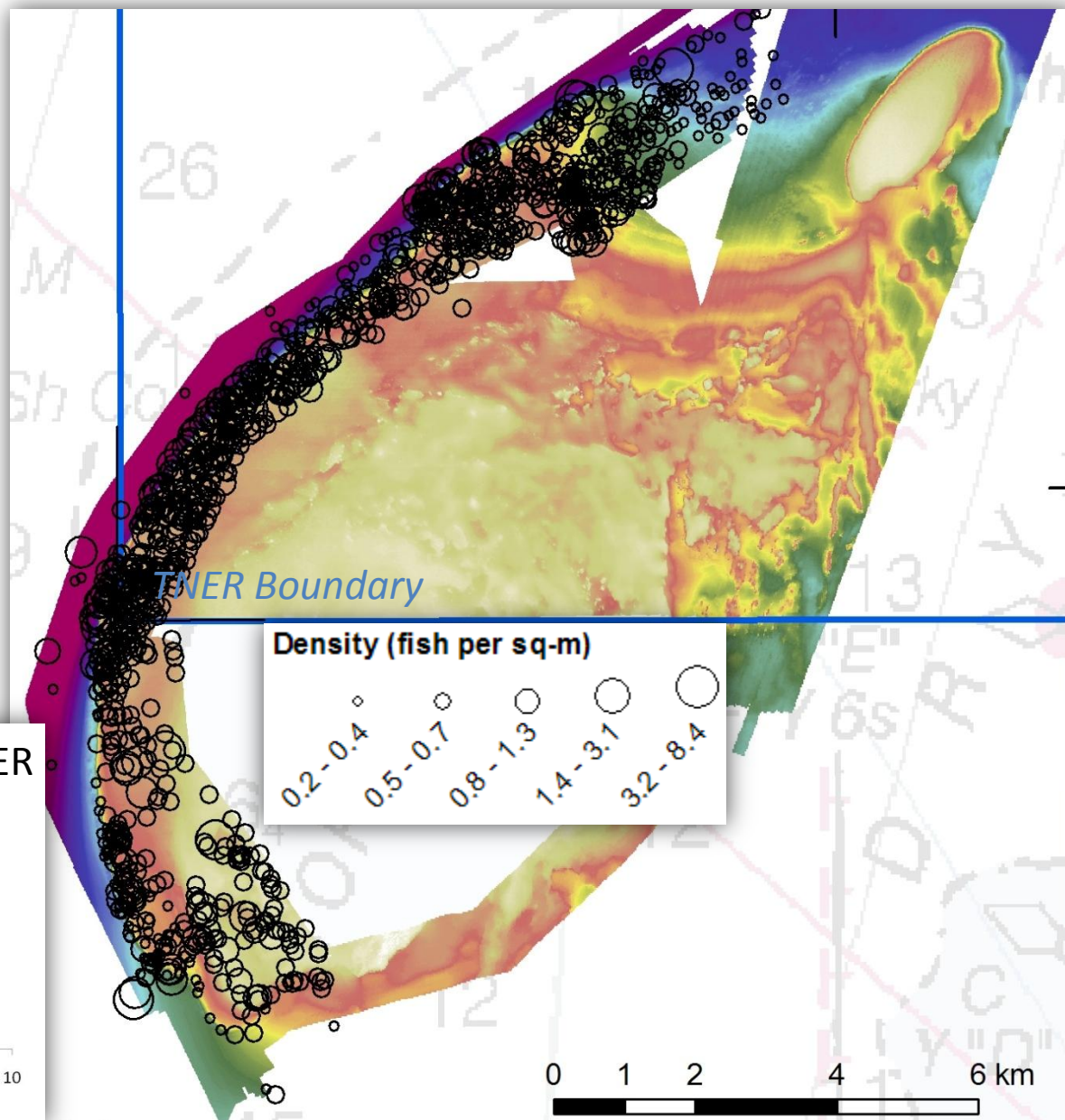
- Scientific split-beam (Simrad EK60) detects fish
- Acoustic strength indicates size – filter large-ish fish
- Linked to boat's GPS
- Waypoints placed for diver surveys



Near the Tortugas Ecological Reserve North boundary: 2008 & 2009

Medium & large fish

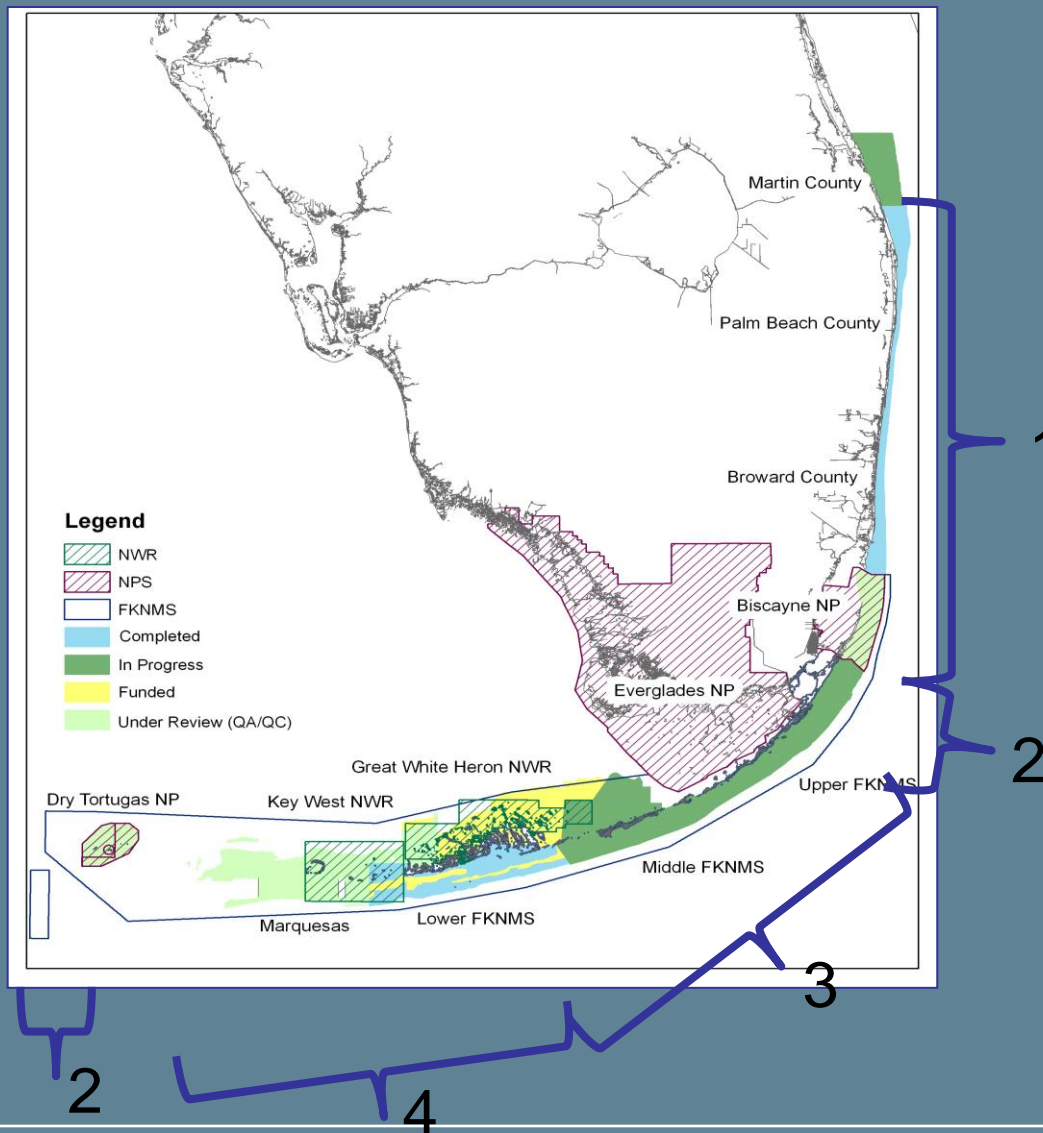
- Densities in EEZ increase toward boundary
- Densities higher in Reserve



Benthic Mapping: A Unified Benthic Habitat Map

Source:

FWC / Florida
Wildlife Research
Institute, St.
Petersburg, FL



Benthic Mapping: A Unified Benthic Habitat Map



Spatial Bibliography

What is it?

Bibliographic data linked to a geographic framework.

Why do it?

Organizes existing information in geographic context, enabling questions of “where”.

Doesn't this already exist?

Close, but not quite.

How might this be useful?

Conservation and science planning, place-based literature reviews, identify gaps, extract content.



Spatial Bibliography

- **Precedent projects in South Florida**
 - Everglades Annotated Bibliography (Schmidt 1991)
 - Florida Keys Bibliography (Chiappone and Wright 1996)
 - Dry Tortugas Annotated Bibliography (Schmidt and Pikula 1997)
 - Biscayne Bay Annotated Bibliography (Cantillo et al. 2000)
 - Florida Bay –Imagery and Information, CoastView Vol. 1
- **Current projects – online bibliographies**
 - Everglades Digital Library <http://everglades.fiu.edu/sfrc/index.htm>
 - Regional Databases at NOAA Miami Regional Library at AOML
<http://www.aoml.noaa.gov/general/lib/Regional/regional.htm>
 - Virtual Libraries: Dry Tortugas, Biscayne Bay, Florida Bay
 - FKNMS – Sanctuary Publications
 - Florida FWRI – Publications and Technical Reports
 - ReefBase Online Library
 - Online metadata search engines – Florida GAME, Gulf GAME
 - CORIS – Florida



Spatial Bibliography

- Do these existing projects meet current needs?
- If not, how to add value without duplicating effort?
- What questions can be addressed?
- What information sources to include?
- What areas to focus on?
- What spatial scale is appropriate?
- What spatial delineation?

watersheds/ estuaries / islands / inshore / offshore

clinal gradient – Dry Tortugas to St. Lucie

political boundaries

jurisdictional boundaries

lat / lon

grid-based framework



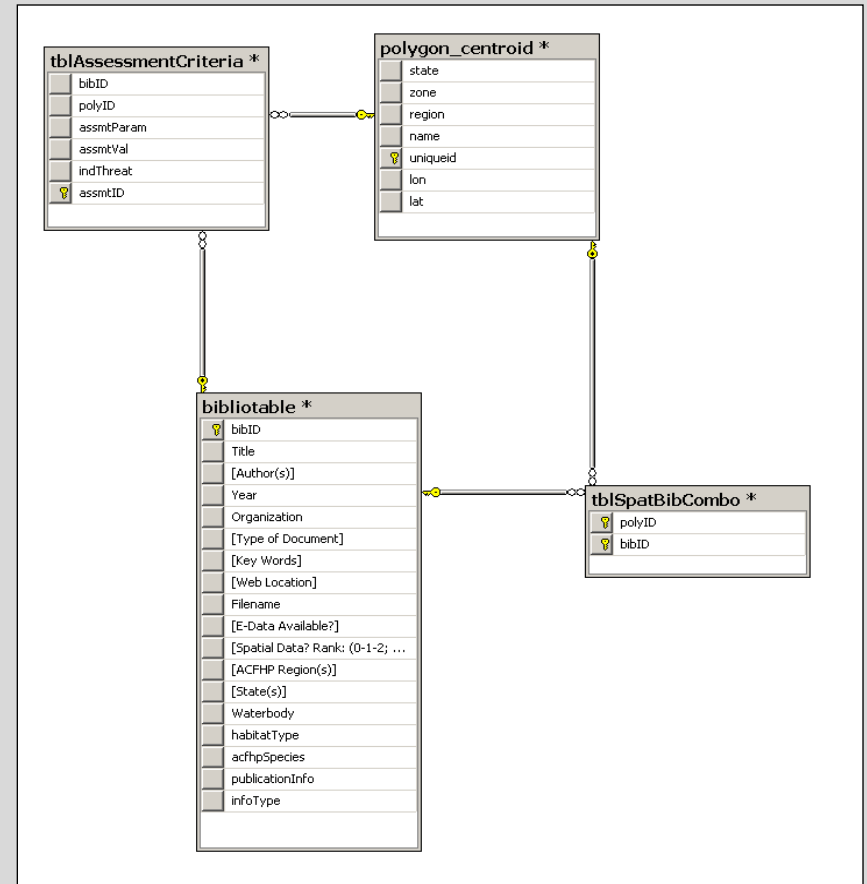
Spatial Bibliography

Database Design – linking Biblio table to spatial framework

	Field Name
	<i>bibID (link to spatial framework and other tables)</i>
	Title
	Author(s)
	Year
	Organization
	Type of Document
	Publication Info
	Web Location
	Filename
	Electronic data availability
	FCRT Regions
	County(s)
	Waterbody Number(s)
	Type of Information
	FCRT Species
	FCRT Habitat Types

Groupings of fields:

	Primary bibliographic information = What
	Electronic availability
	Spatial footprint = Where
	Species and habitats



Spatial Bibliography

- Current scope – build useable data tables
- Next steps – develop online queryable database?

The screenshot shows a web browser window with the URL <http://www8.nos.noaa.gov/bhv/spatbibQuery.aspx>. The page header includes the NCCOS logo and the text "Center for Coastal Monitoring and Assessment (CCMA) Science Serving Coastal Communities".

Below the header is a query interface with several dropdown menus for filtering results:

- Habitat Type:** Riverine, Shellfish Beds, Submerged Aquatic Vegetation, Tidal Vegetation
- Region:** All Regions, Mid-Atlantic, North Atlantic, South Atlantic
- State:** All States, CT, DC, DE
- Zone:** All Zones, CDA, EDA, Estuarine
- Waterbody:** Albemarle Sound, Albemarle Sound EDA, Altamaha River, Altamaha River EDA
- Information Type:** All Items, Conservation Plan, Habitat Assessment, Habitat Characterization

There are radio buttons for "Grid Output" (selected) and "Excel Download", and a "Query" button.

A note below the query button states: "Because any document may refer to multiple habitat types, these documents can appear in the output multiple times. Additionally, numerous habitat types occur in documents referencing a specific waterbody or waterbodies. However, in actuality, these habitat types are not necessarily found in these waterbodies."

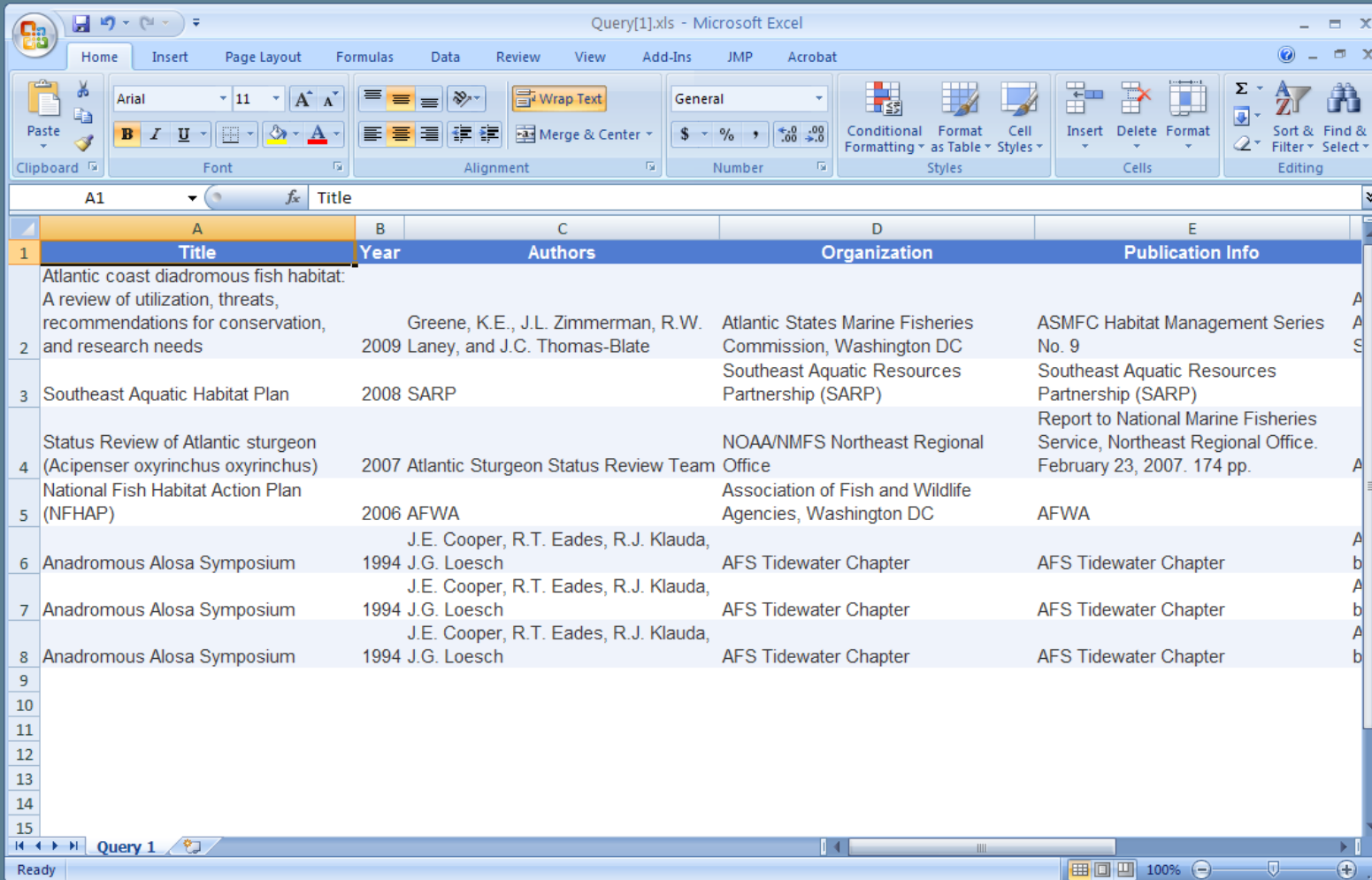
The main content is a table with the following columns: Title, Year, Authors, Organization, Publication Info, Species, Habitat Type, Information Type, and Web Location.

Title	Year	Authors	Organization	Publication Info	Species	Habitat Type	Information Type	Web Location
Atlantic coast diadromous fish habitat: A review of utilization, threats, recommendations for conservation, and research needs	2009	Greene, K.E., J.L. Zimmerman, R.W. Laney, and J.C. Thomas-Blate	Atlantic States Marine Fisheries Commission, Washington DC	ASMFC Habitat Management Series No. 9	Alewife, American eel, American shad, Atlantic sturgeon, Hickory shad, Striped bass, Blueback herring	Riverine	Conservation Plan	Click Here
Southeast Aquatic Habitat Plan	2008	SARP	Southeast Aquatic Resources Partnership (SARP)	Southeast Aquatic Resources Partnership (SARP)		Riverine	Conservation Plan	Click Here



Spatial Bibliography

- What kind of output would be useful?



The screenshot shows a Microsoft Excel spreadsheet titled "Query[1].xls". The spreadsheet contains a table with the following data:

	A	B	C	D	E
	Title	Year	Authors	Organization	Publication Info
1	Atlantic coast diadromous fish habitat: A review of utilization, threats, recommendations for conservation, and research needs	2009	Greene, K.E., J.L. Zimmerman, R.W. Laney, and J.C. Thomas-Blate	Atlantic States Marine Fisheries Commission, Washington DC	ASMFC Habitat Management Series No. 9
2	Southeast Aquatic Habitat Plan	2008	SARP	Southeast Aquatic Resources Partnership (SARP)	Southeast Aquatic Resources Partnership (SARP)
3	Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus)	2007	Atlantic Sturgeon Status Review Team	NOAA/NMFS Northeast Regional Office	Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.
4	National Fish Habitat Action Plan (NFHAP)	2006	AFWA	Association of Fish and Wildlife Agencies, Washington DC	AFWA
5	Anadromous Alosa Symposium	1994	J.E. Cooper, R.T. Eades, R.J. Klauda, J.G. Loesch	AFS Tidewater Chapter	AFS Tidewater Chapter
6	Anadromous Alosa Symposium	1994	J.E. Cooper, R.T. Eades, R.J. Klauda, J.G. Loesch	AFS Tidewater Chapter	AFS Tidewater Chapter
7	Anadromous Alosa Symposium	1994	J.E. Cooper, R.T. Eades, R.J. Klauda, J.G. Loesch	AFS Tidewater Chapter	AFS Tidewater Chapter
8	Anadromous Alosa Symposium	1994	J.E. Cooper, R.T. Eades, R.J. Klauda, J.G. Loesch	AFS Tidewater Chapter	AFS Tidewater Chapter



Spatial Bibliography

- Tool development – want vs. need vs. feasibility
- Query interface – map-based and/or pull-down menus?
- And who would maintain and host long-term?

NCCOS

Map Satellite Terrain

Name: Biscayne Bay
Polygon ID: 34
Zone: Estuarine
Region: South Florida
States: FL

All Regions
 North Atlantic
 South Atlantic
 Mid-Atlantic
 South Florida

Draw new Rectangle Delete Rectangle

Instructions:
To see data for a single point, hold CTRL and left click on the point. Then choose which type of data you would like to see from the Query Type menu below the map. Left clicking on a point will pop up a window with a quick summary of the point. If you would like to select more than one point, follow the instructions below for drawing a rectangle.

Instructions for drawing a rectangle:
Click 'Draw new Rectangle', click once on the map where you would like to start the rectangle. Move your mouse and click once again where you would like the opposite corner of the rectangle to be. To select a different area, you must delete your previous rectangle.

Skip to Zoom level: 4

Query Type: Assessment Data Bibliographic Data



FCRT Project: Timeline

- **Year 2012**- Compile & generate data layers for geo-database and spatial bibliography database; develop detailed analytical plan based on outcome of scoping meetings and expert working group;
- **Year 2013** - Data integration & analysis; generate draft & final map products (e.g, resource distribution) for review;
- **Year 2014** - Final product development, dissemination, and project wrap-up



FCRT Project: Next Steps

- Identify, acquire and compile any additional, critical datasets
- Finalize dataset(s) and conduct analyses
- Review of Analyses by clients & partners
- Work with managers to develop relevant and useful products

