

# Florida Keys National Marine Sanctuary: Decision Support System

**Dan Dorfman**

**Angela Orthmeyer**

**Daniel Mateos-Molina**

**Chris Jeffrey**



National Ocean Service  
National Centers for Coastal Ocean Science



CSS-Dynamac

# A Biogeographic Assessment of the Florida Coral Reef Tract: Scientific Information Collection and Integration



# Datasets: Natural Resources

## Metrics

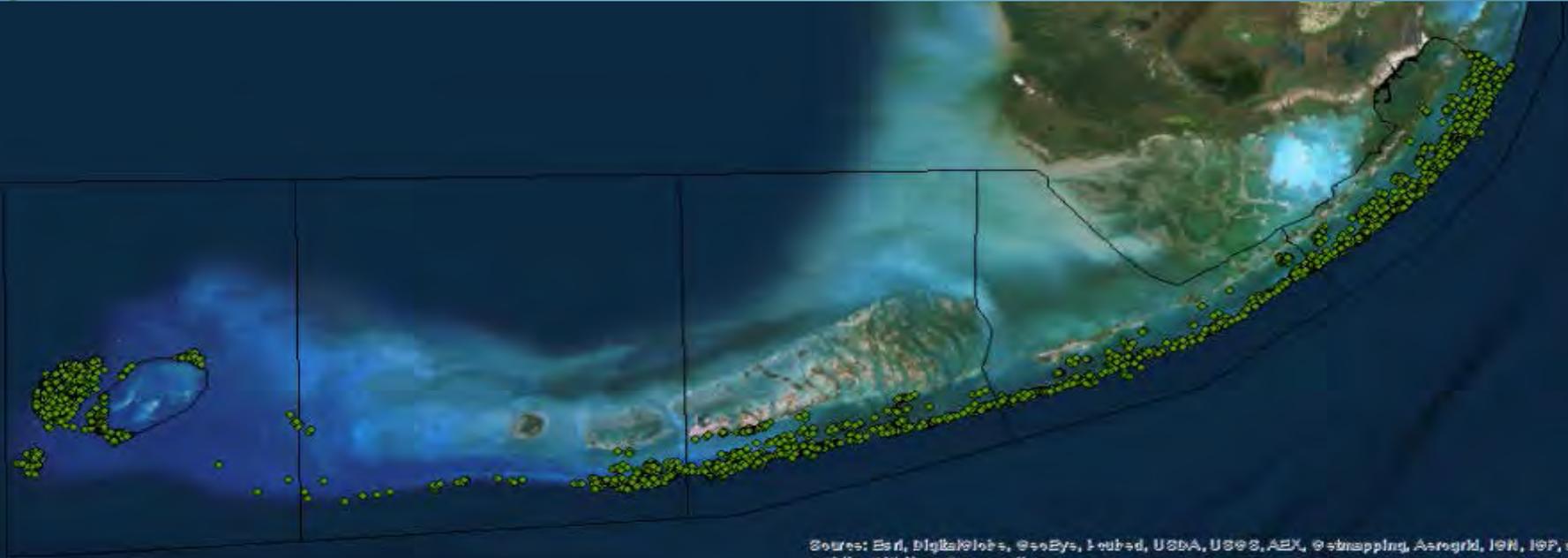
- Benthic Habitats
  - Patch & aggregated reef
  - High relief reefs
  - Seagrasses
- Coral
  - Stony coral
  - Soft coral
  - Resilient reefs
- Fish
  - Reef fish
  - Fish aggregations



Photos courtesy of NOAA photo library



# Benthic Habitat Map & Survey Data



# Conservation Features

- **Aggregate Reef**
- **Individual or Aggregated Patch Reef**
- **Mangrove**
- **Pavement**
- **Reef Rubble**
- **Scattered Coral/Rock in Unconsolidated Sediment**
- **Seagrass (Continuous)**
- **Seagrass (Discontinuous)**
- **Unconsolidated Sediment**
- **High Relief Reefs**
- **Resilient Reefs**
- **Fish Aggregations**
- **Stony Coral Species Richness (High)**
- **Stony Coral Species Richness (Medium)**
- **Stony Coral Species Richness (Low)**
- **Stony Coral Density (High)**
- **Stony Coral Density (Medium)**
- **Stony Coral Density (Low)**
- **Stony Coral Cover (High)**
- **Stony Coral Cover (Medium)**
- **Stony Coral Cover (Low)**
- **Soft Coral Species Richness (High)**
- **Soft Coral Species Richness (Medium)**
- **Soft Coral Species Richness (Low)**
- **Soft Coral Density (High)**
- **Soft Coral Density (Medium)**
- **Soft Coral Density (Low)**
- **Fish Abundance (High)**
- **Fish Abundance (Medium)**
- **Fish Abundance (Low)**
- **Fish Species Richness (High)**
- **Fish Species Richness (Medium)**
- **Fish Species Richness (Low)**
- **Snapper/Grouper**
- **Top 10 Ornamentals**
- **Parrot Fish**



# Working Group Process:

- Sanctuary Advisory Council established Shallow Water and Ecological Protection Working Groups to review sanctuary marine zones.
- Working Groups were led through a process to review data, share information, and develop recommendations for modified or new marine zones.
- Working Groups developed a suite of recommendations for Sanctuary Advisory Council consideration.
- Sanctuary Advisory Council reviewed and provided additional input for Sanctuary analysis in a Draft Environmental Impact Statement.

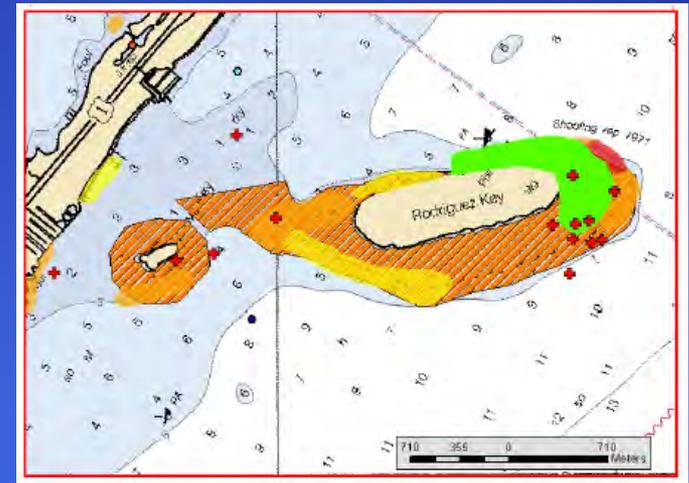


# Shallow Water Working Group Recommendations:

- Reviewed **27 existing** Wildlife Management Areas for modifications to access restrictions.
- Reviewed **25 new** proposed zones for some type of increased protection for shallow water resources.

## Recommendation:

- Remove 2 existing zones
- Status Quo for 7 existing zones
- Modify 19 existing zones
- Proposed 24 new zones



# Ecosystem Protection Working Group Recommendations:

- Reviewed Sanctuary Preservation Areas, Special Use Areas, Ecological Reserves, Existing Management Areas, the Sanctuary Boundary and the Area to be Avoided (ATBA)

## Recommendation:

- Modify 11 existing marine zones
- Modify the Sanctuary and ATBA boundary
- Propose 7 new marine zones
- Remove the catch and release by trolling exception in 4 existing marine zones



# Identifying Ecologically Important Areas

- Review Working Group and Advisory Council recommendations to ensure they meet Sanctuary Advisory Council Goals:
  - Improve the diversity of natural biological communities...to protect, and, where appropriate restore and enhance natural habitats, populations and ecological processes overall and in each of these sub regions ...;
  - Reduce stresses from human activities by establishing areas that restrict access to sensitive wildlife populations and habitats;
  - Protect large, contiguous, diverse and interconnected habitats.....; and
  - Increase abundance and condition of selected key species....
- **Utilize a decision support tool to evaluate proposed recommendations and to generate new options**



# Marxan Application:

A decision support tool which is generally used for identifying ecologically important areas and designing networks of natural resource management areas.

Designed at University of Queensland by Ian Ball, Hugh Possingham, & Matt Watts



THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA



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# Marxan:

Marxan is a software tool which supports the use of a systematic optimization algorithm.

It has been used to support the design of marine and terrestrial reserves world-wide.

It is the most widely used conservation planning tool with more than 5,600 users in 180 countries.

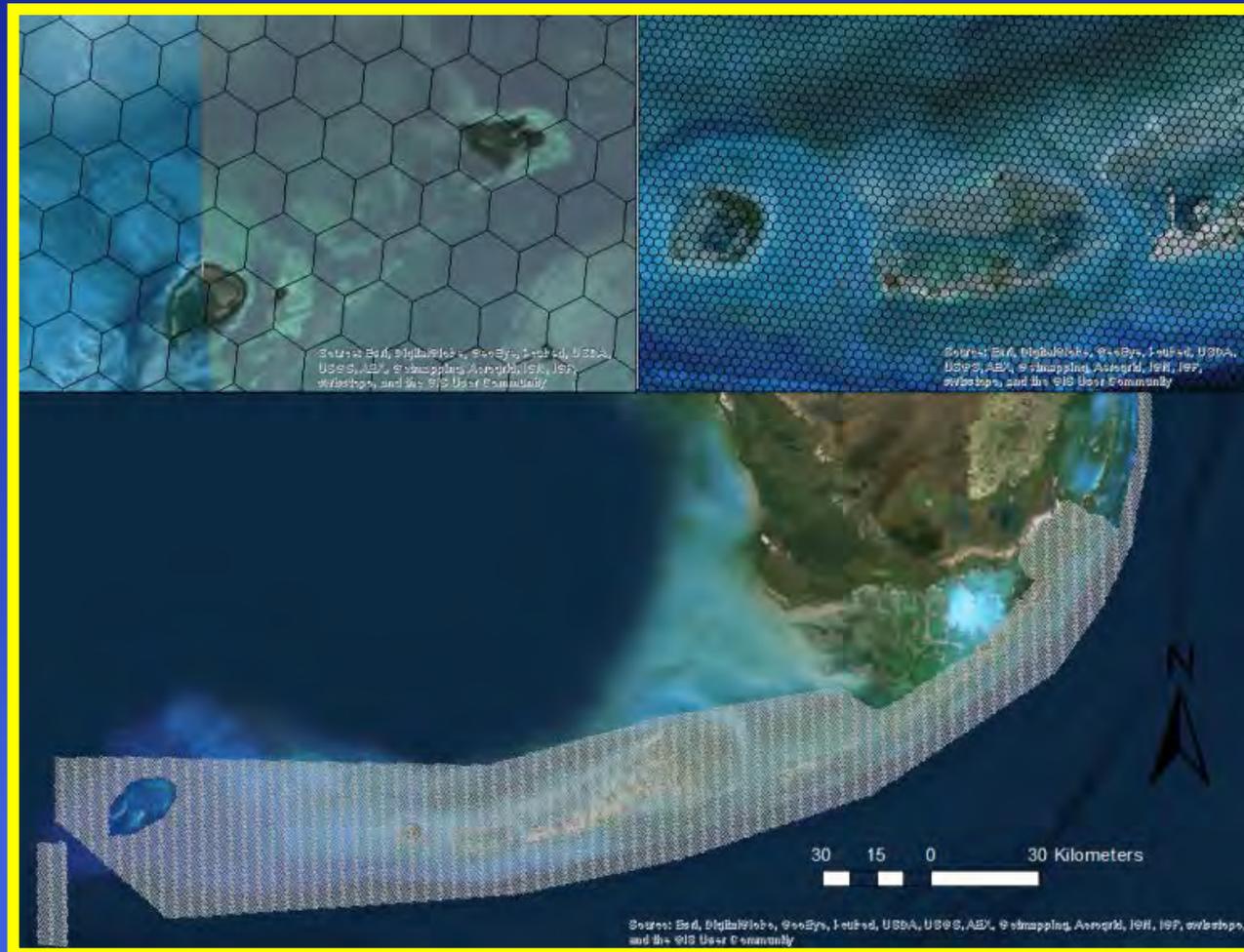


Marxan is designed to find efficient solutions to complex problems and can incorporate spatial considerations.

It is generally used to solve a minimum set problem, where one set of representation goals are achieved while minimizing “cost”. With “cost” generally defined as area.



# Planning Units (21 124, size 0.5 km<sup>2</sup>, 50 ha.)



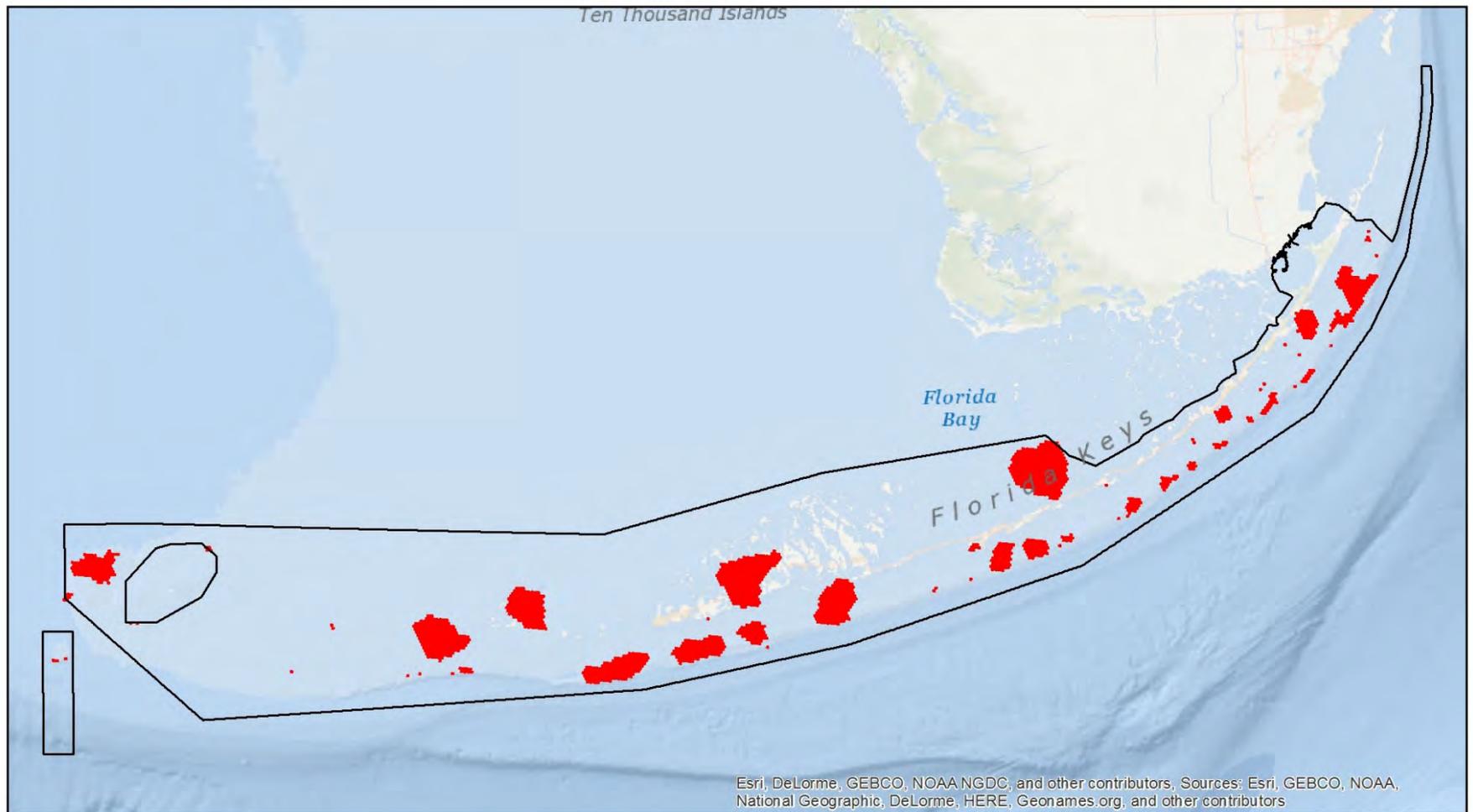
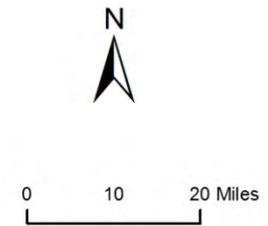
# Ecological Representation Criteria

Metric	Representation Goal (%)
Benthic Habitat Types	20
Seagrass	10
Fish Aggregation Sites	50
High Relief Reefs	30
Resilient Reefs	30
Low Fish Abundance	30
Med Fish Abundance	30
High Fish Abundance	50
Low Fish Richnes	30
Med Fish Richness	30
High Fish Richness	50
Low Grouper/Snapper Abundance	30
Med Grouper/Snapper Abundance	30
High Grouper/Snapper Abundance	30
Low Parrot Fish Abundance	30
Med Parrot Fish Abundance	30
High Parrot Fish Abundance	30
Low Ornamentals (Top 10)	30
Med Ornamentals (Top 10)	30
High Ornamentals (Top 10)	30

Low Coral Cover	30
Med Coral Cover	30
High Coral Cover	50
Low Coral Density	30
Med Coral Density	30
High Coral Density	50
Low Coral Richness	30
Med Coral Richness	30
High Coral Richness	50
Low Soft Coral Density	30
Med Soft Coral Density	30
High Soft Coral Density	50
Low Soft Coral Richness	30
Med Soft Coral Richness	30
High Soft Coral Richness	50
A. cervicornis	30
A. palmata	30
D. cylindrus	30
M. annularis	30
M. ferox	30
M. franksi	30
M. faveolata	30

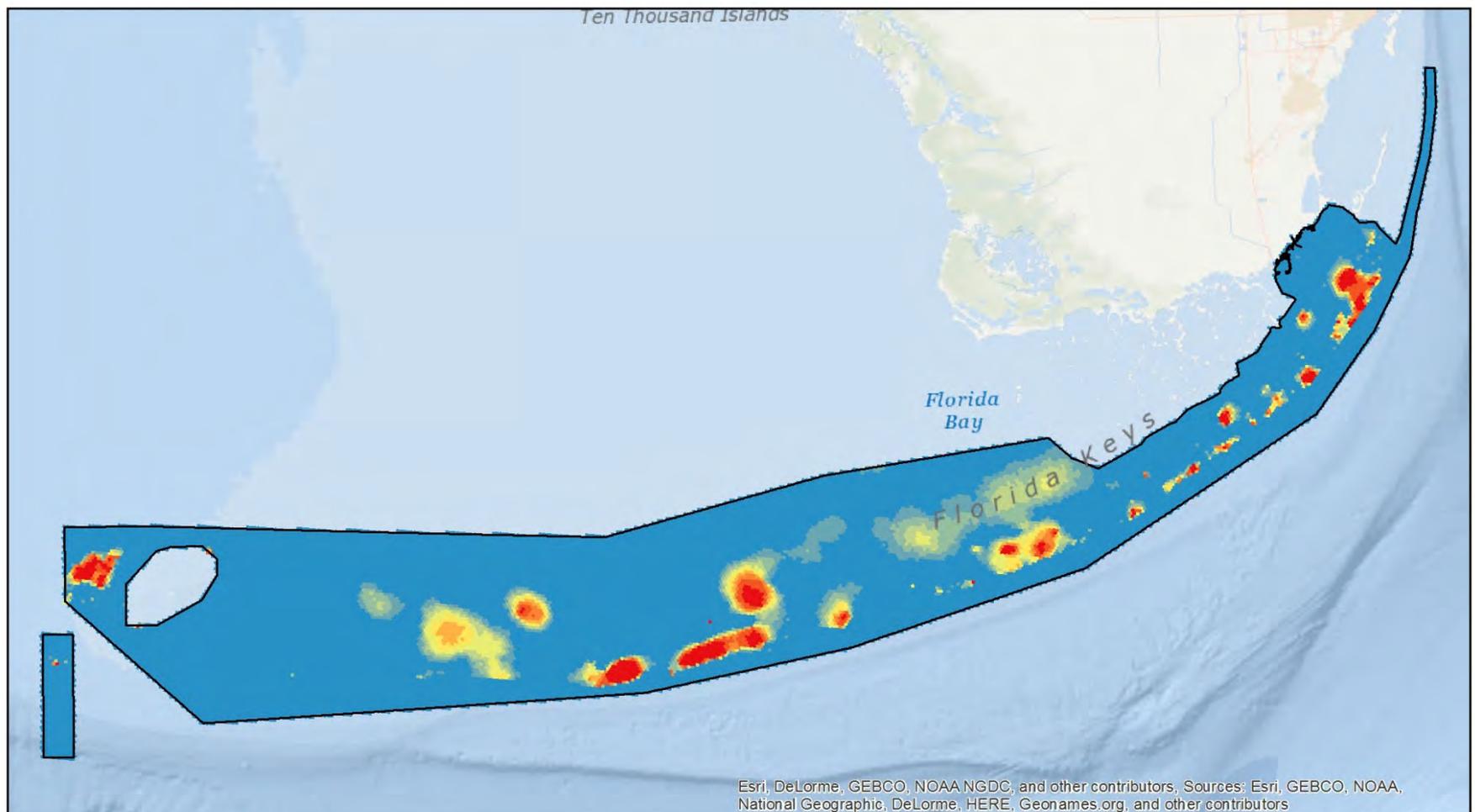
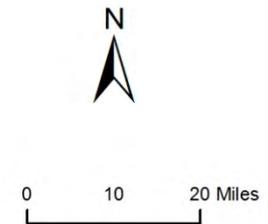
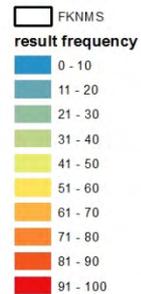


# Florida Keys National Marine Sanctuary: Spatially Efficient Result

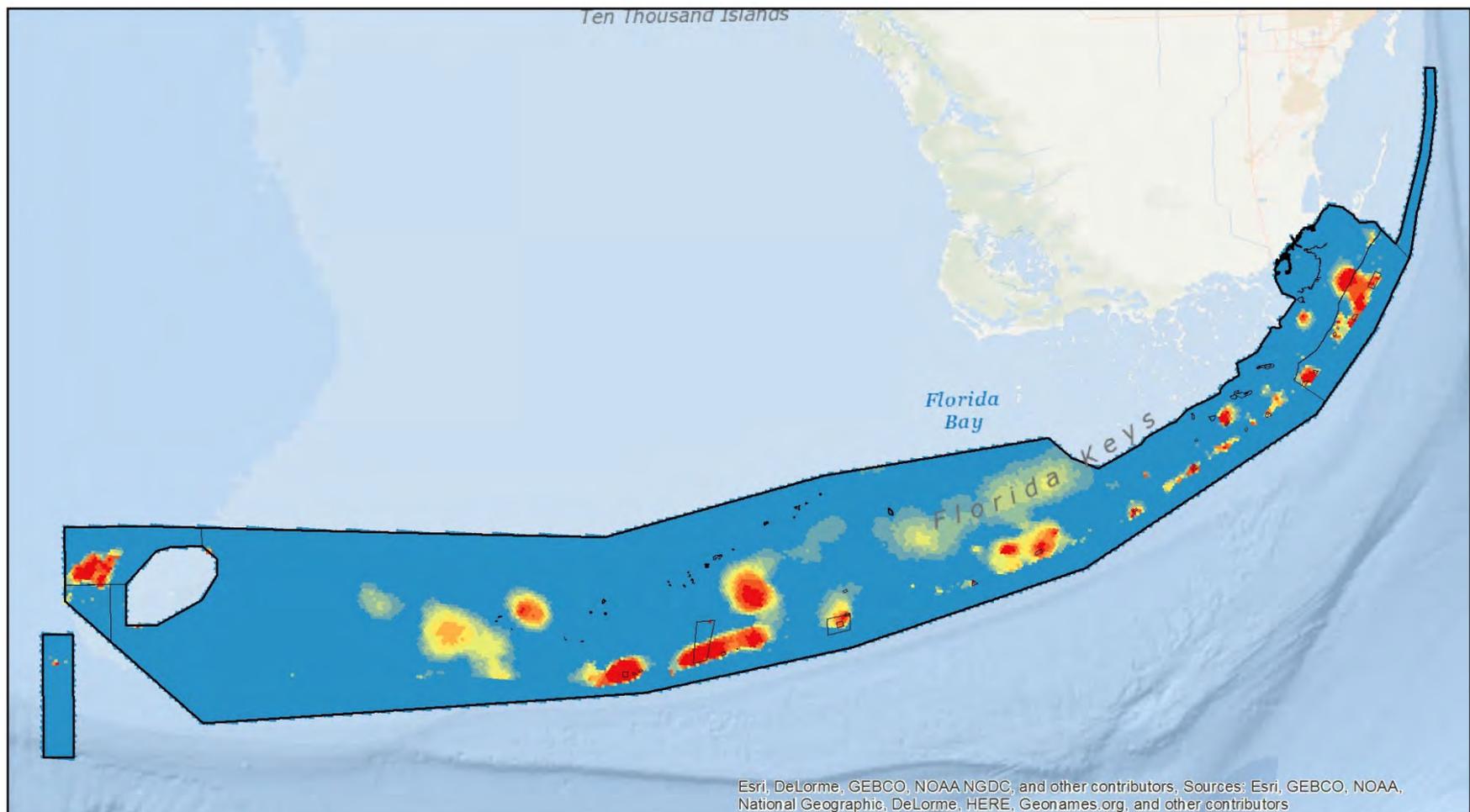
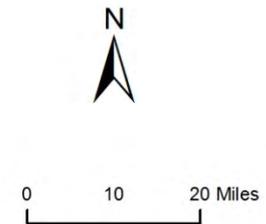
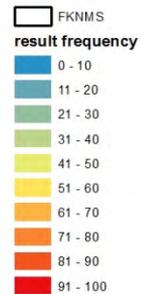


Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors, Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors

# Florida Keys National Marine Sanctuary: Summary Analysis Results



# Florida Keys National Marine Sanctuary: Summary Analysis Results



# Next Steps:

- Staff develops range of regulatory and zoning alternatives based on scoping comments, Advisory Council recommendations and input, and agency input.
- Alternative development includes coordination amongst agencies looking at feasibility, enforceability, administrative requirements, cost, legality, etc.
- Staff analyzes environmental / economic benefits and impacts of each alternative.
- Proposed Actions and Alternatives released in a Draft Environmental Impact Statement.



Thank You!

For more information please contact:

Dan Dorfman, [dan.dorfman@noaa.gov](mailto:dan.dorfman@noaa.gov)

