Science informed marine spatial planning for offshore wind

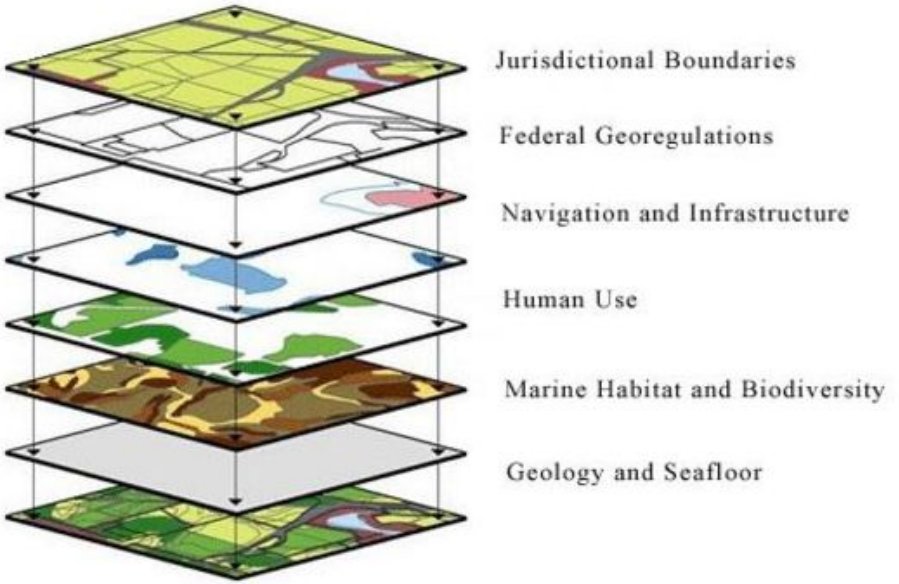
World Fisheries Congress: Pathways for a sustainable co-existence of offshore energy, fisheries and marine conservation: From local empirical evidence to global perspectives
March 3-7, 2024

John Walter
Deputy Director for Science and Council Services
Southeast Fisheries Science Center

Co-authors: JAMES MORRIS[5], J. READ HENDON[1], JOSEPH E. SERAFY[1], ROLDAN C. MUÑOZ[2], WILLEM KLAJBOR[4], G. TODD KELLISON[1], NICK FARMER[2], DAVID HANISKO[1], JENNIFER WRIGHT[4] & ERICA RULE[1]
[1] NOAA Fisheries, Southeast Fisheries Science Center, john.f.walter@noaa.gov
[2] NOAA National Ocean Service, National Center for Coastal Ocean Science,
[3] NOAA Southeast Regional Office
[4] University of Miami Cooperative Institute for Marine and Atmospheric Science

Take-home messages

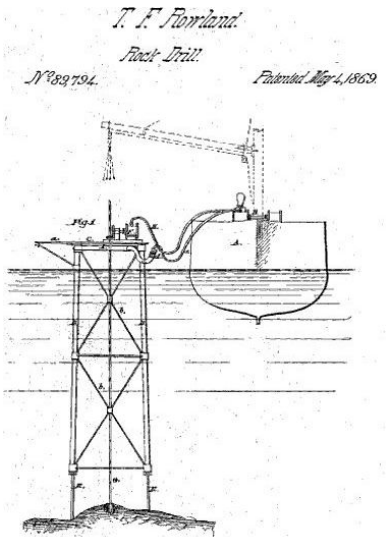
1. Start early, start big to finish big
2. Model-based marine spatial planning
3. Use best available spatial intelligence



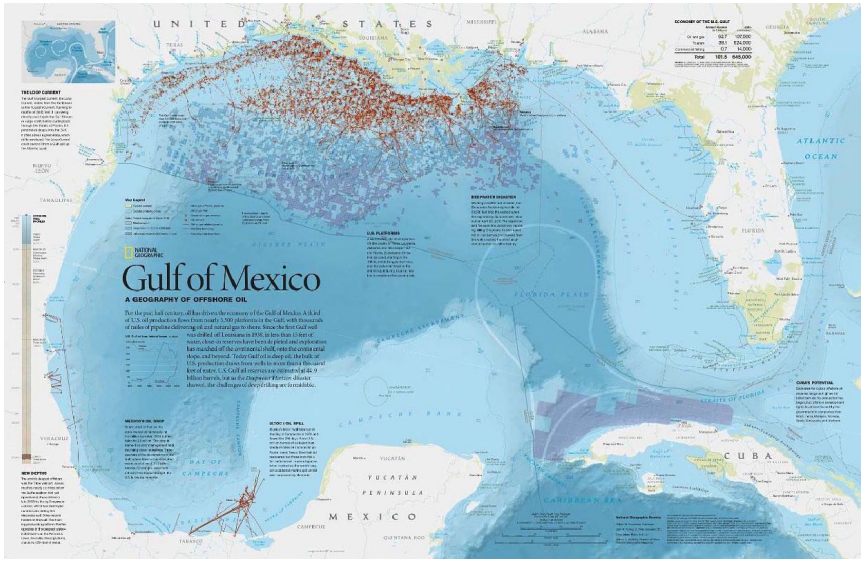
1. Start early: This isn't our first venture into offshore energy

But it is an opportunity to do it right

Offshore Rig
Patent 1869



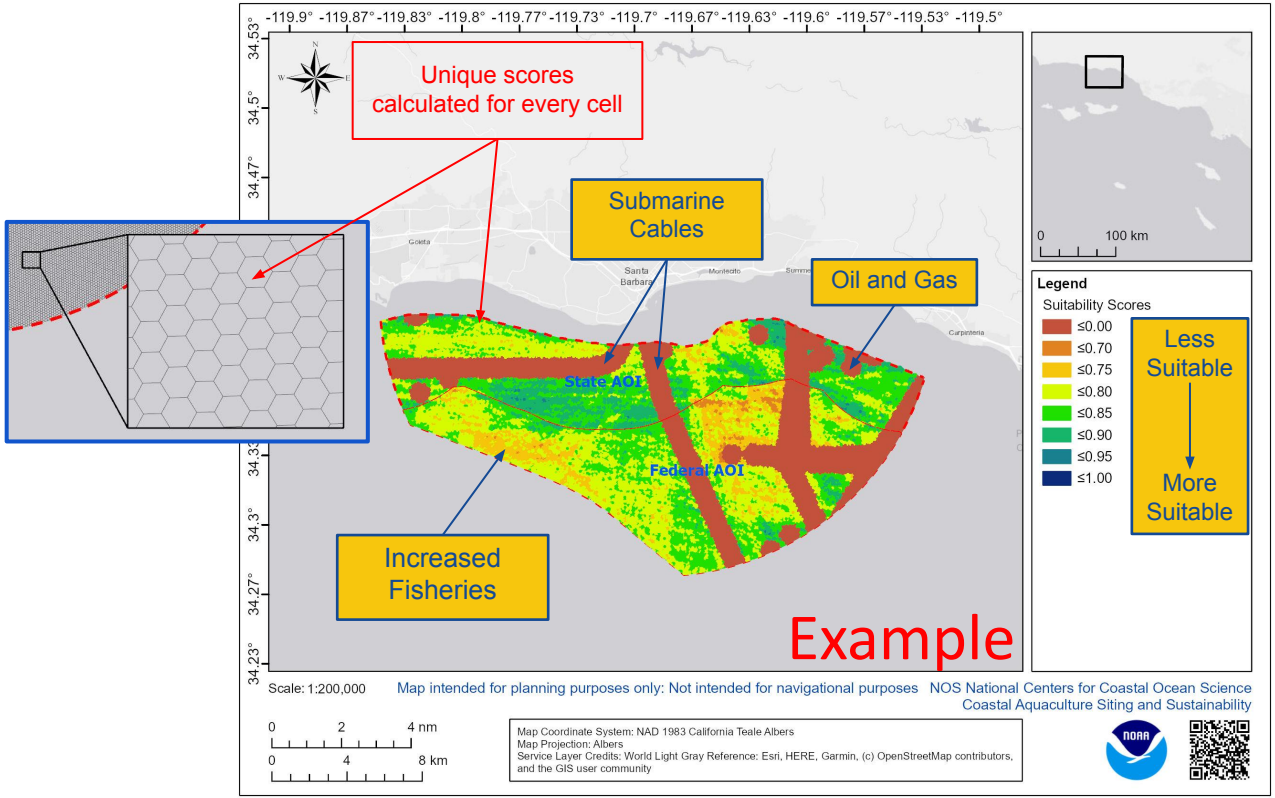
Kermac Rig No. 16, in 1947 became the first offshore rig in the Gulf of Mexico that was out of sight of land. .



www.nationalgeographic.org/hires/gulf-mexico-geography-offshore-oil/

"Unparalleled opportunity to get science in at the beginning of what could be a major change to the system. It is like having the opportunity to turn back the clock to the first offshore oil platform in 1947 and to take a holistic and cumulative approach."

2. Model-based marine spatial planning: Find opportunity, *mitigate conflicts*



A **spatial suitability model** weights locations relative to each other based on given criteria.

Location is everything!

How do we build the regional spatial model?

NORTHEAST OCEAN DATA
Maps and Data for Ocean Planning in the Northeastern United States

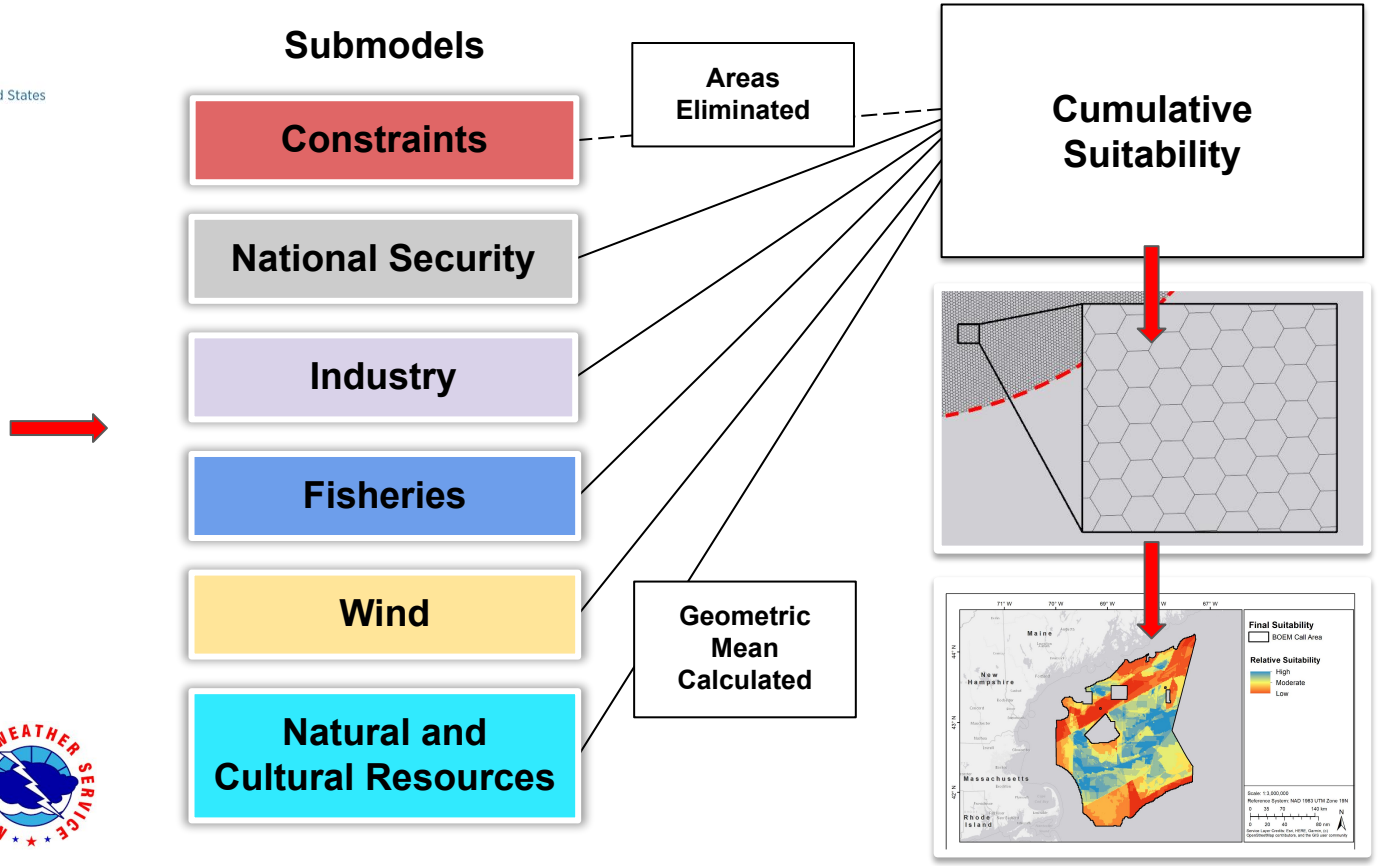
MarineCadastre.gov
An Ocean of Information
A joint BOEM and NOAA initiative providing authoritative data to meet the needs of the offshore energy and marine planning communities.

NOAA FISHERIES

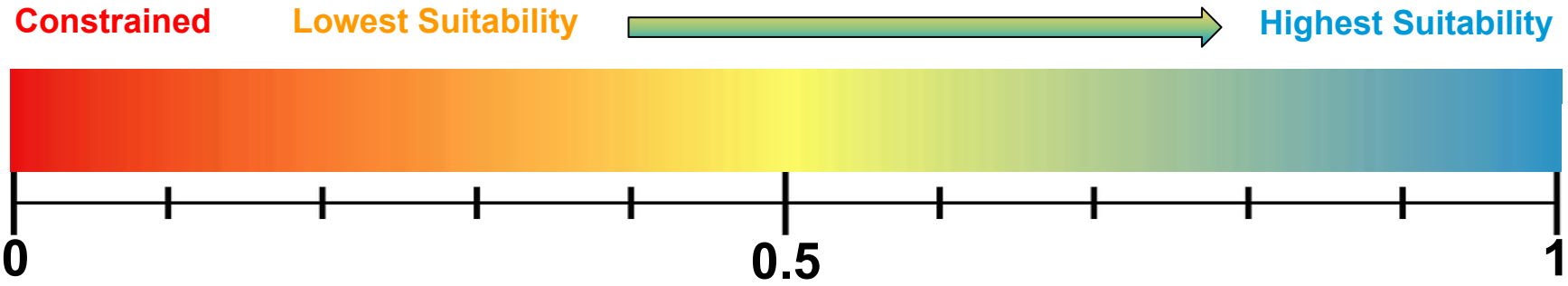
BOEM
Bureau of Ocean Energy Management

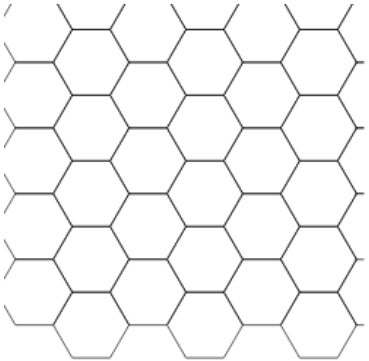
NCCOS

State Agencies

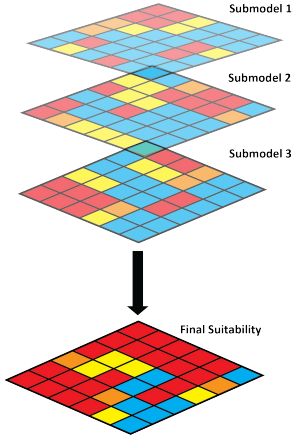


Scoring Data Layers





Scores are assigned to each grid cell for each separate data layer



Cumulative scores for each submodel are calculated

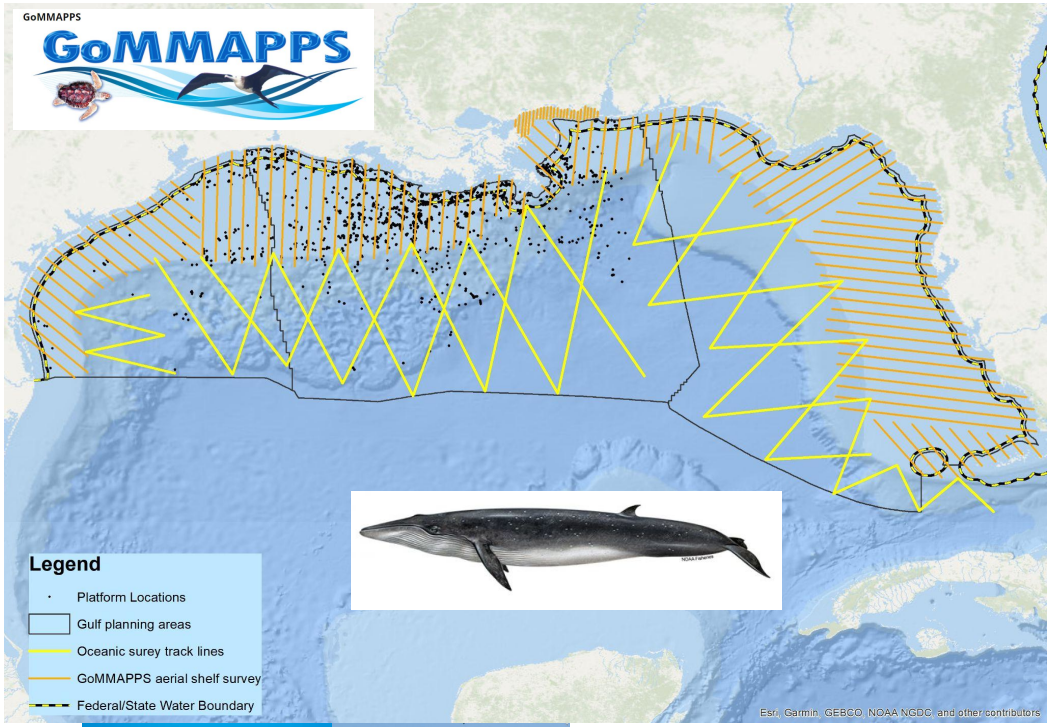
The geometric mean of all submodels is calculated to determine final suitability

3. Building a submodel using informed science: Protected resources

Protected species considerations for ocean planning: A case study for offshore wind energy development in the U.S. Gulf of Mexico.

Nicholas A. Farmer[1], Lance P. Garrison[2], Jenny A. Litz[2], Joel G. Ortega-Ortiz[2,3], Gina Rappucci[2,3 (a)], Paul M. Richards[2], Jessica R. Powell[4], Dana M. Bethea[5], Jonathan A. Jossart[6], Alyssa L. Randall[6], Mariana E. Steen[7], Tershara N. Matthews[8], James A. Morris, Jr.[9]

Marine and Coastal Fisheries (2023)



PLOS ONE

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

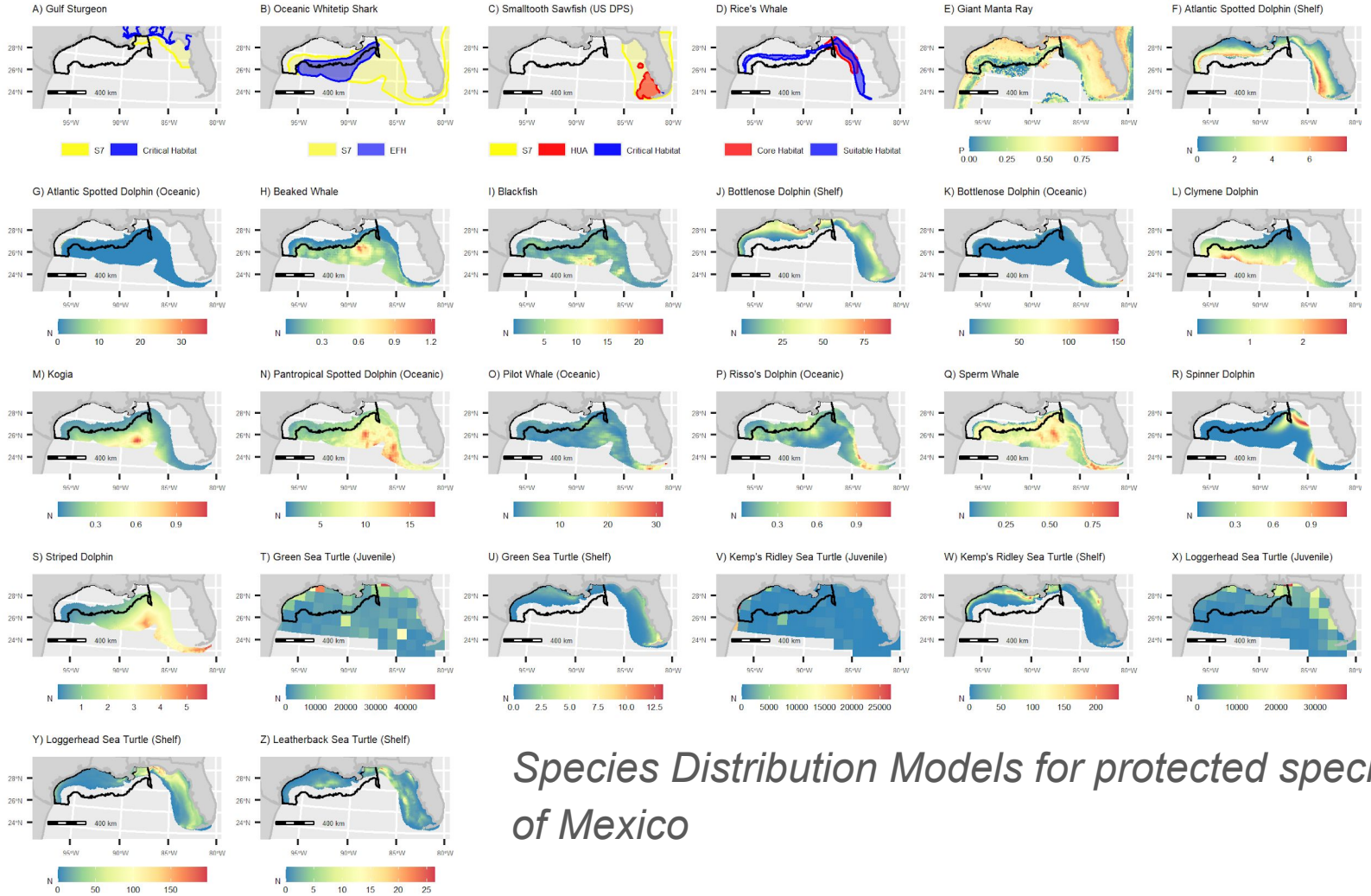
Modeling protected species distributions and habitats to inform siting and management of pioneering ocean industries: A case study for Gulf of Mexico aquaculture

Nicholas A. Farmer, Jessica R. Powell, James A. Morris Jr., Melissa S. Soldevilla, Lisa C. Wickliffe, Jonathan A. Jossart, Jonathan K. MacKay, Alyssa L. Randall, Gretchen E. Bath, Penny Ruvelas, Laura Gray, Jennifer Lee, Wendy Piniak, Lance Garrison, Robert Hardy, Kristen M. Hart, Chris Sasso, Lesley Stokes, Kenneth L. Riley [view less]

Published: September 30, 2022 • https://doi.org/10.1371/journal.pone.0267333

See the preprint

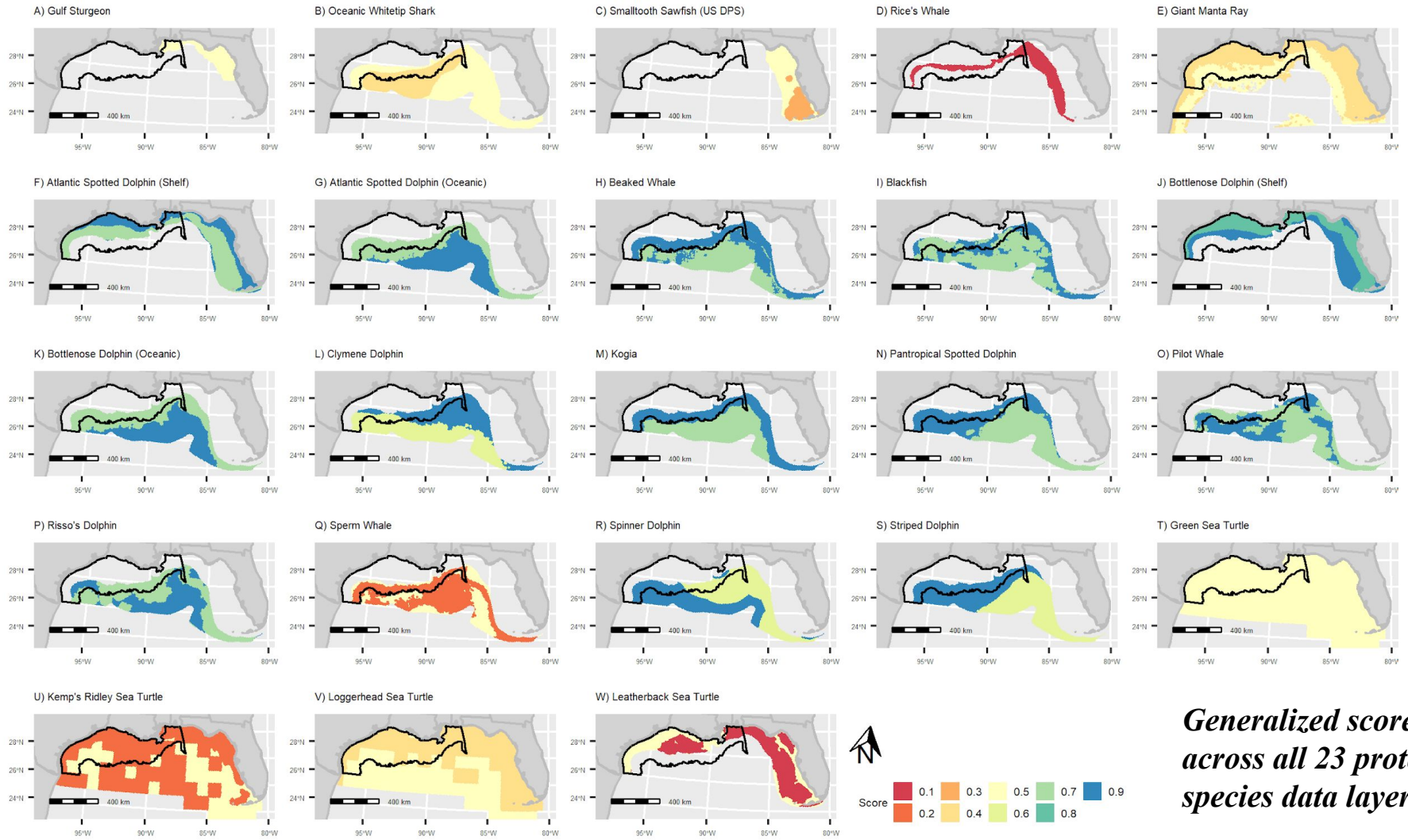
NOAA FISHERIES NCCOS NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE CSS BOEM BUREAU OF OCEAN ENERGY MANAGEMENT



Species Distribution Models for protected species in Gulf of Mexico

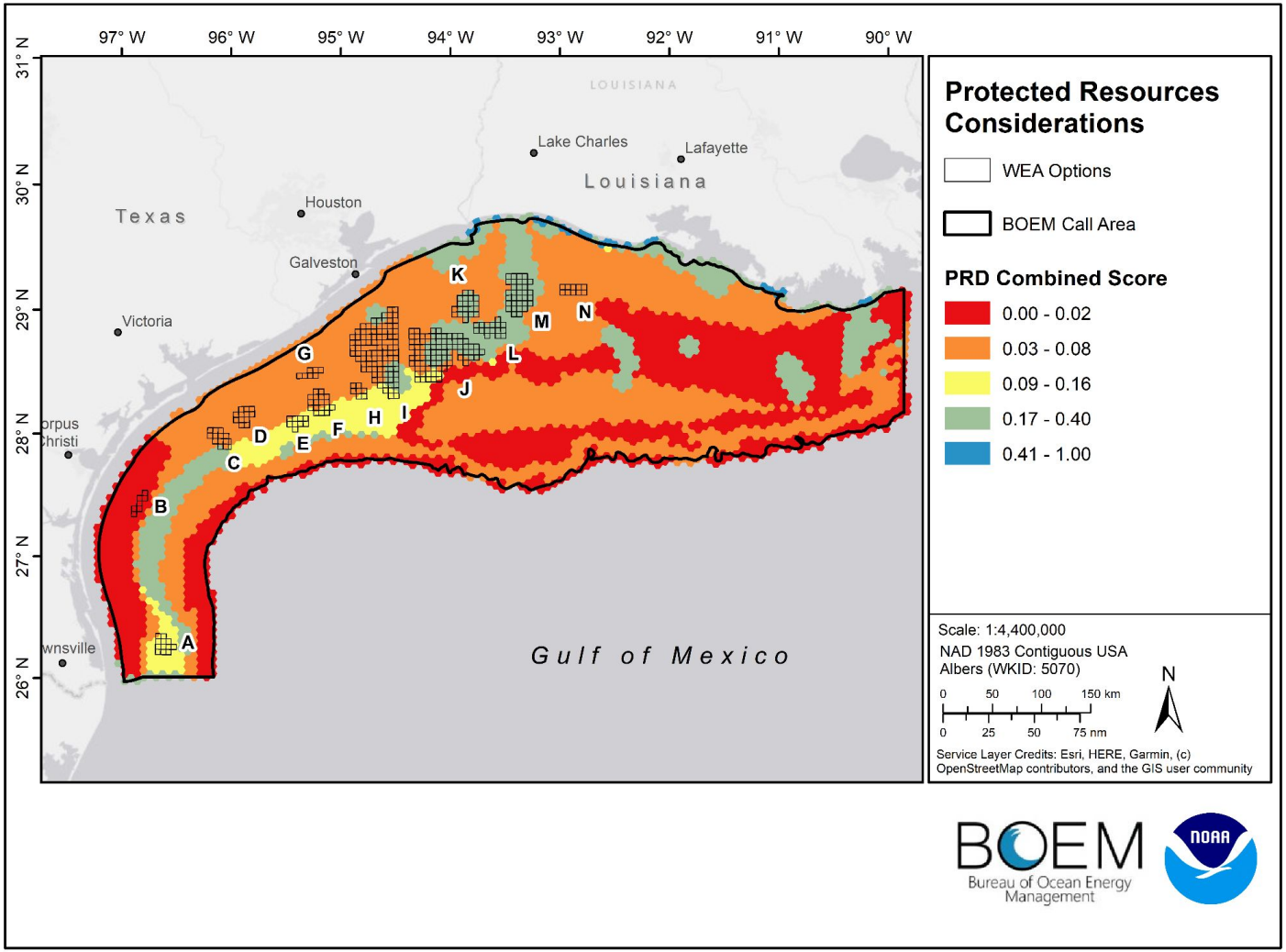
Generalized Scoring System

Status	Trend	Score
Endangered	declining, small population (N<500) or both	0.10
Endangered	stable or unknown	0.20
Endangered	increasing	0.30
Threatened	declining or unknown	0.40
Threatened	stable or increasing	0.50
ESA-Listed Low Use Area	default score ESA-listed low-use area	0.50
MMPA Strategic	declining or unknown	0.60
MMPA-listed	small population* or unknown/declining	0.70
MMPA-listed	large population or stable/increasing	0.80
MMPA-listed Low Use Area	default score MMPA-listed low-use area	0.90

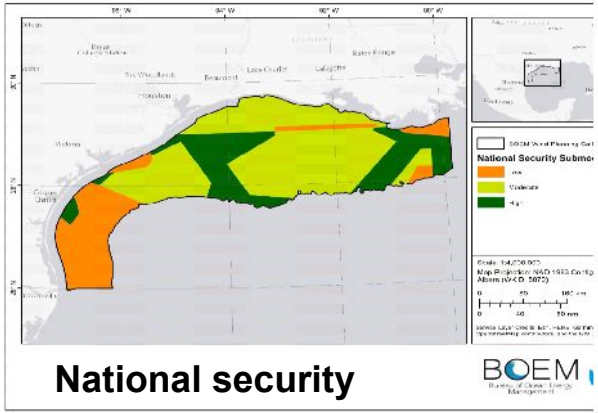


Generalized scores across all 23 protected species data layers.

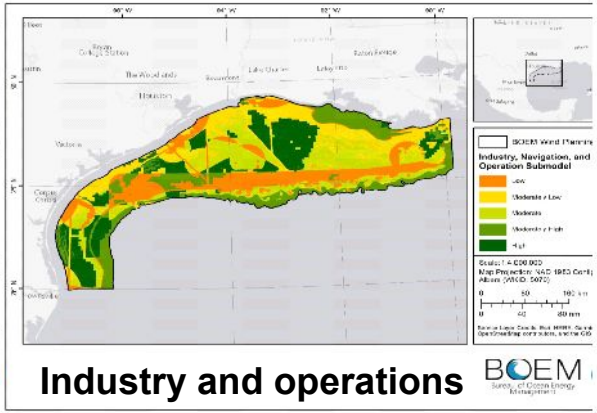
Protected Resources considerations



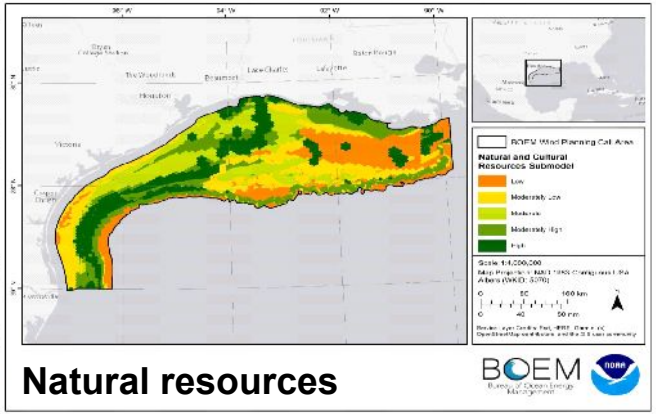
Gulf of Mexico submodels



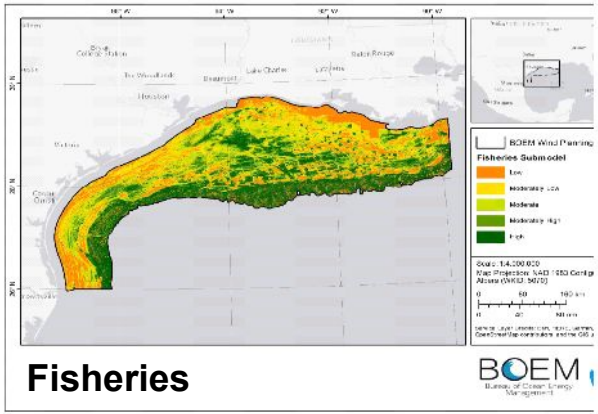
National security



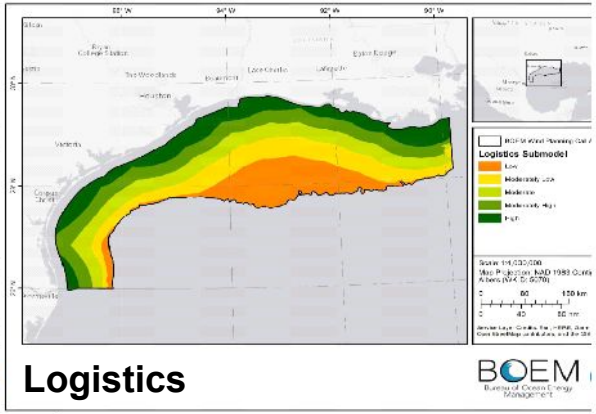
Industry and operations



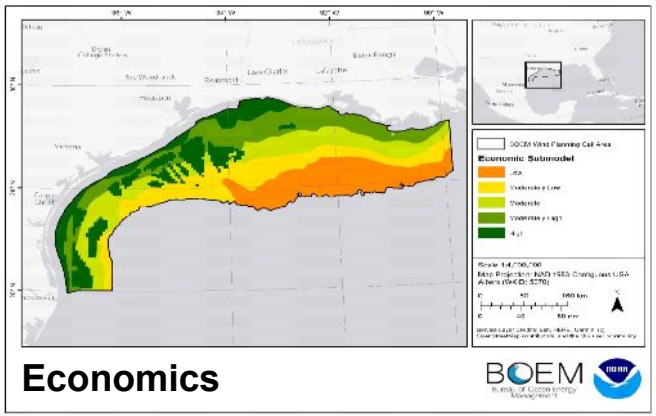
Natural resources



Fisheries



Logistics

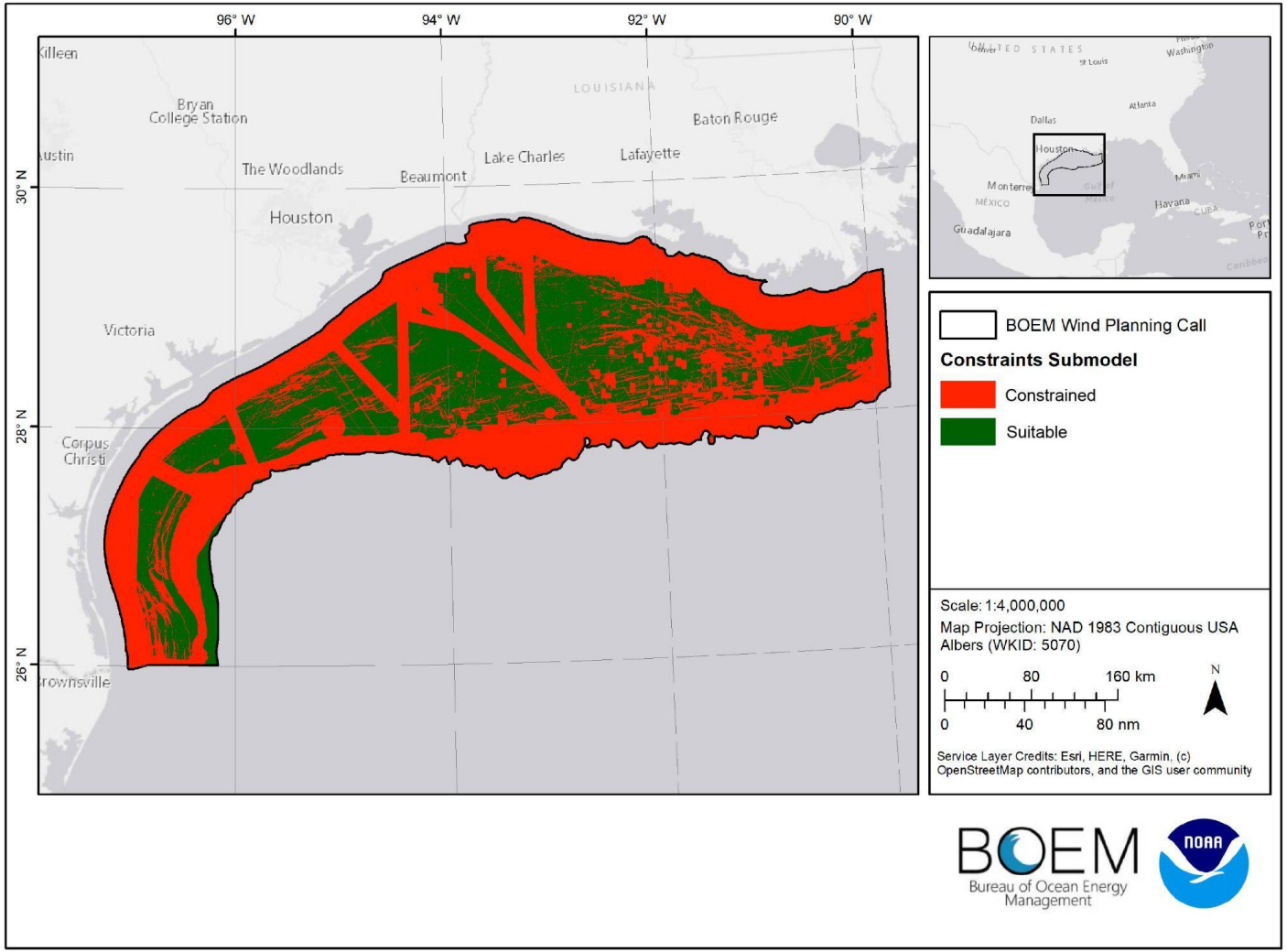


Economics

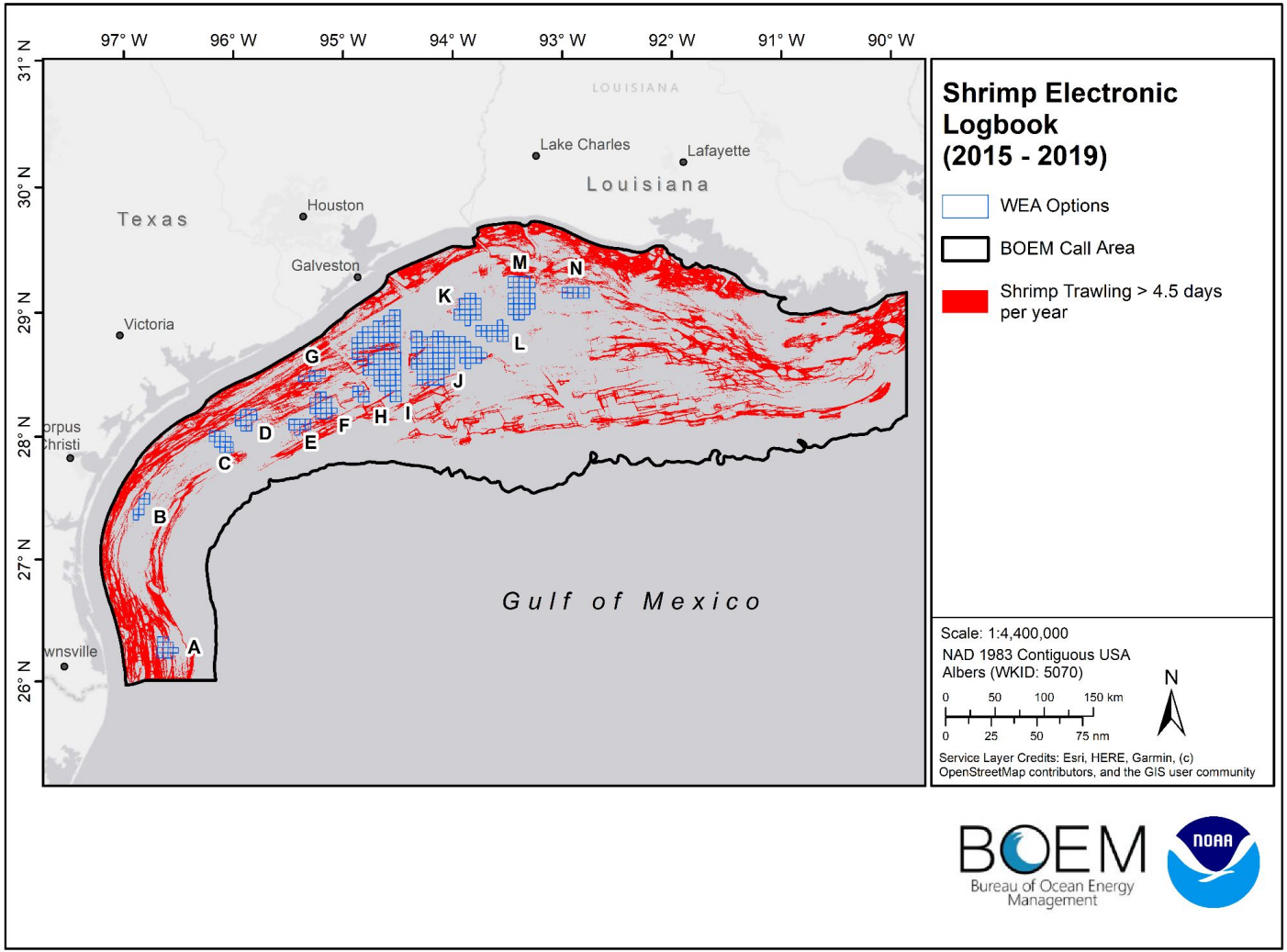
Constraints Submodel

Data Layer	Setback Distances	Score	Cells Impacted	Percent Area Constrained
VMS Shrimp Fishing (Moderate-High areas)	-	0	869,626	29.2%
FWS 20 nm coastal buffer	-	0	616,025	20.7%
Shipping Fairways and Regulations	3219 m	0	580,521	19.5%
Rice's Whale 100 m to 400 m	-	0	521,052	17.5%
Active Oil and gas Lease Blocks (Including FGNMS Blocks)	-	0	271,086	9.1%
BOEM Lease Blocks with Significant Sediment Resources	-	0	165,796	5.6%
BOEM No Activity Zones	1000 m	0	104,056	3.5%
Oil and Gas Pipelines (Only Active Pipelines)	200 ft	0	97,090	3.3%
Menhaden Fishing	-	0	81,054	2.7%
Oil and Gas Boreholes, Test Wells, and Wells	200 ft	0	71,435	2.4%
Anchorage Areas (used/disused)	-	0	29,434	1.0%
Oil and Gas Drilling Platforms	500 ft	0	27,285	0.9%
Submarine Cables	500 ft	0	11,943	0.4%
Unexploded Ordnance (UXO) polygon	-	0	10,237	0.3%
LA permitted artificial reefs	500 ft	0	4,673	0.2%
Aids to Navigation (beacons and buoys)	500 m	0	2,935	0.1%
TX permitted artificial reefs	1000 ft	0	3,041	0.1%
Environmental Sensors and Buoys	500 m	0	1,042	0.04%
		All Constraints	2,005,813	67.40%

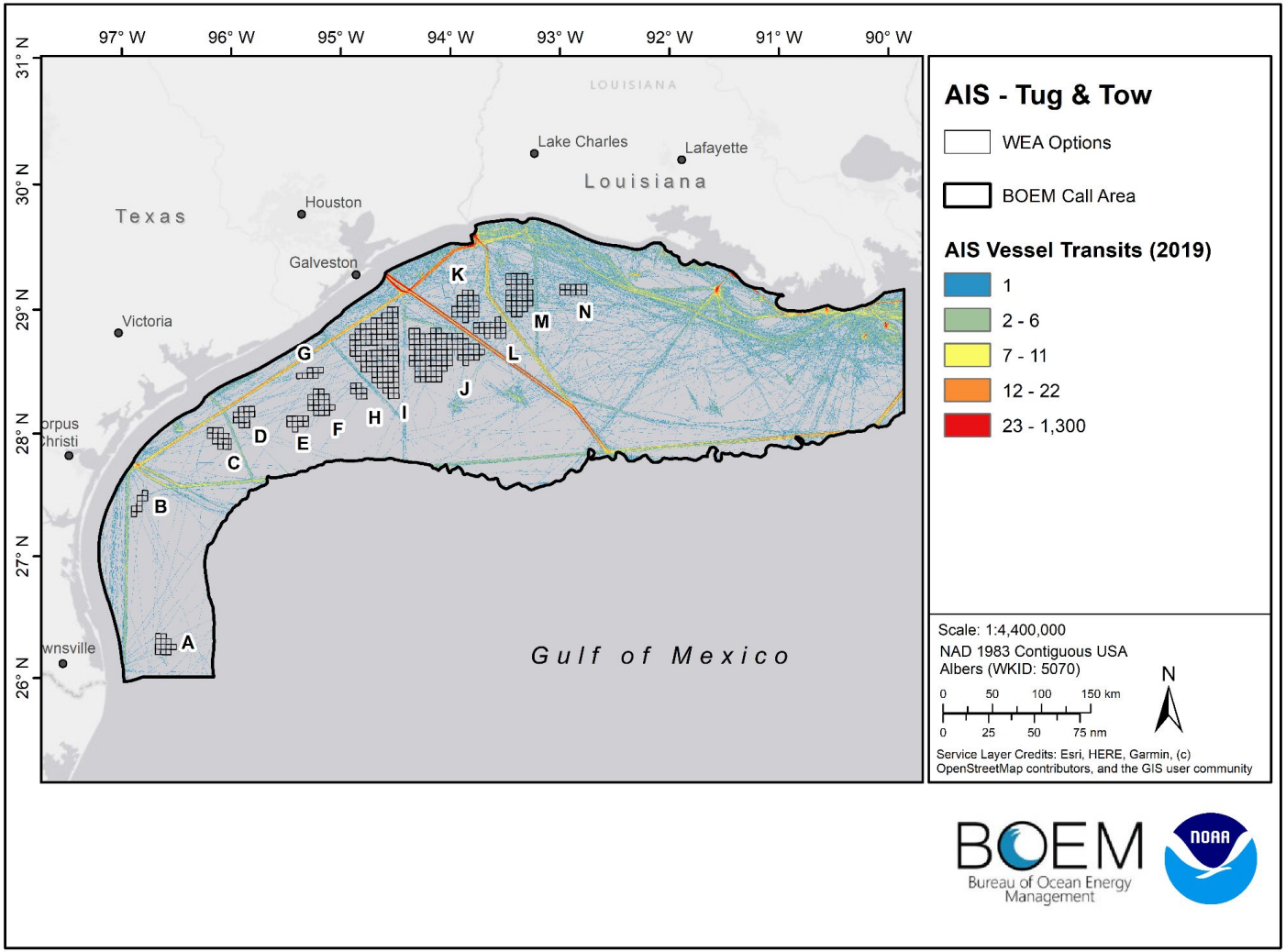
Constraints Submodel



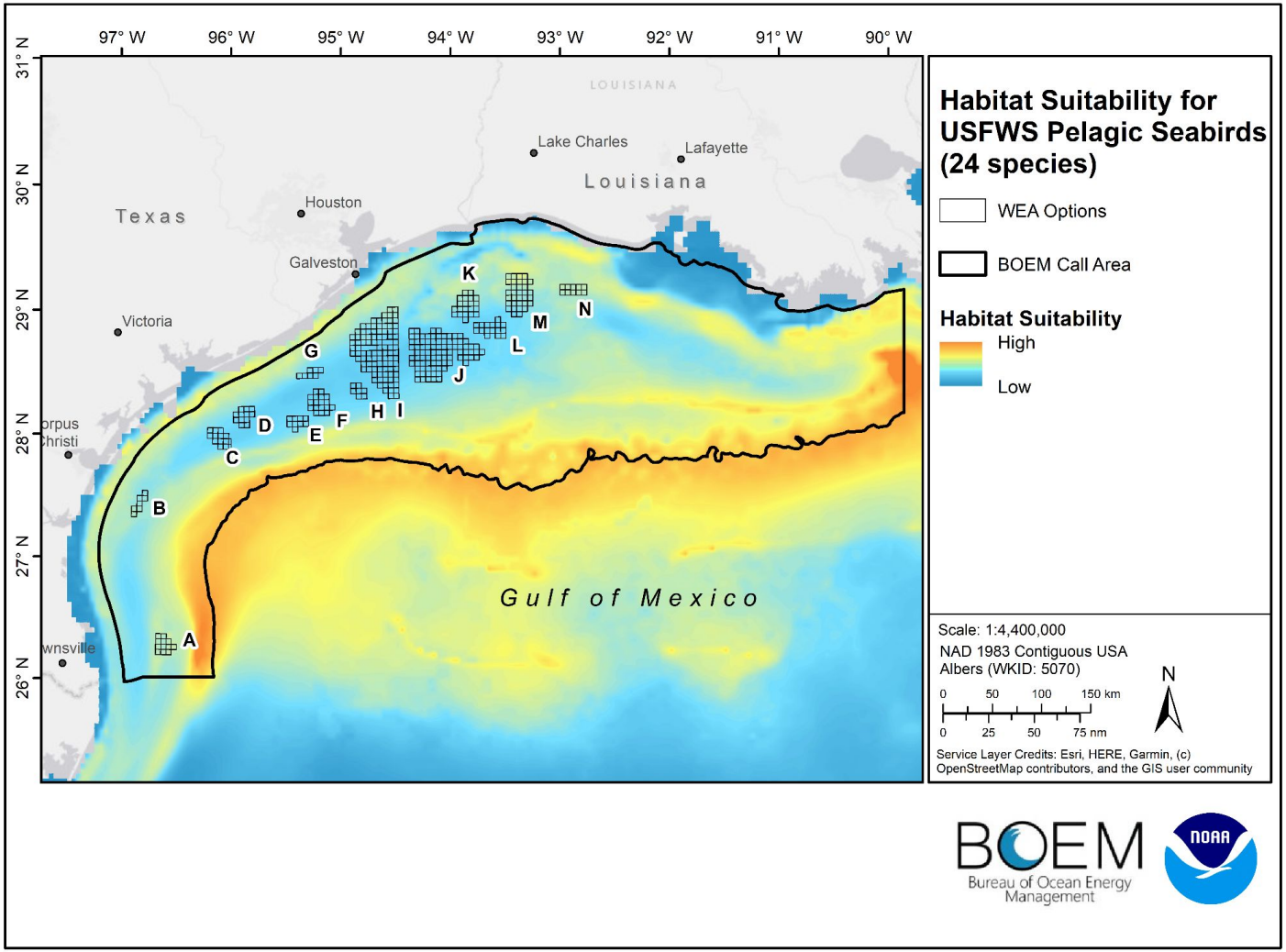
Shrimp fishery Electronic Logbook (2015 - 2019)



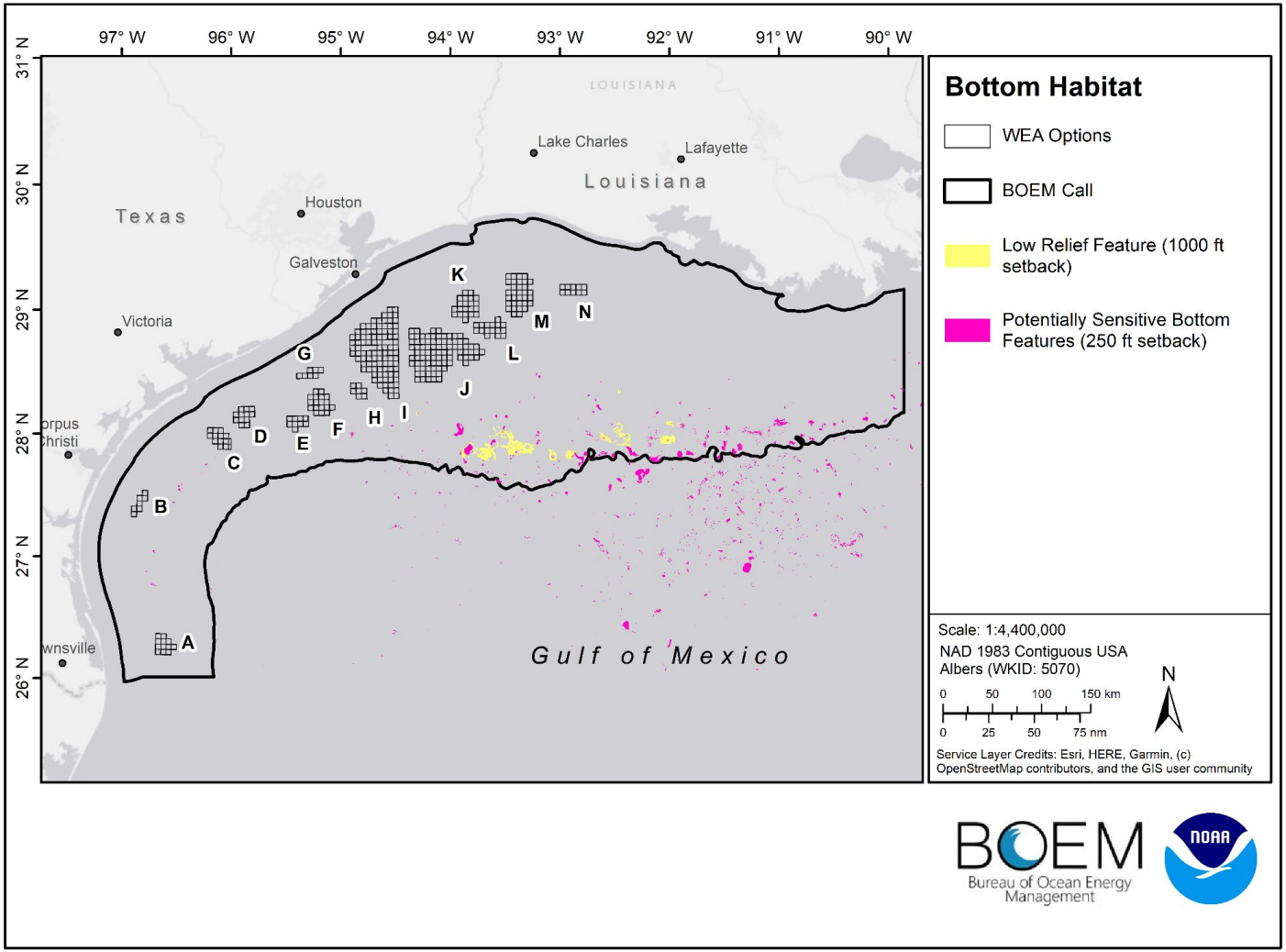
Vessel Automated Information systems 2019 Tug & Tow



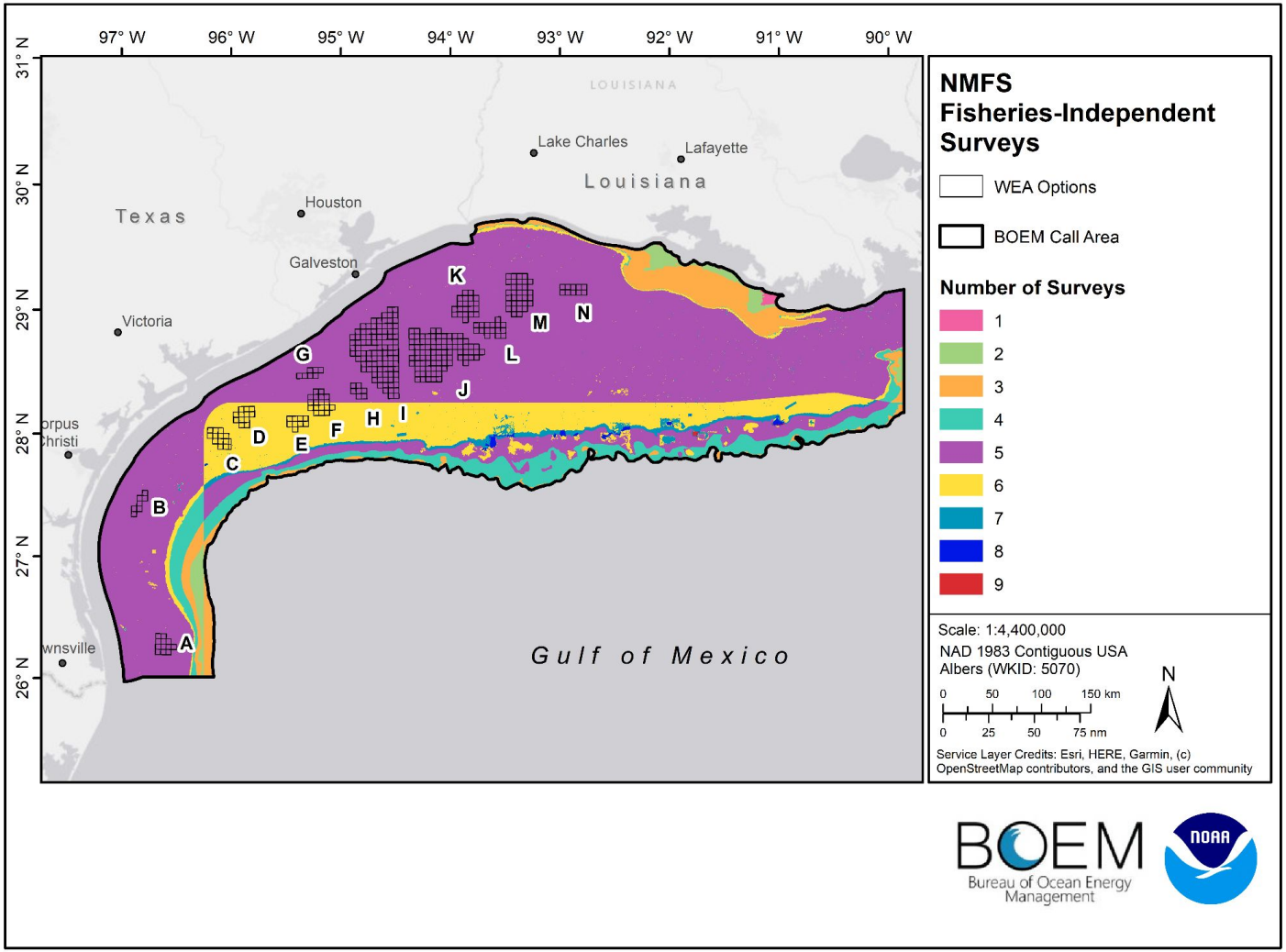
USFWS Pelagic Bird Considerations (24 species)



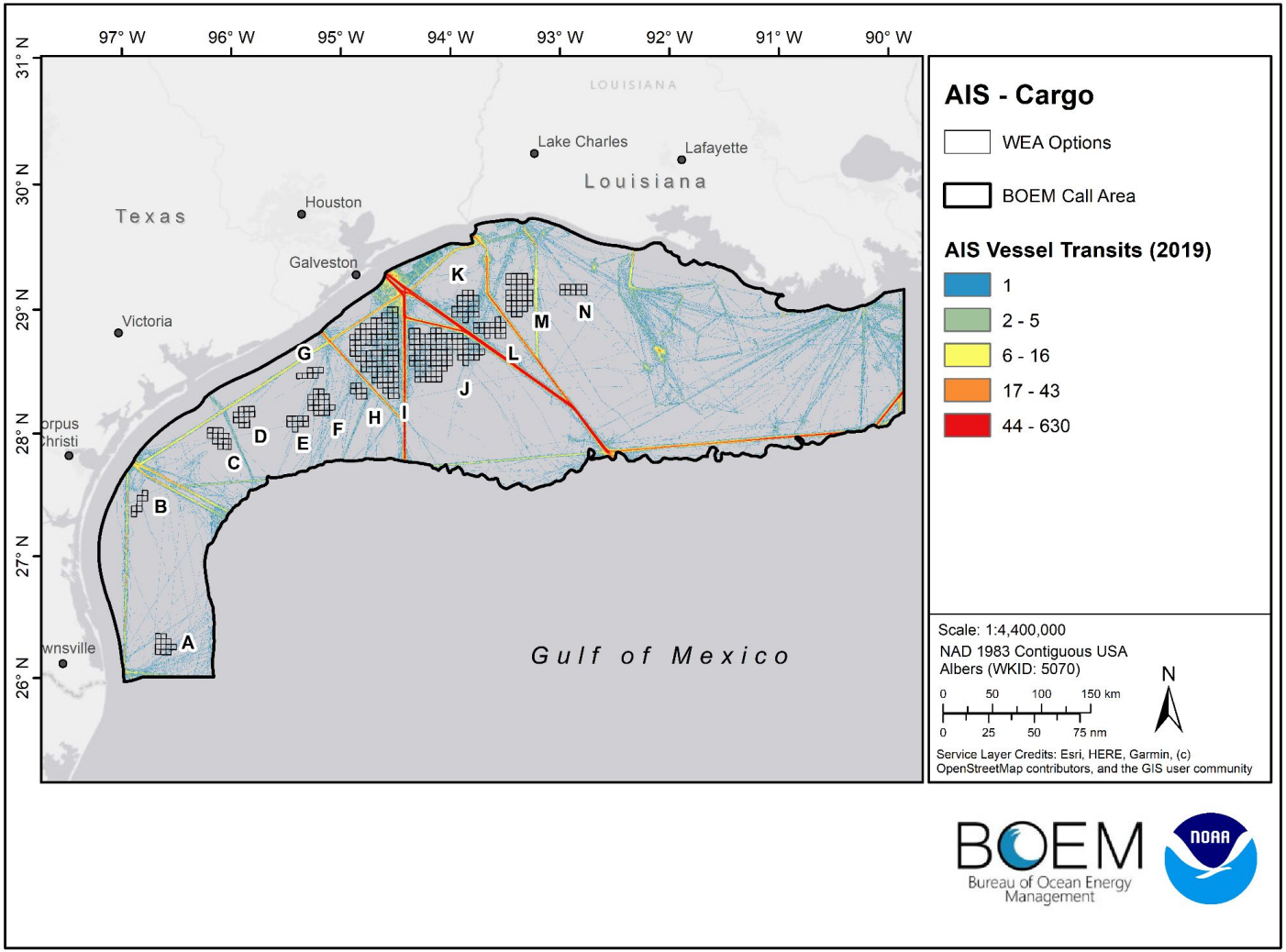
Bottom habitat



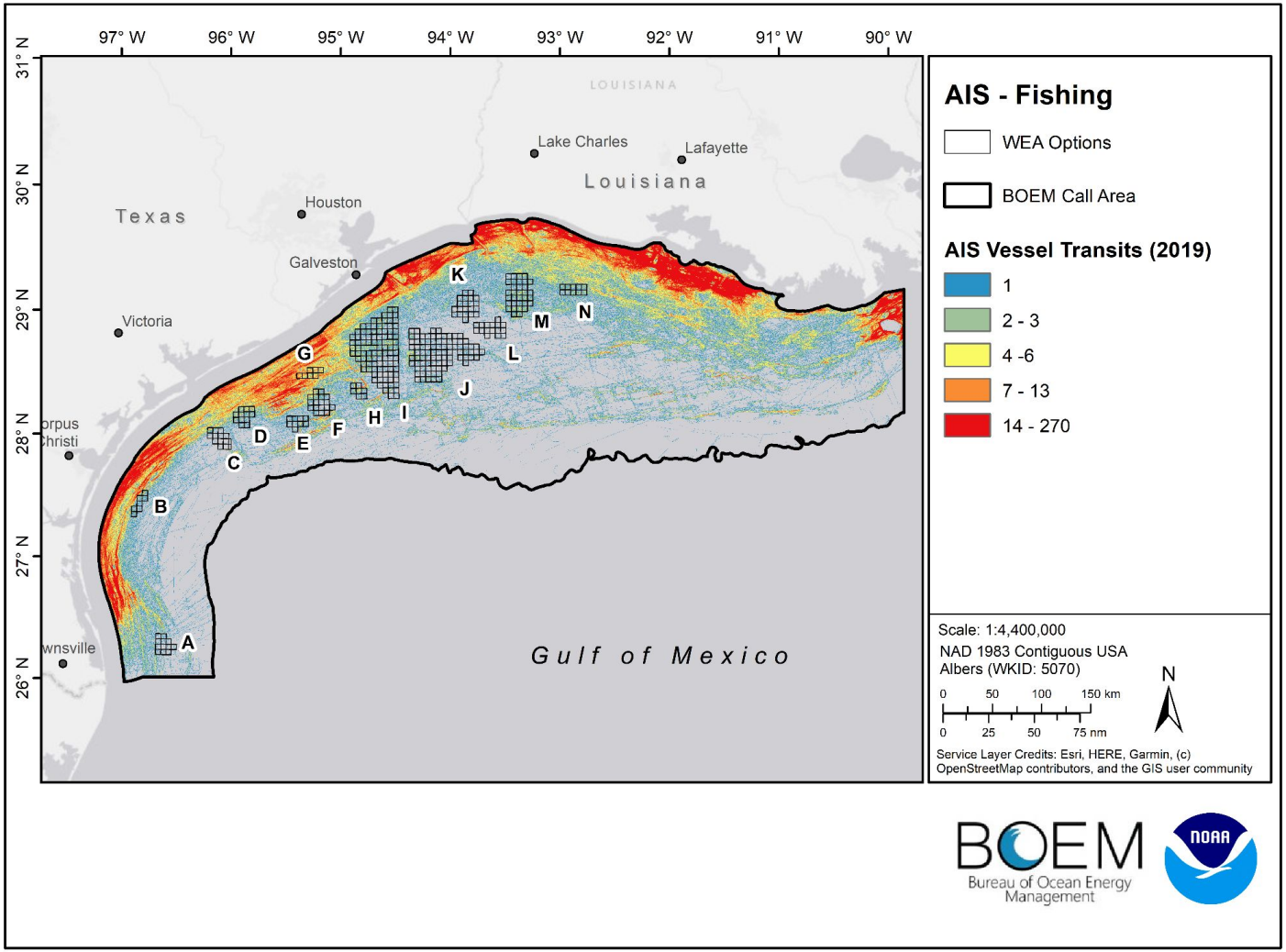
NMFS Surveys



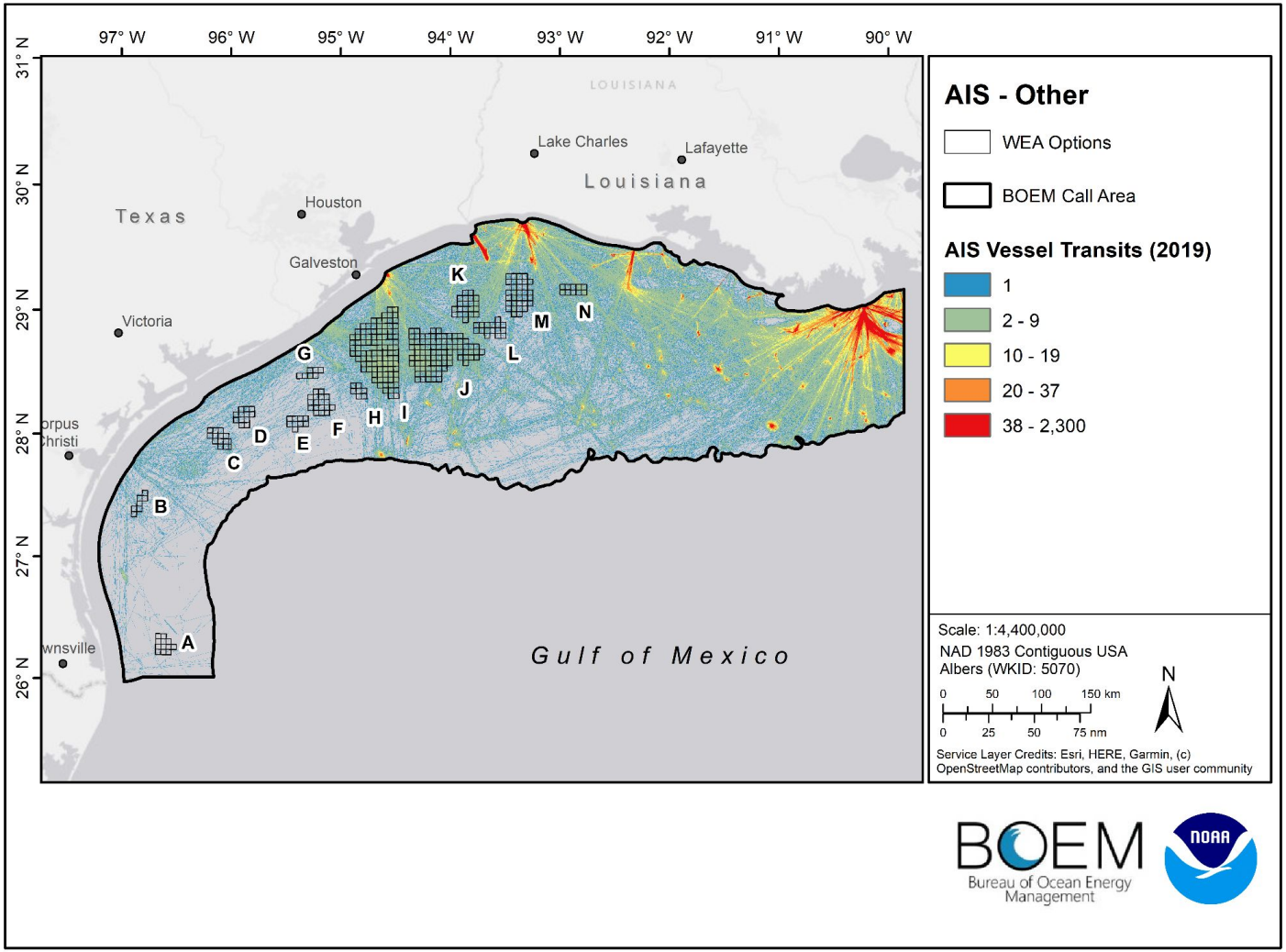
AIS 2019 Cargo



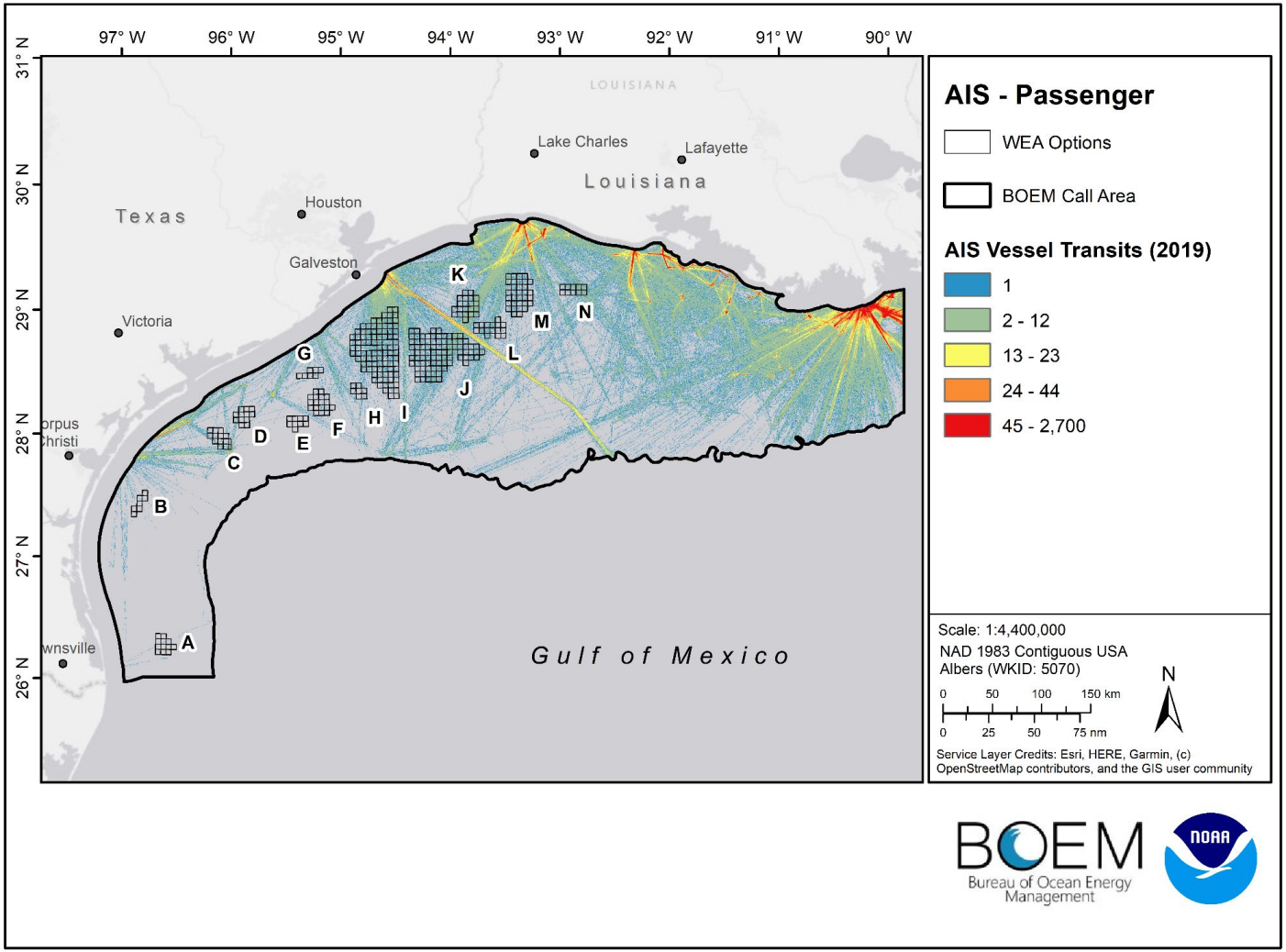
AIS 2019 Fishing



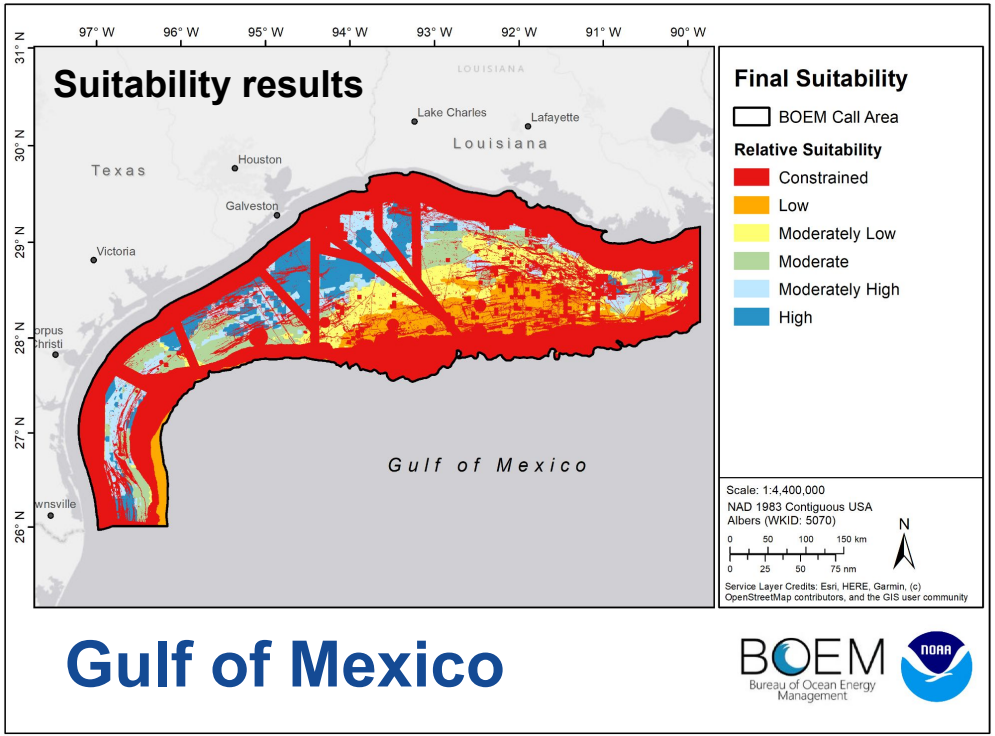
AIS 2019 Other

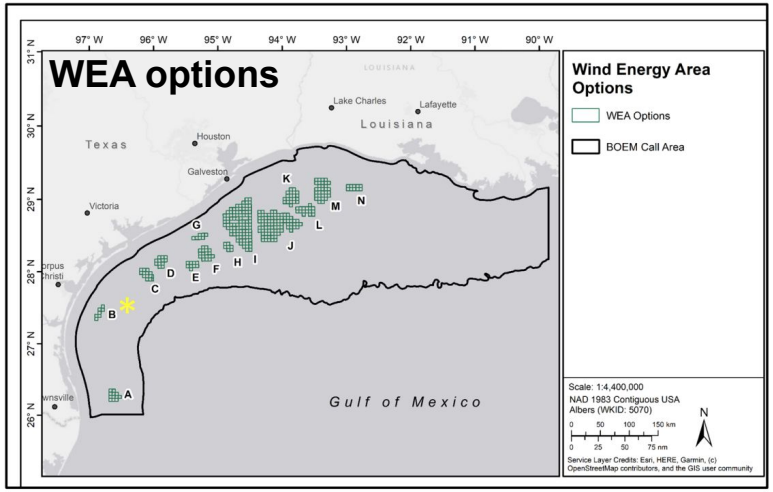


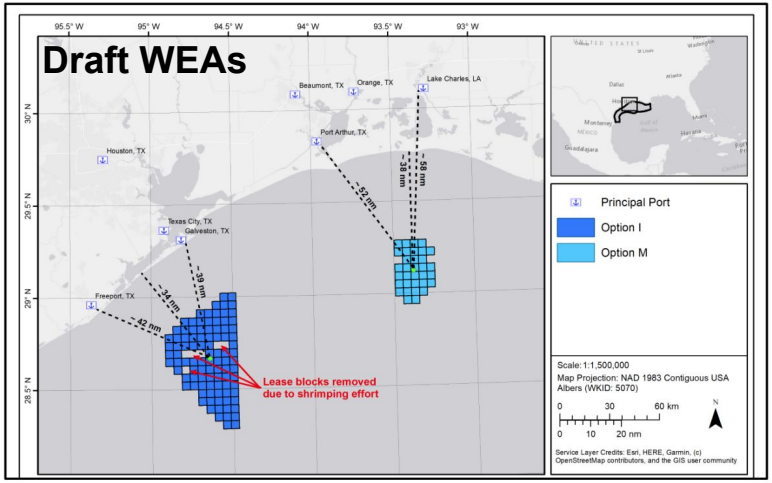
AIS 2019 Passenger



Start big to finish big, 30 million acres to 300K acres for Gulf Wind I, Gulf Wind II evaluating nearly 1 million acres for 2024 lease sale



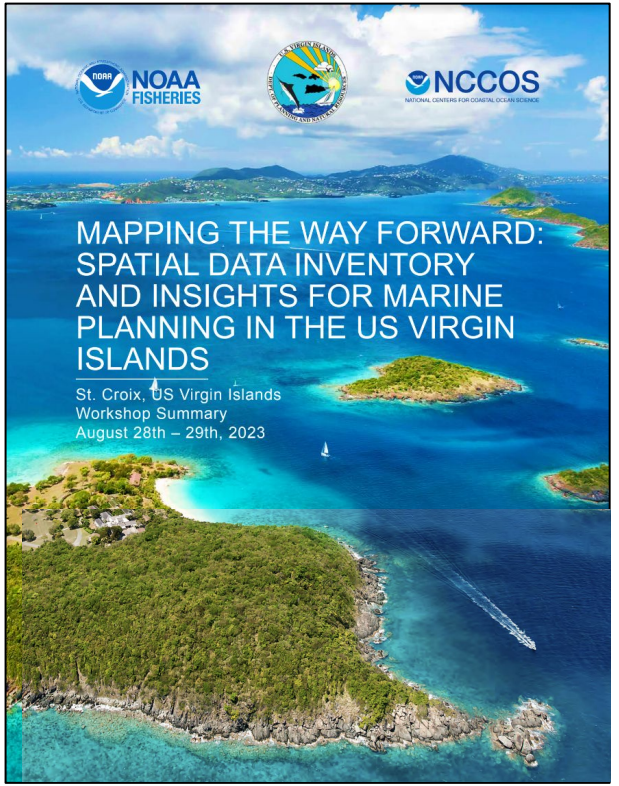




Conclusions

Our hope is that marine spatial planning "*...brings us closer to respectful, sustainable uses of our natural resources...*"

-Dr. Nicole Angeli, Director USVI DFW
USVI Marine Planning Workshop, 2023



Partners and data providers

MarineCadastre.gov
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.

BOEM
Bureau of Ocean Energy Management

EPA

USGS
science for a changing world

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

NORTHEAST OCEAN DATA

UNITED STATES COAST GUARD 1790

WEST COAST OCEAN DATA PORTAL

DEPARTMENT OF DEFENSE · UNITED STATES OF AMERICA

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