



AQUASMART SITING: PLANNING FOR AQUACULTURE EXPANSION IN COASTAL U.S. WATERS

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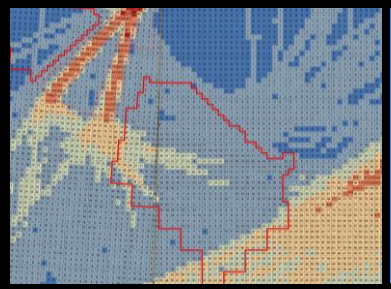
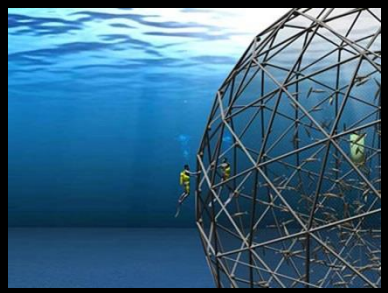
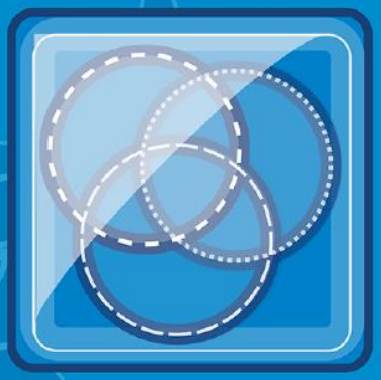



NOAA AQUACULTURE PROGRAM

Ocean & Atmospheric Research

National Marine Fisheries Service



National Ocean Service

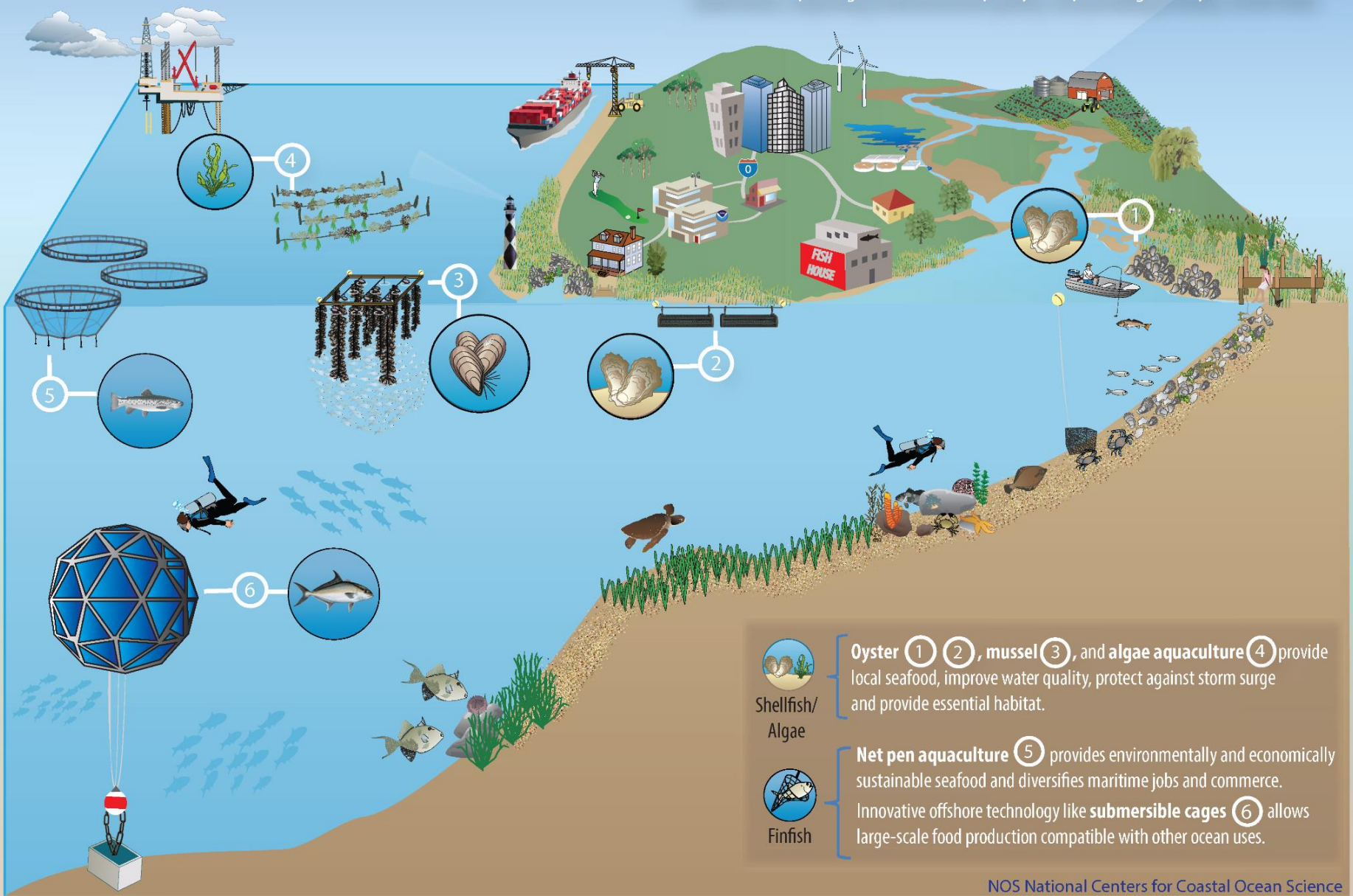
Supporting Aquaculture Growth In The U.S.

"It is the policy of NOAA...to encourage and foster sustainable aquaculture development that...is in harmony with healthy, productive, and resilient marine ecosystems..."

In this context, every effort should be made to ensure industry growth occurs within a framework of environmental responsibility and ocean stewardship.

AQUACULTURE GROWS RESILIENT COASTAL COMMUNITIES

Marine aquaculture builds resilient coastal communities by growing working waterfronts, improving environmental quality, and providing healthy, secure food.



Shellfish/ Algae

Oyster (1) (2), **mussel** (3), and **algae aquaculture** (4) provide local seafood, improve water quality, protect against storm surge and provide essential habitat.

Finfish

Net pen aquaculture (5) provides environmentally and economically sustainable seafood and diversifies maritime jobs and commerce.

Innovative offshore technology like **submersible cages** (6) allows large-scale food production compatible with other ocean uses.

NOS National Centers for Coastal Ocean Science

Coastal Aquaculture Siting and Sustainability Program

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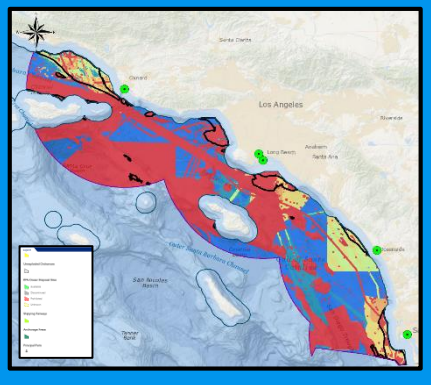
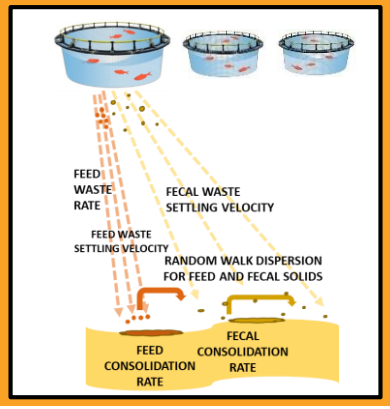
Coastal Aquaculture Siting and Sustainability Program

Spatial Planning and Siting



Environmental Interactions



Ecosystem Services

Major Customers

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

United States Environmental Protection Agency

Department of Defense United States of America

United States Coast Guard 1790

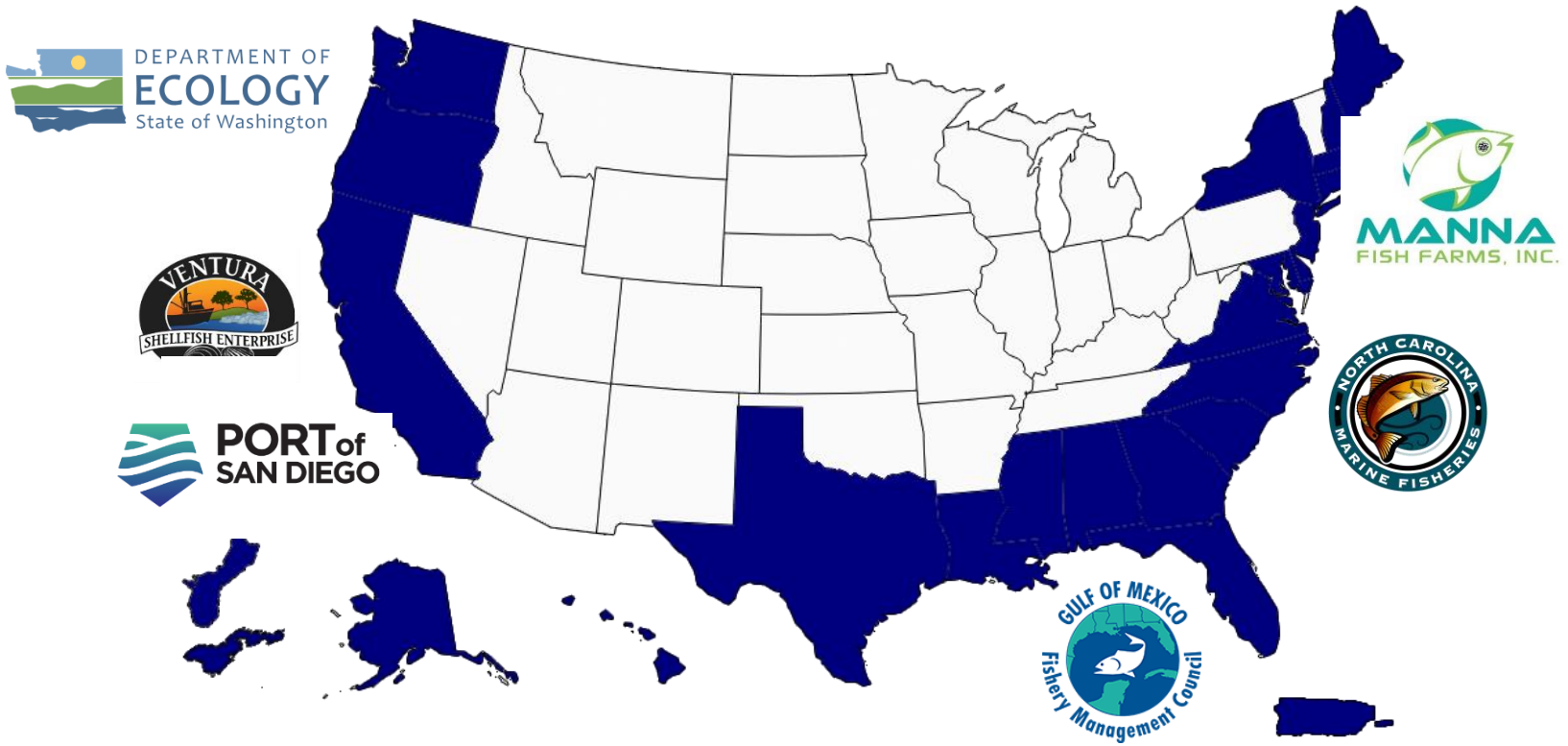
Department of Environment and Natural Resources

Department of Energy United States of America

U.S. Fish & Wildlife Service Department of the Interior

US Army Corps of Engineers®

50 Projects Nationwide



Major Customers

NOAA · National Oceanic and Atmospheric Administration · U.S. Department of Commerce

United States Environmental Protection Agency

Department of Defense · United States of America

United States Coast Guard · 1790

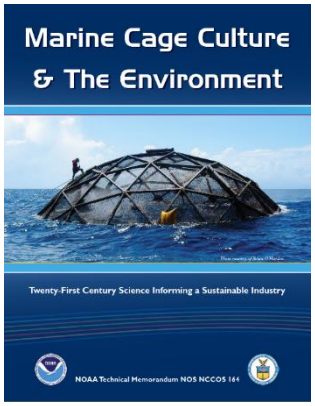
Department of Environment and Natural Resources

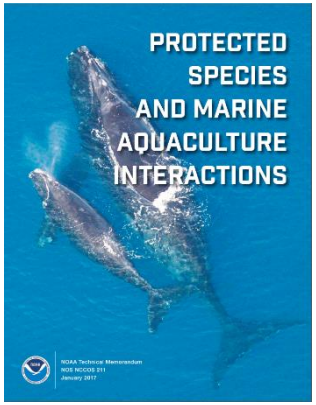
Department of Energy · United States of America

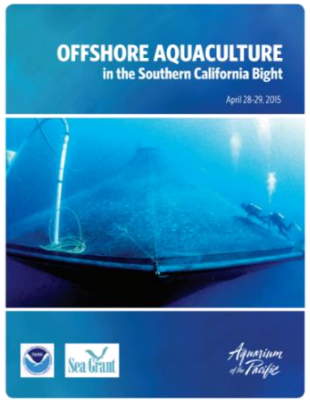
U.S. Fish & Wildlife Service · Department of the Interior

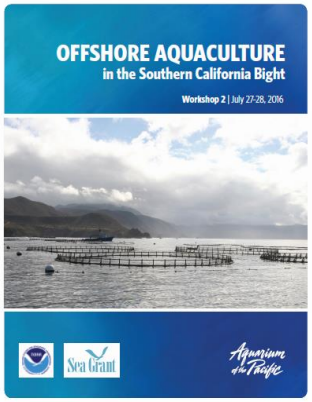
US Army Corps of Engineers®

We work to be valued for our experience and expertise and trusted for our environmental ethic.

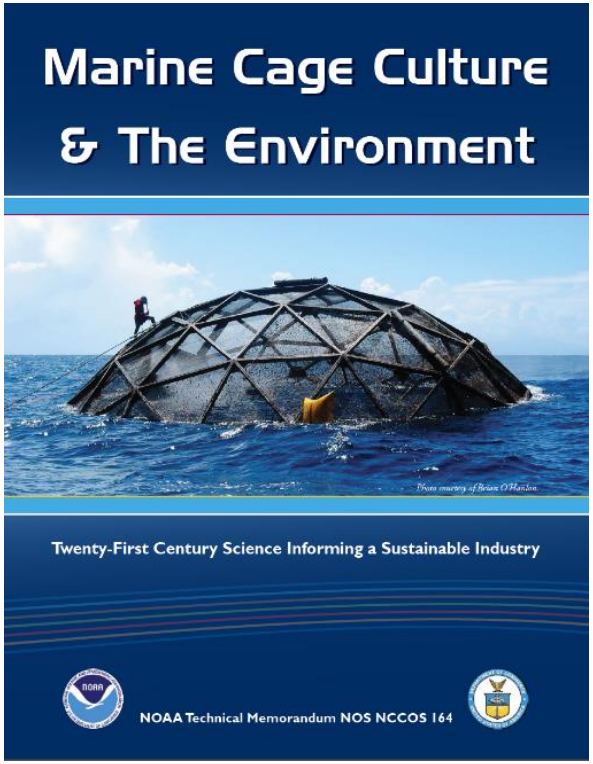








Environmental Interactions



December 2013

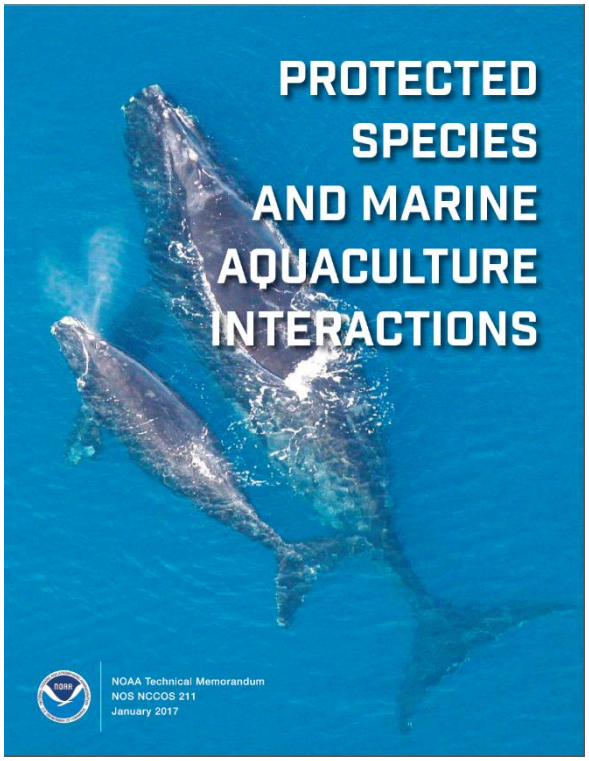
Summary and analysis of environmental interactions of open ocean finfish aquaculture

500+ sources
Peer reviewed science
Global, modern perspective

- **Water Quality**
- **Benthic Geochemistry**
- **Biodiversity**
- **Chemicals**
- **Management Tools**

Included a section on protected species and sensitive habitats

Protected Species Interactions

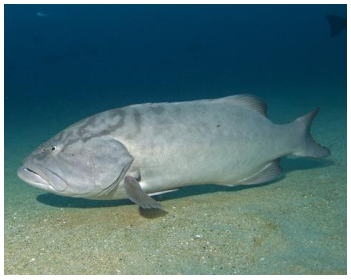


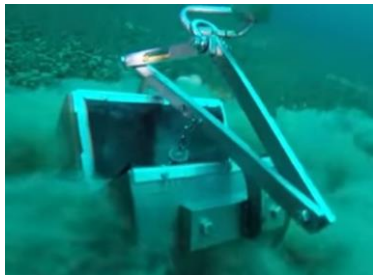
January 2017

- Includes information about protected species and aquaculture sectors
- Nationally relevant
- Tool for agencies, researchers, and industry
- Fishery gear section included expert coauthors
- Draft risk assessment, gap analysis, and best management practices

Guidance Document Series: Environmental monitoring of offshore aquaculture installations

- Baseline environmental surveys
- Water quality and benthic monitoring of offshore farms
- Monitoring wildlife (protected species, invasive species) interactions with offshore aquaculture installations
- Structural monitoring of offshore installations



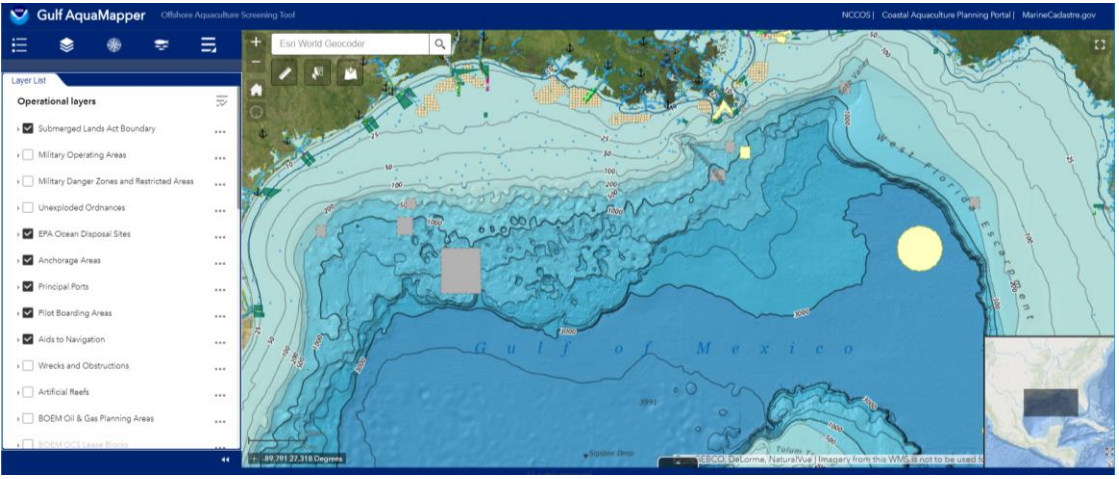

Crisis Response Services

Spatial Science, Disaster Preparedness

NOS provides a broad range of scientific, technical, and policy experts to support the response and inform recovery.

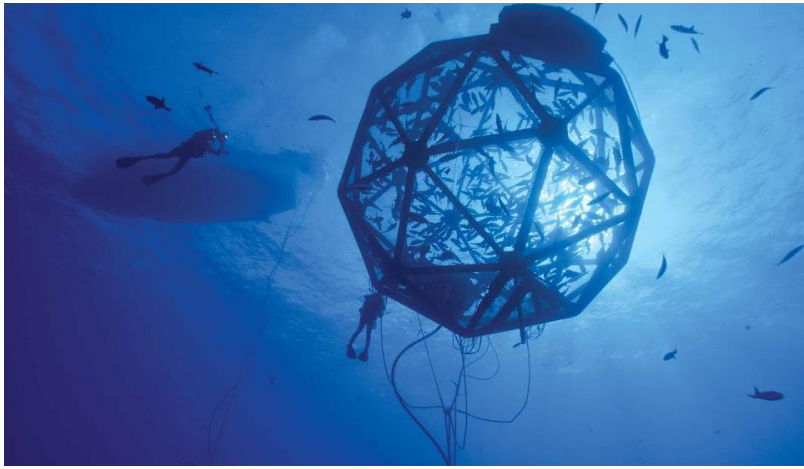
Guidance on spatial technologies for disaster risk management in aquaculture

Drone images following a disaster affecting aquaculture facilities in Washington State



"The solution to sustainable aquaculture is responsible planning and siting of farms."

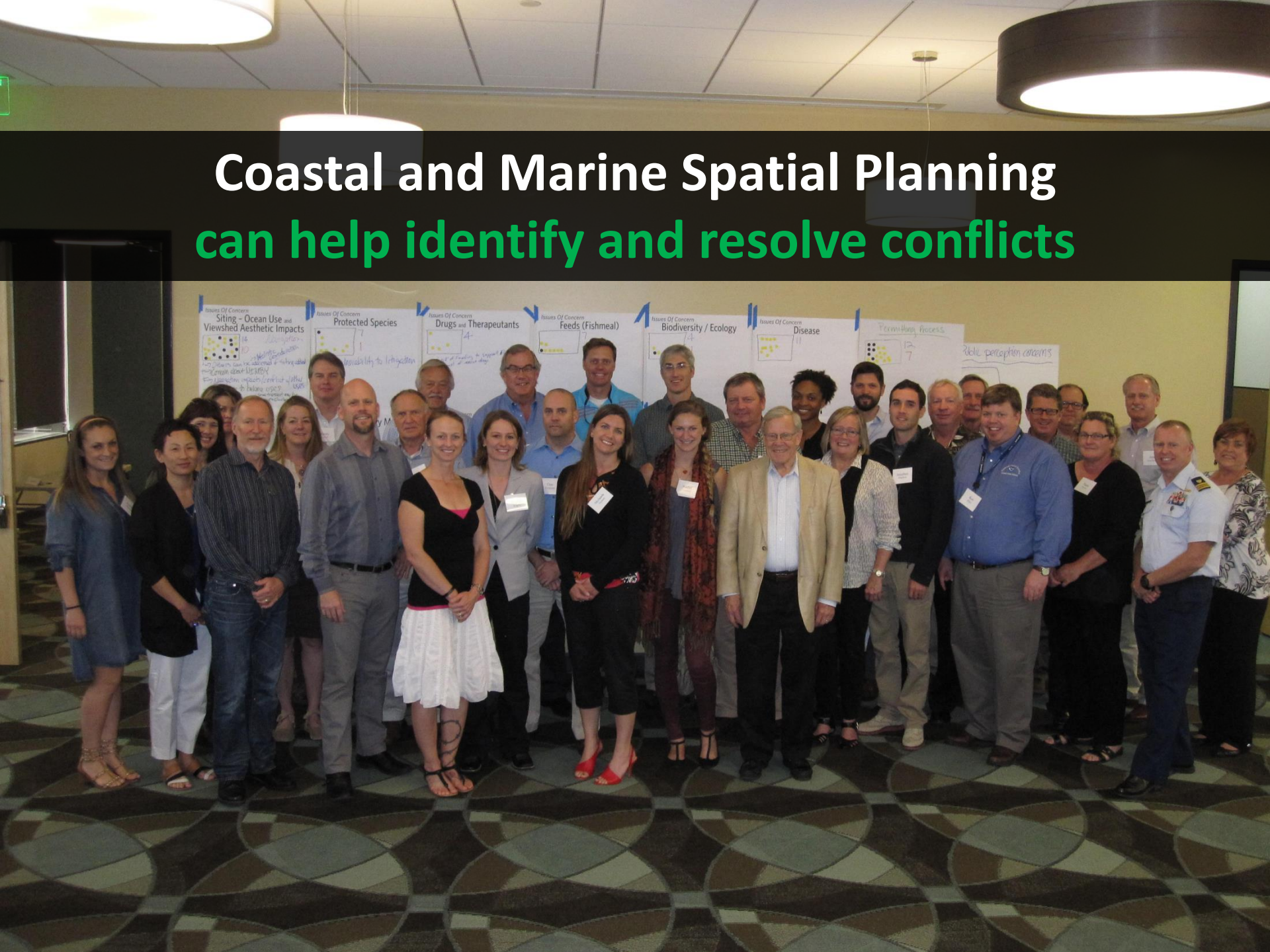
Dr. Jerry Schubel, Aquarium of the Pacific



The coastal ocean is a busy place!

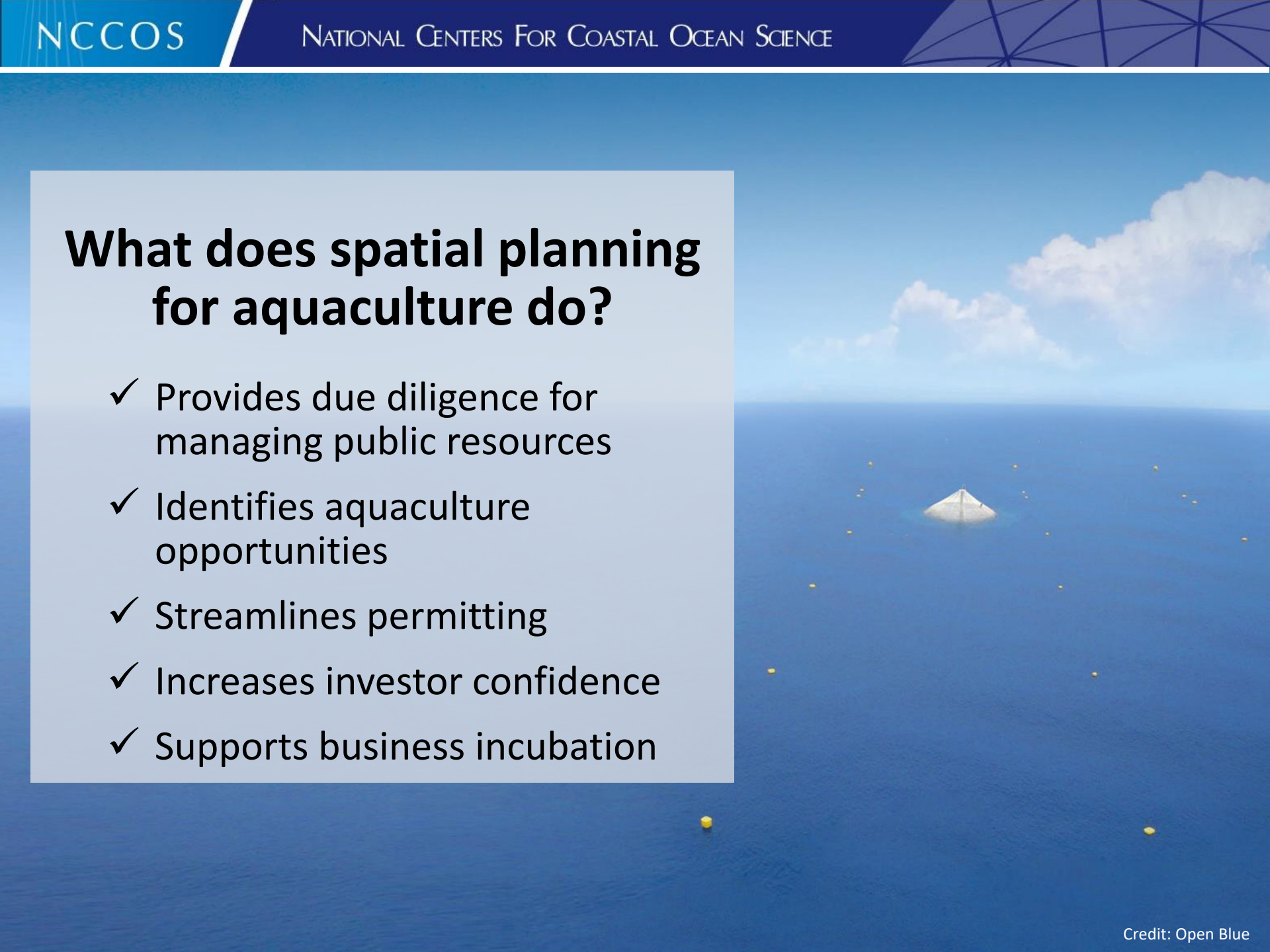
Coastal and Marine Spatial Planning

can help identify and resolve conflicts



What does spatial planning for aquaculture do?

- ✓ Provides due diligence for managing public resources
- ✓ Identifies aquaculture opportunities
- ✓ Streamlines permitting
- ✓ Increases investor confidence
- ✓ Supports business incubation



Credit: Open Blue


OceanReports
Tool
We've Automated Marine Spatial Planning!

POSTCARD FROM THE FIELD

OceanReports Now Live!

OceanReports NOAA Team Leads

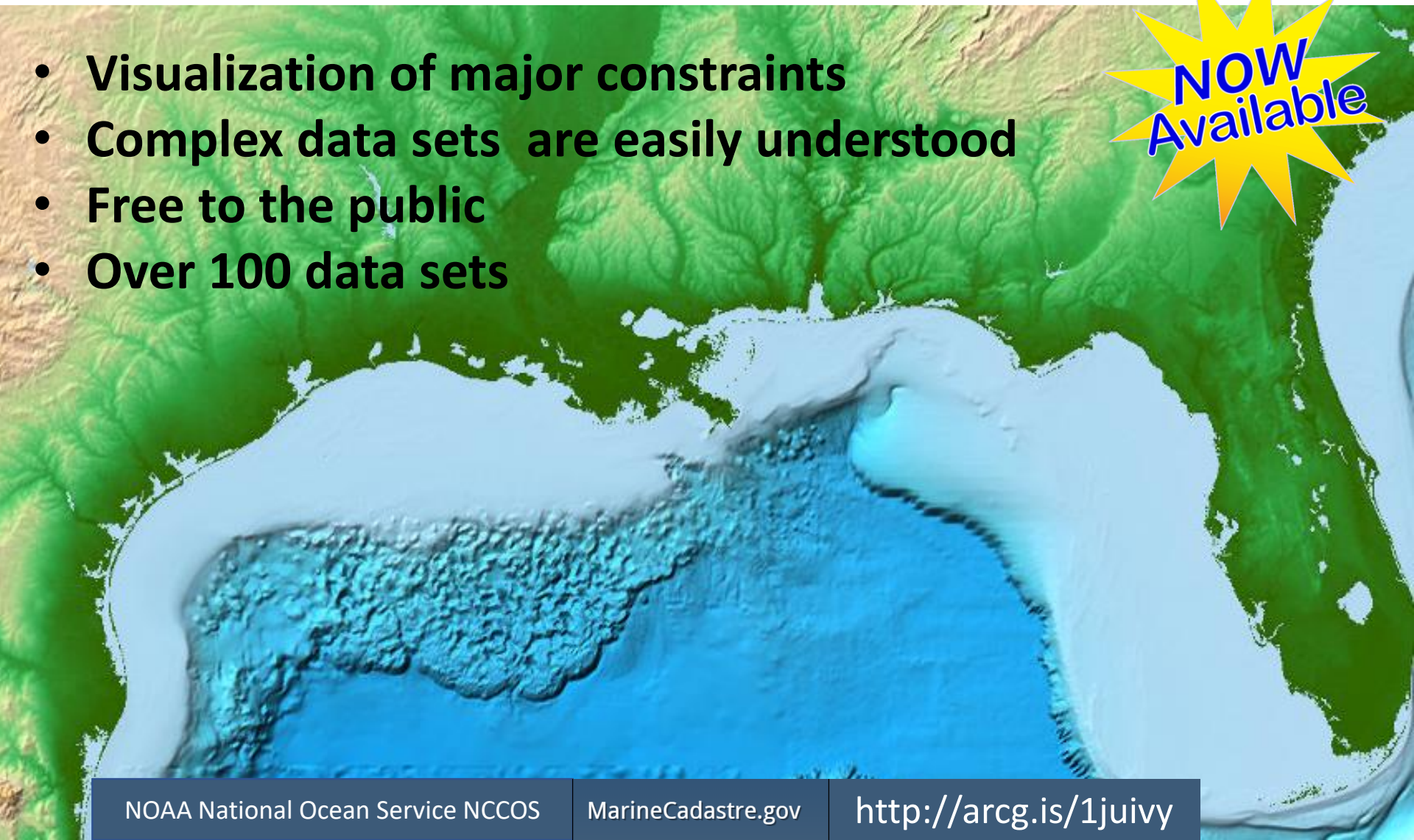
James Morris
NOAA Marine Ecologist

Dave Stein
NOAA Geographer

Today NOAA, Bureau of Ocean Energy Management and many partners introduced the *OceanReports* web tool, enabling anyone to analyze ocean "neighborhoods" for specific needs. Drawing on 100 data sources useful for conservation and industry development, *OceanReports* provides one-stop, fast, open access to custom reports and spatial data. The new tool will save public dollars, cut industry costs, reduce permitting timelines, and support better management of U.S. ocean space.

We've Automated Marine Spatial Planning!

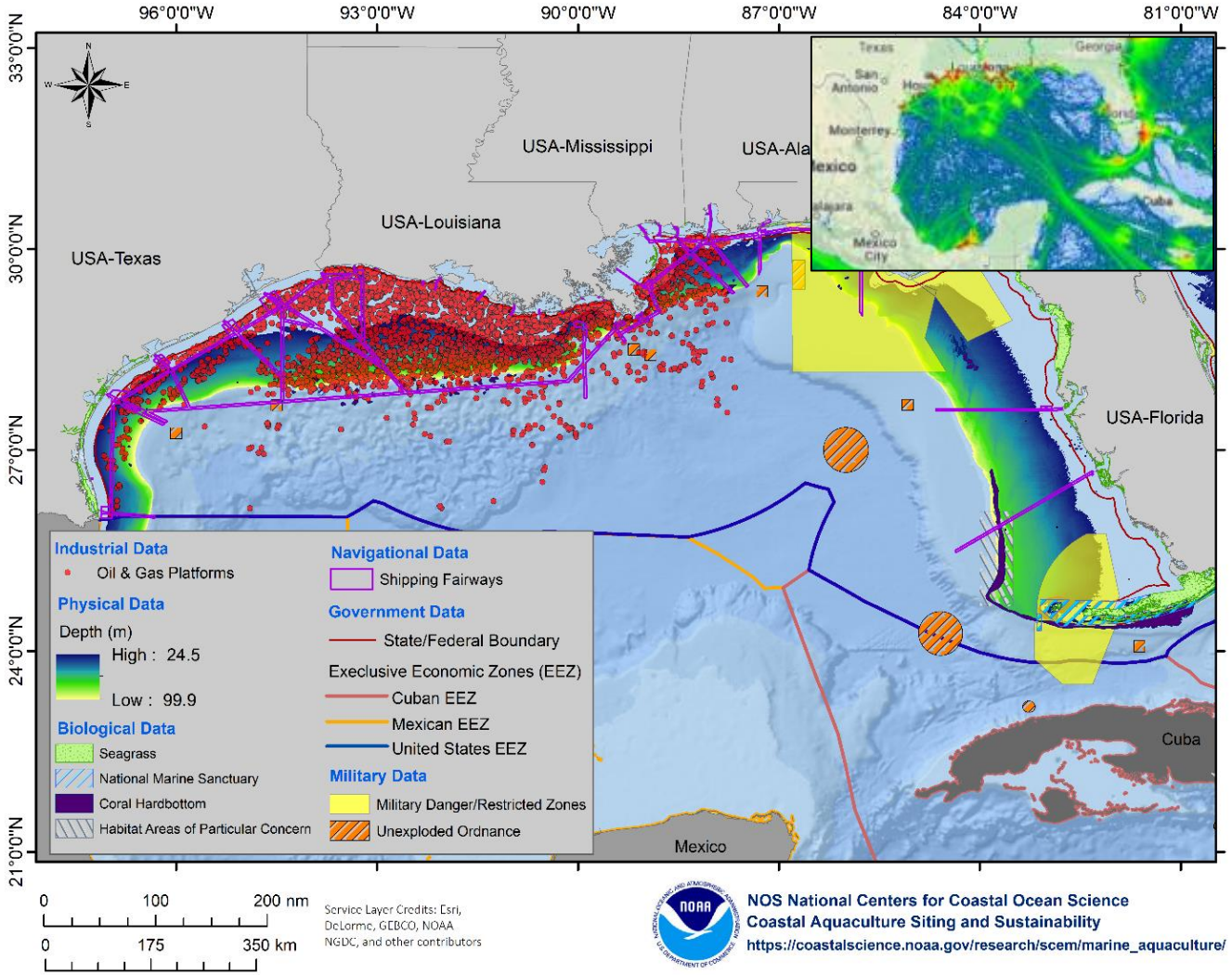
Gulf AquaMapper



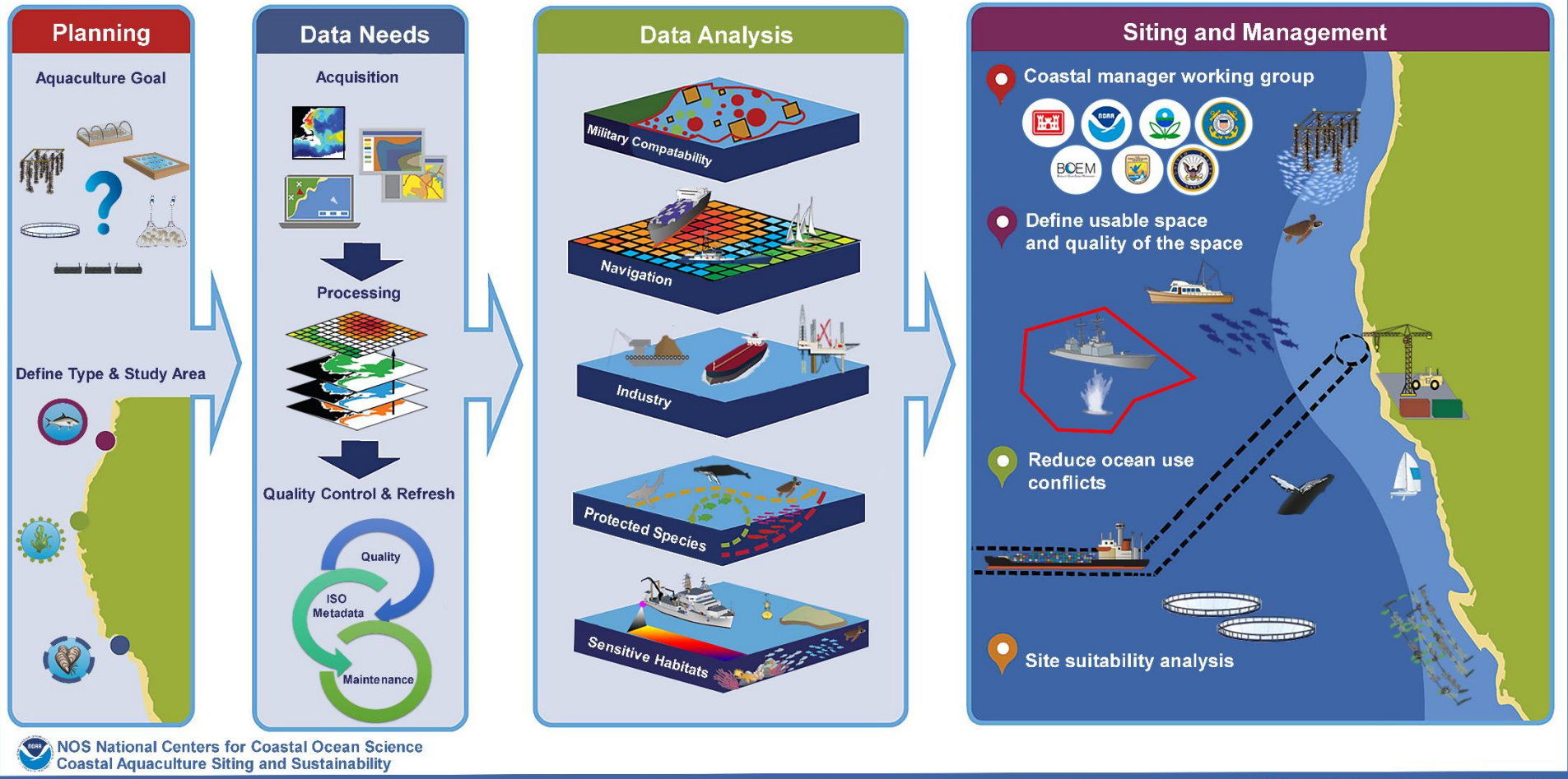
- Visualization of major constraints
- Complex data sets are easily understood
- Free to the public
- Over 100 data sets

NOAA National Ocean Service NCCOS | MarineCadastre.gov | http://arcg.is/1juivy

Why is the Gulf AquaMapper needed?



Coastal Aquaculture Siting



NOS National Centers for Coastal Ocean Science
Coastal Aquaculture Siting and Sustainability

Some graphics courtesy of IAN, UMCES, NCCOS BioGeo, and the Marine-life Data and Analysis Team (MDAT)

Farming Parameters:

- Preferred port(s):
- Max distance from port(s):
- Min and max depth requirements:
- Min and max seawater temp:
- Min and max current velocity:
- Max wave energy:
- Max farm footprint (including anchorage):

Ventura Shellfish Enterprise – A Case Study for Siting Analysis

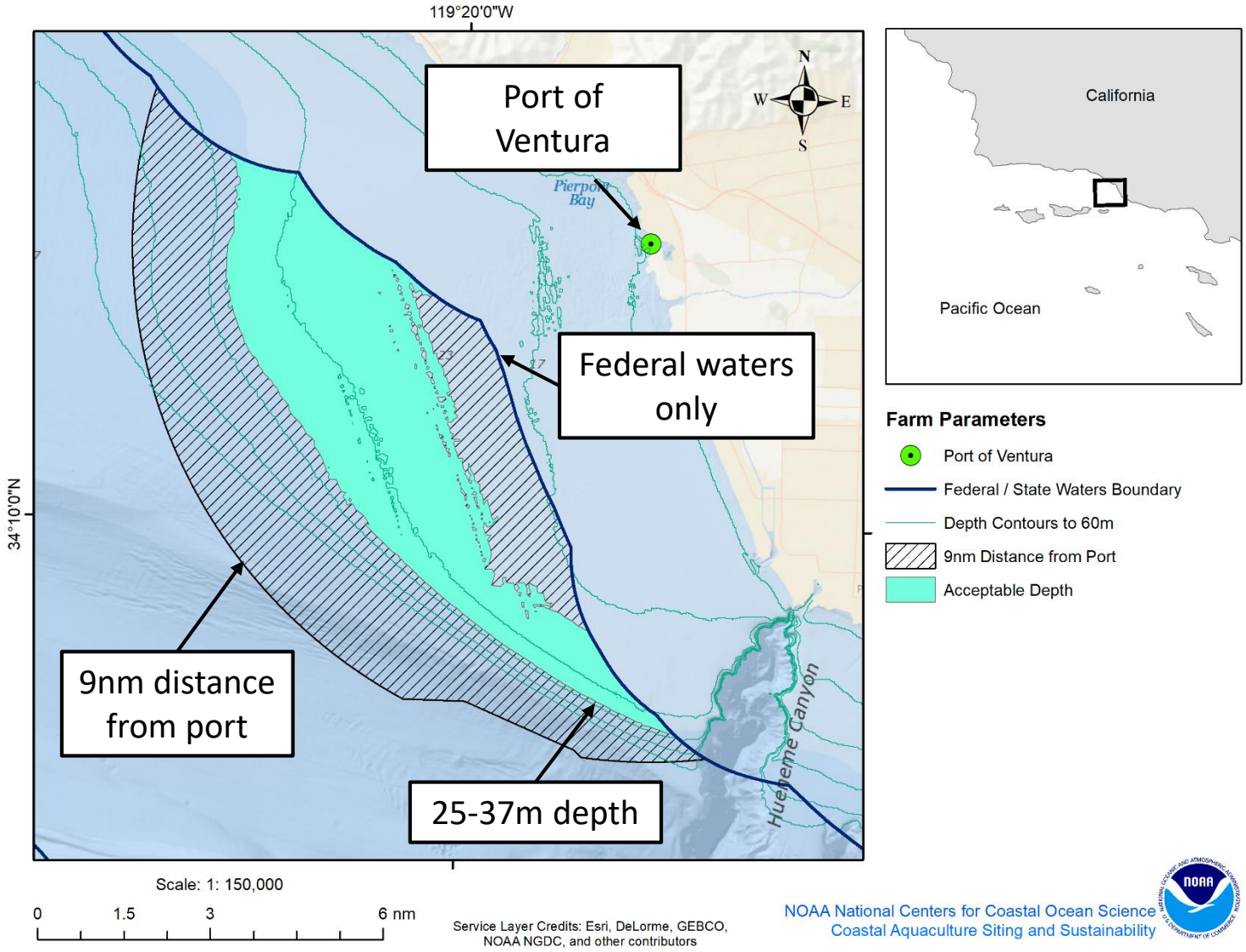
- ✓**Max distance from port(s):** 9 nautical miles from Ventura Harbor
- ✓**Min and max depth requirements:** ≥ 80 ft (25 m) and < 120 ft (37 m)
- ✓**Max farm footprint (including anchorage):** 20 x 100 acre plots [2,000 acres total]
- ✓**Federal waters only**
- ✓**Species:** *Mytilus galloprovincialis*
- ✓**Gear type:** Longline

Spatial Data Collection

Data Type	# of Data Sources Considered
✓ Military	4
✓ Industry	18
✓ Navigation	12
✓ Natural Resources	16
✓ Oceanographic	12
✓ Administrative Boundaries	4

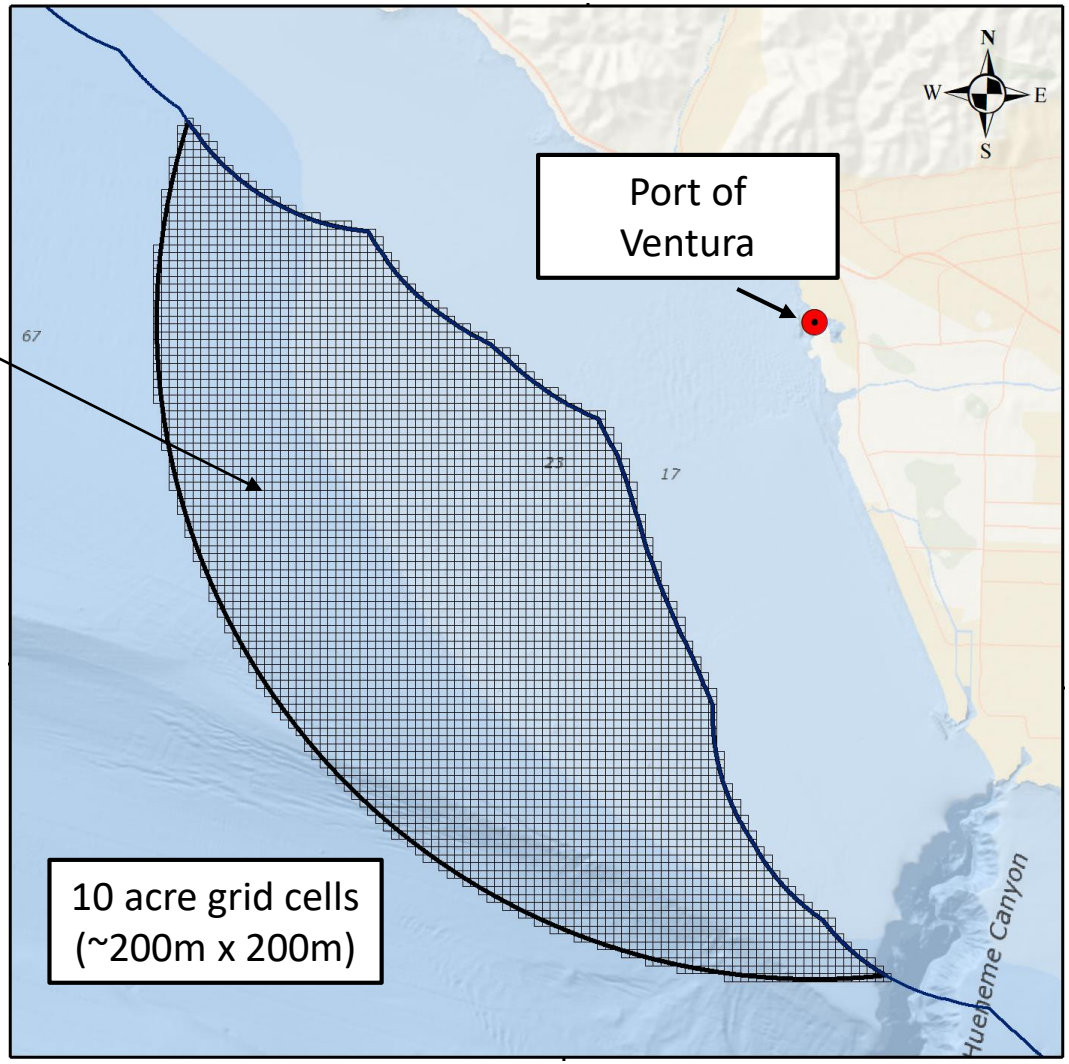
**A total of 60+ data layers considered in analysis*

Identify area of interest based on farm parameters



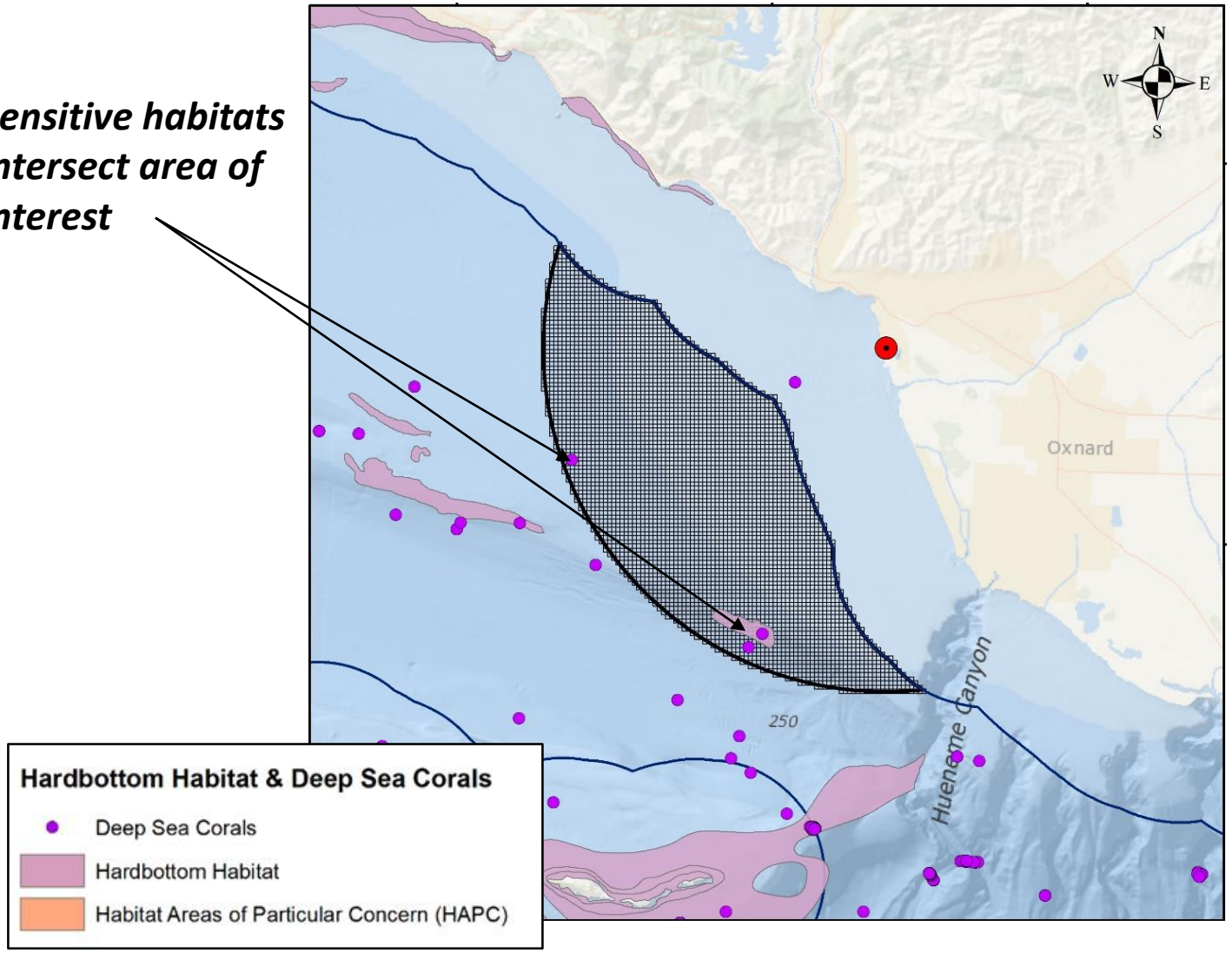
Site Selection and Suitability Methods

Establish a grid for area of interest, select an appropriate cell size



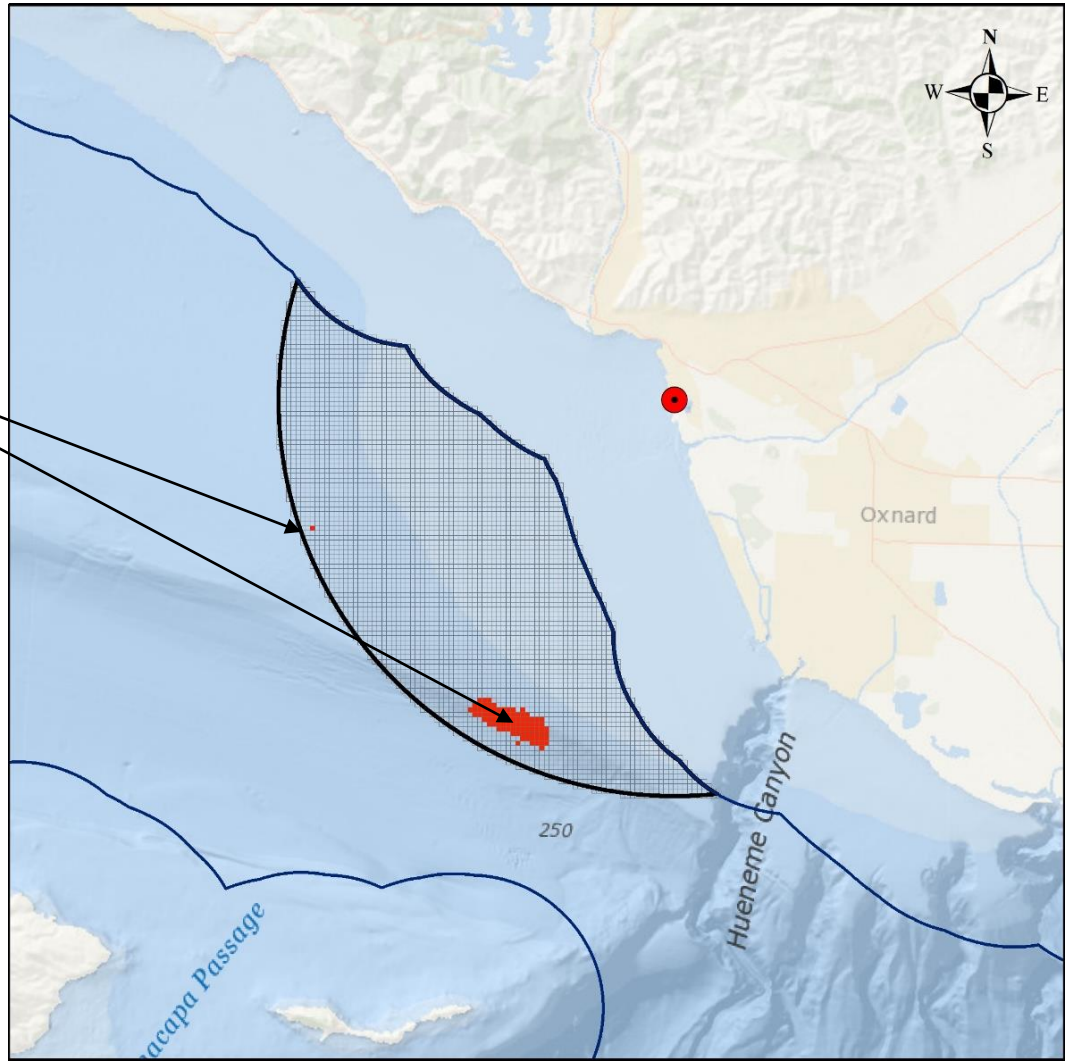
Methods Demonstration

Sensitive habitats intersect area of interest



Methods Demonstration

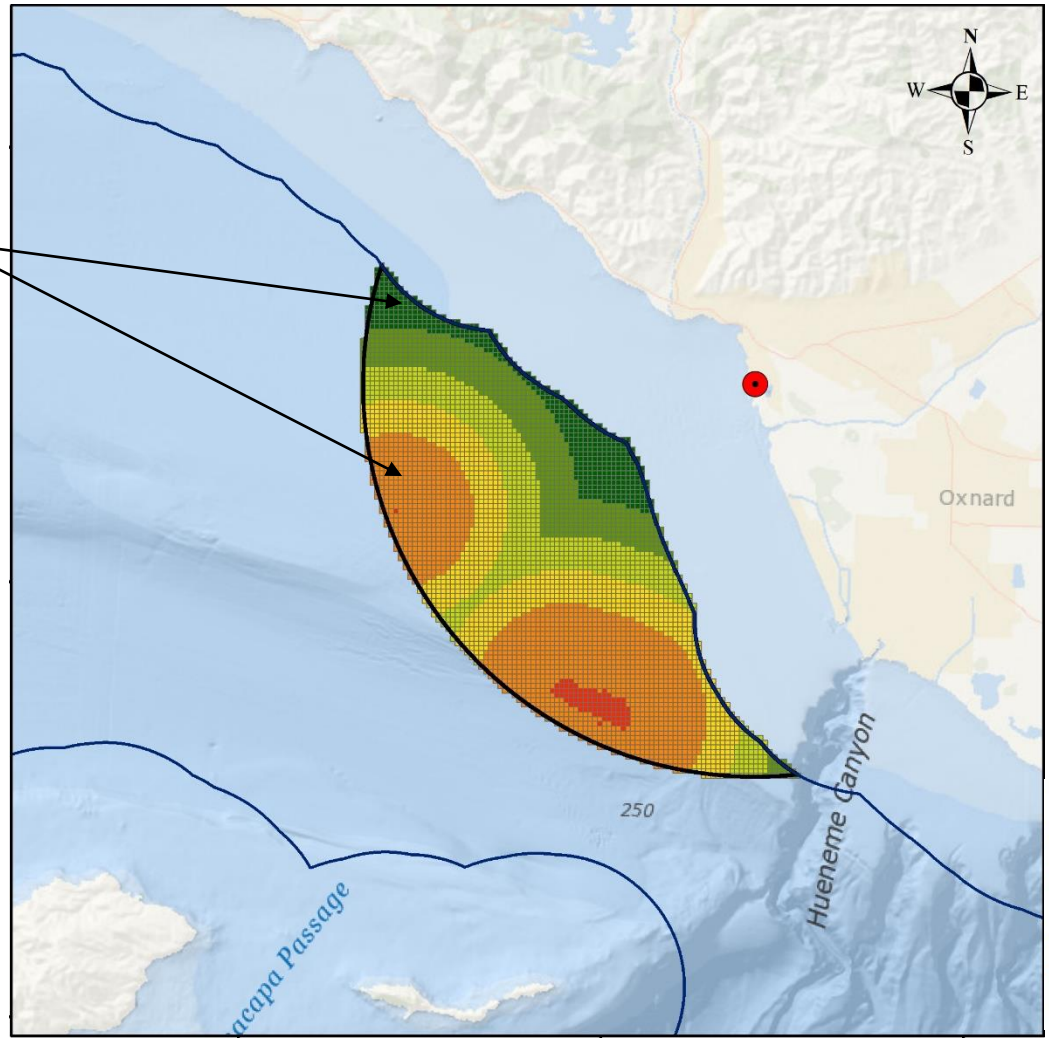
Grid cells intersecting sensitive habitats are excluded from further consideration

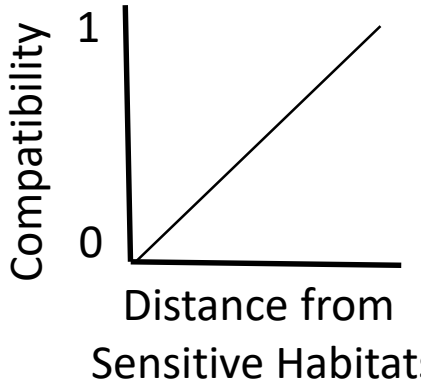


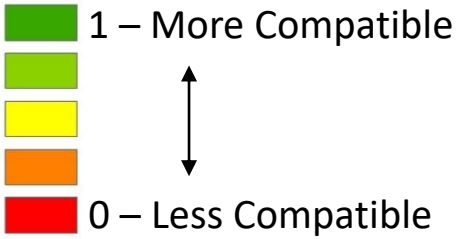
0 - Less Compatible

Methods Demonstration

Grid cells far from sensitive habitats are assigned higher weights than those nearby



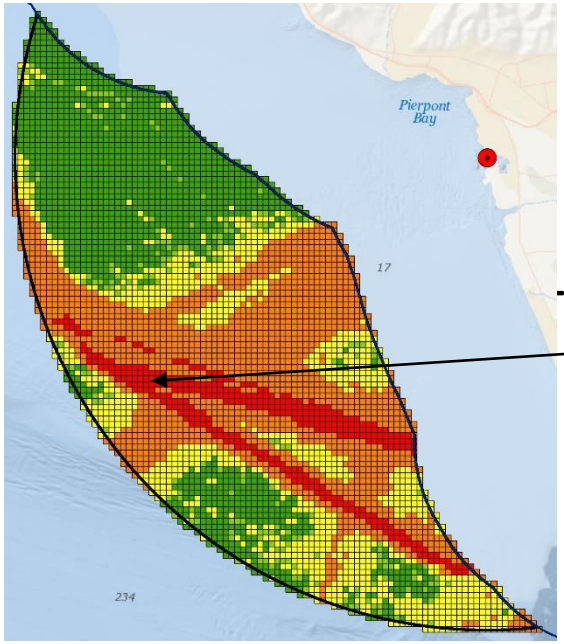




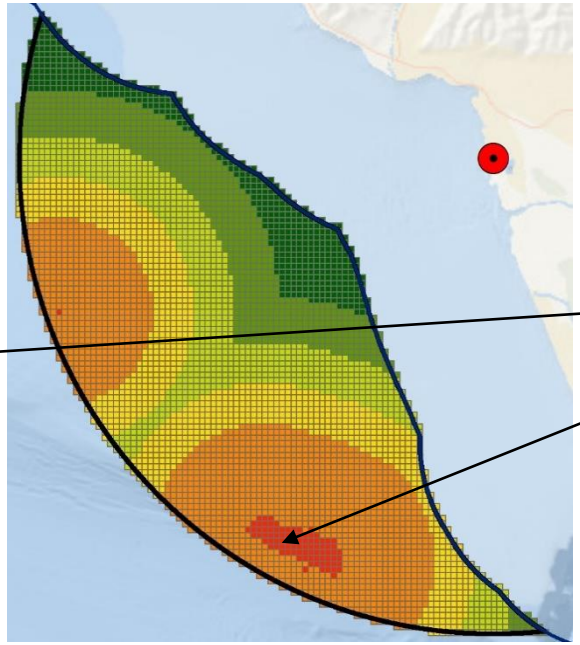
Methods Demonstration

Perform Gridded Suitability Analysis

Vessel Traffic



Sensitive Habitat



Because these cells have a value of 0, they will be wholly excluded from further consideration within the analysis

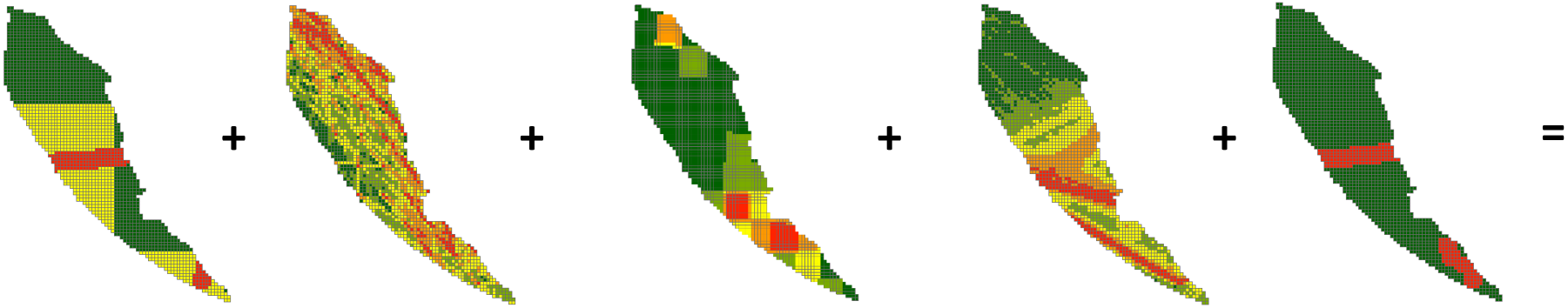
…+ additional layers for other constraints

1 – More Compatible

0 – Less Compatible

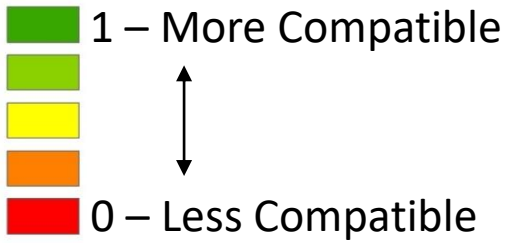
Case Study: Ventura Shellfish Enterprise

Oil & Gas + Commercial Fishing (Trawl) + Commercial Fishing (Squid) + Vessel Traffic + Cables & Wrecks =



Putting All The Data Together

Final Suitability Grid



Gulf Aquaculture Happenings

- **Kampachi Farms** will launch Vellela Epsilon Demonstration Project (permits expected Summer 2019)
- **Manna Fish Farms** and **University of Southern Mississippi** pursuing offshore commercial project (permits expected Spring 2020)
- **State of Florida** initiated spatial planning research to explore development of Offshore Aquaculture Management Areas

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES EST. 1868

KAMPACHI FARMS, LLC OCEAN CULTURE, NATURALLY

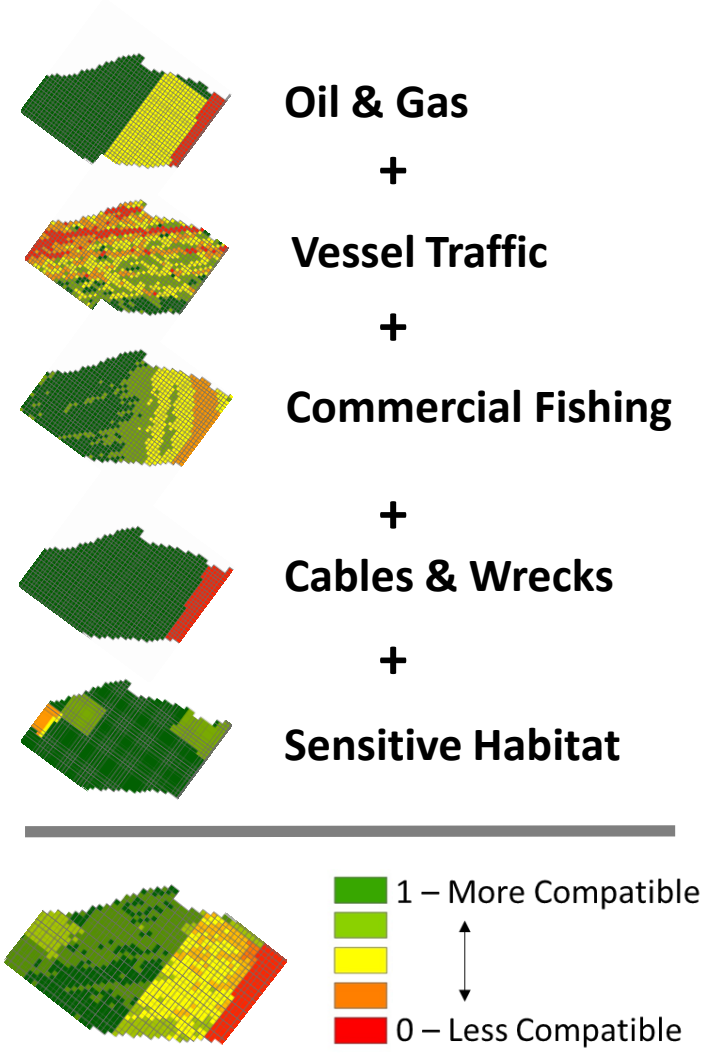
MANNA FISH FARMS, INC.

Sea Grant Florida

Data Considered

- Bathymetry
- Military
- Unexploded Ordnance
- Shipping Lanes
- AIS Vessel Traffic
- Shrimp Vessel Activity
- Submarine Cables
- Artificial Reefs
- Lightering Zones
- Oil & Gas Platforms
- Oil & Gas Well
- Oil & Gas Active Leases
- Oil & Gas Pipelines
- Shipwrecks and obstructions
- Deep Sea Coral
- Protected Resources

Aquaculture Suitability Model



Coastal Aquaculture Planning Portal (CAPP)

New!

A Toolbox for Sustainable Aquaculture Coastal Planning and Siting

The Coastal Aquaculture Planning Portal (CAPP) is a toolbox of coastal planning tools designed to assist managers, planners, and industry with sustainable aquaculture development. This toolbox was developed in partnership with Digital Coast, a product of the *NOAA* National Ocean Service Office of Coastal Management.

Choose one of the subportals below.

~80 aquaculture tools!

NCCOS National Centers for Coastal Ocean Science — About | Research | Products | News

A NOAA scientific diver inspects an offshore netpen for finfish aquaculture. Credit: NOAA

New Aquamapper Tool Available for Aquaculture Siting in the Gulf of Mexico

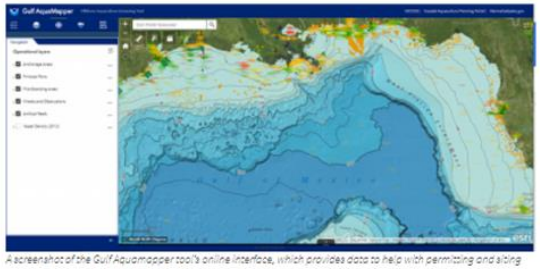
Published on: 02/14/2018

Research Area(s): Marine Spatial Ecology / Coastal Aquaculture Siting and Sustainability

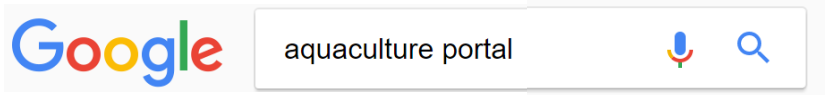
Region(s) of Study: Waterbodies / Gulf of Mexico

Primary Contact(s): james.morris@noaa.gov

NCCOS is excited to release the newly created Gulf Aquamapper, a web-based tool for exploration, permitting and siting of offshore aquaculture in the Gulf of Mexico. The Gulf Aquamapper is a geodatabase featuring aquaculture-relevant GIS data for biological, navigational, military, social, economic, physical and chemical parameters. The Gulf AquaMapper can be used as a one-stop screening solution for industry and coastal managers focused on identifying suitable and unsuitable areas for aquaculture development. With over 50 data types, the Gulf Aquamapper is the first spatial planning tool designed specifically for aquaculture in the Gulf of Mexico. In particular, the tool aims to streamline the permitting process established by the Gulf Aquaculture Fishery Management Plan (PDF) in 2016, by reducing logistical and economic inefficiencies for coastal managers and aquaculture investors. Multiple data layers can be viewed simultaneously for a more comprehensive assessment of competing uses, and maps can be printed and shared to inform a more detailed site assessment to verify environmental conditions and establish site-specific designs.



A screenshot of the Gulf Aquamapper tool's online interface, which provides data to help with permitting and siting of potential offshore aquaculture ventures. Credit: NOAA

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