Public Webinar: Scopes and Methods for Information Synthesis to Support Mid-Atlantic Regional Ocean Planning

MARCO

MID-ATLANTIC REGIONAL COUNCIL ON THE OCEAN

Webinar materials

The following materials will be posted to the MARCO website (http://midatlanticocean.org/) following the webinar:

- Webinar summary
- Recording of the webinar
- Webinar slide deck
- Webinar participant list
- Record of all questions from members of the public

Marine-life Data & Analysis



Patrick N. Halpin

Marine Geospatial Ecology Lab, Duke University

Marine Life Data & Analysis Team (MDAT) Principal Investigator

Brian Kinlan (Co-I), Earvin Balderama (Co-I), Mike Fogarty (Co-I)

Jason Roberts, Arliss Winship, Corrie Curtice, Jesse Cleary, Emily Shumchenia

Mid-Atlantic Synthesis Kick-off Meeting

Mid-Atlantic Regional Planning Body Public Webinar

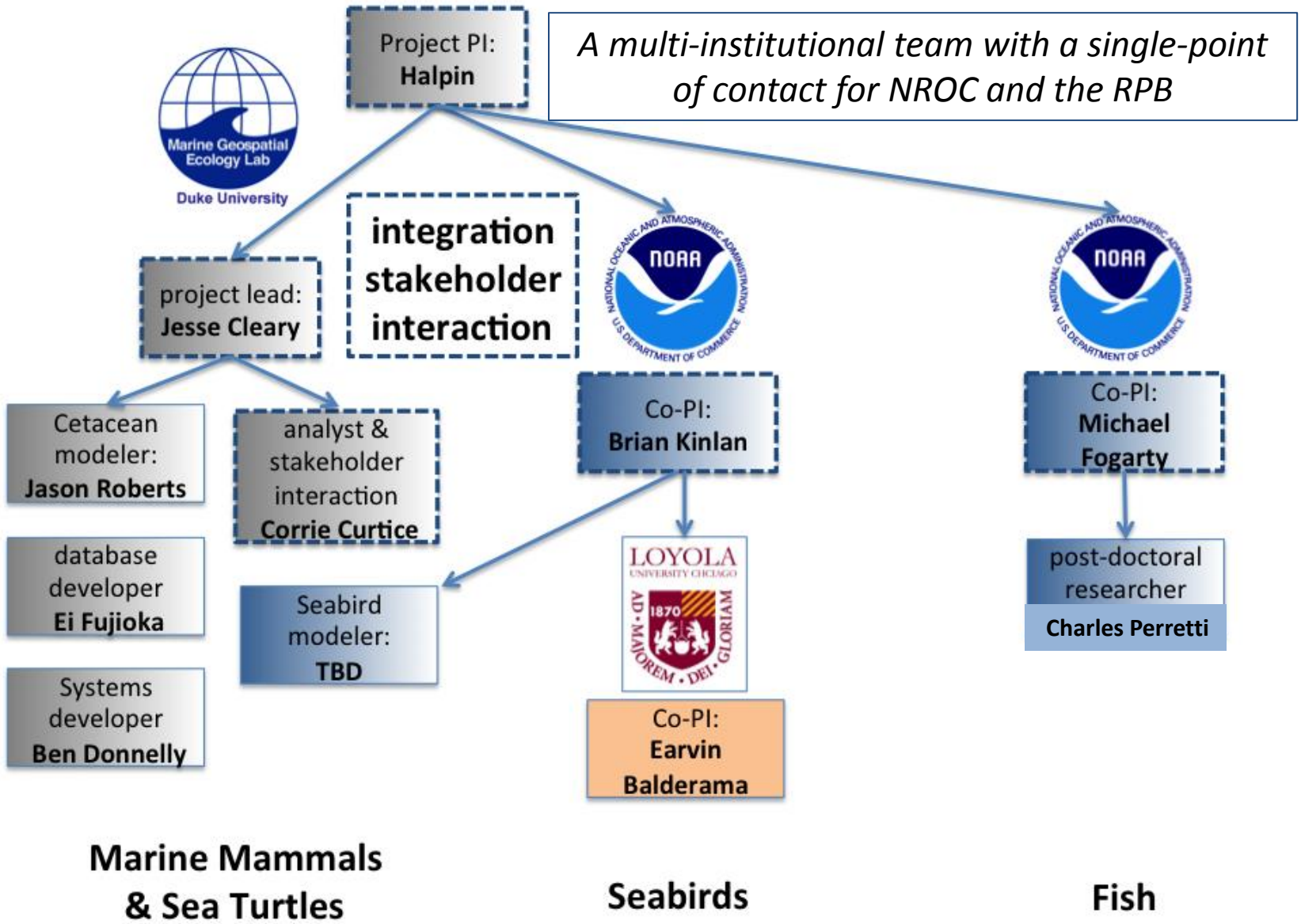
July 13, 2015



Overview

- MDAT Team
- Scope of Work
- Timeline & next steps

Project organization chart



regional data sets

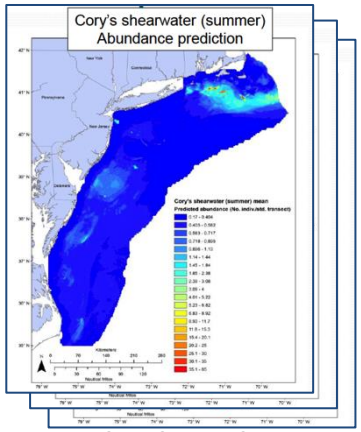
regional data sets

seabirds

NOAA-NCCOS

existing data & models

seabird abundance models



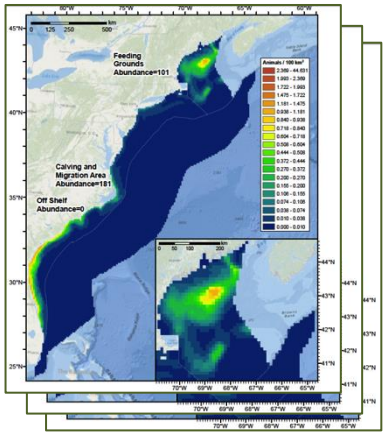
seabird products

marine mammals
sea turtles

Duke-MGEL

existing data & models

cetacean abundance models



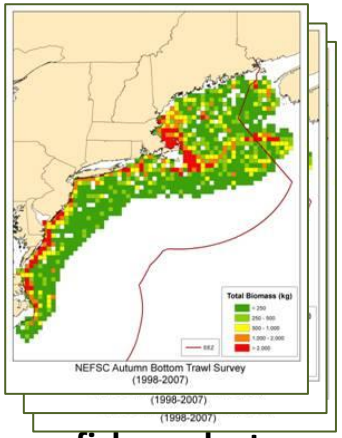
mammal & turtle products

fish

NOAA-NEFSC

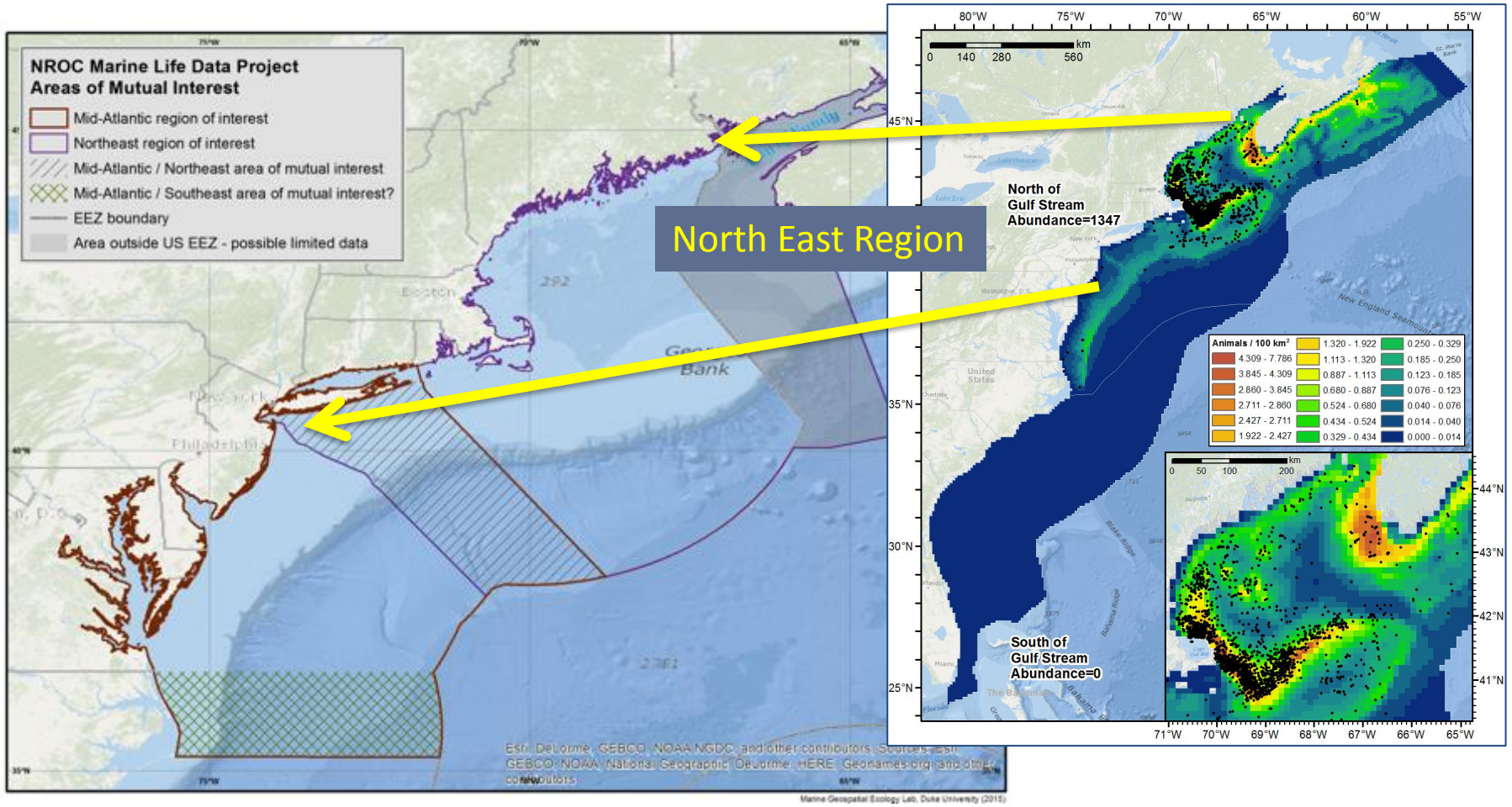
existing data & models

fish abundance models

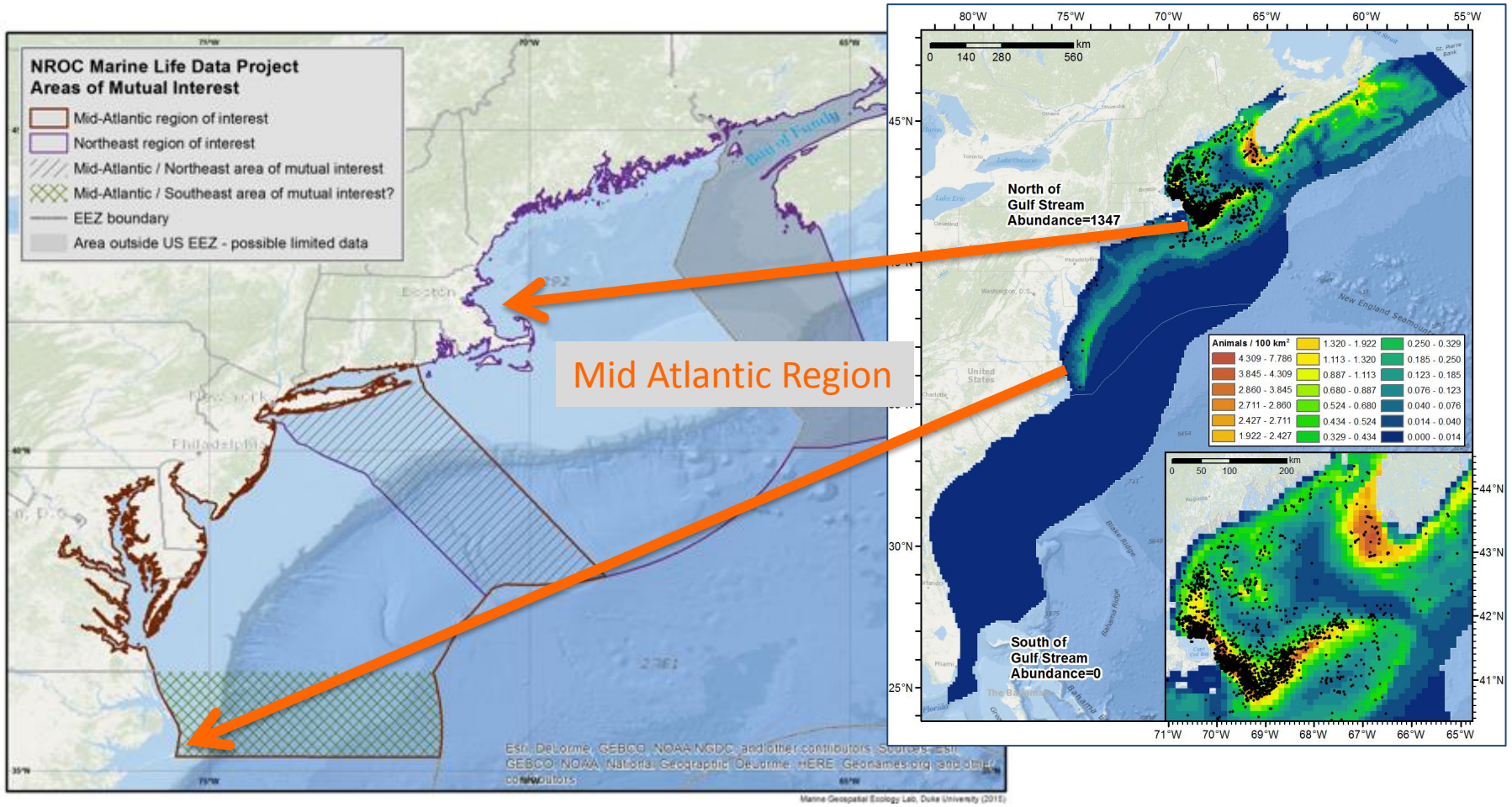


fish products

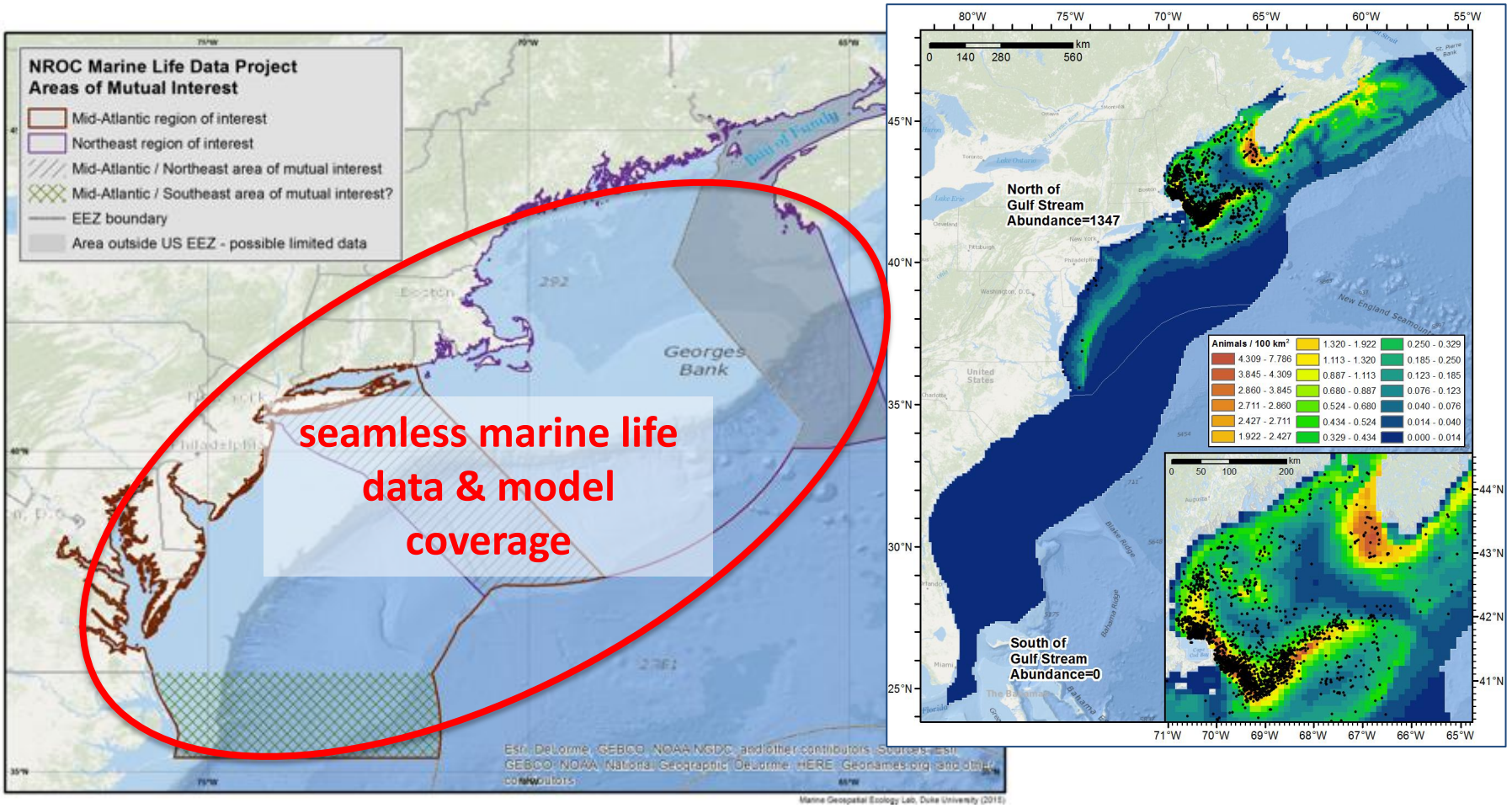
North East & Mid-Atlantic RPB Areas



North East & Mid-Atlantic RPB Areas



North East & Mid-Atlantic RPB Areas

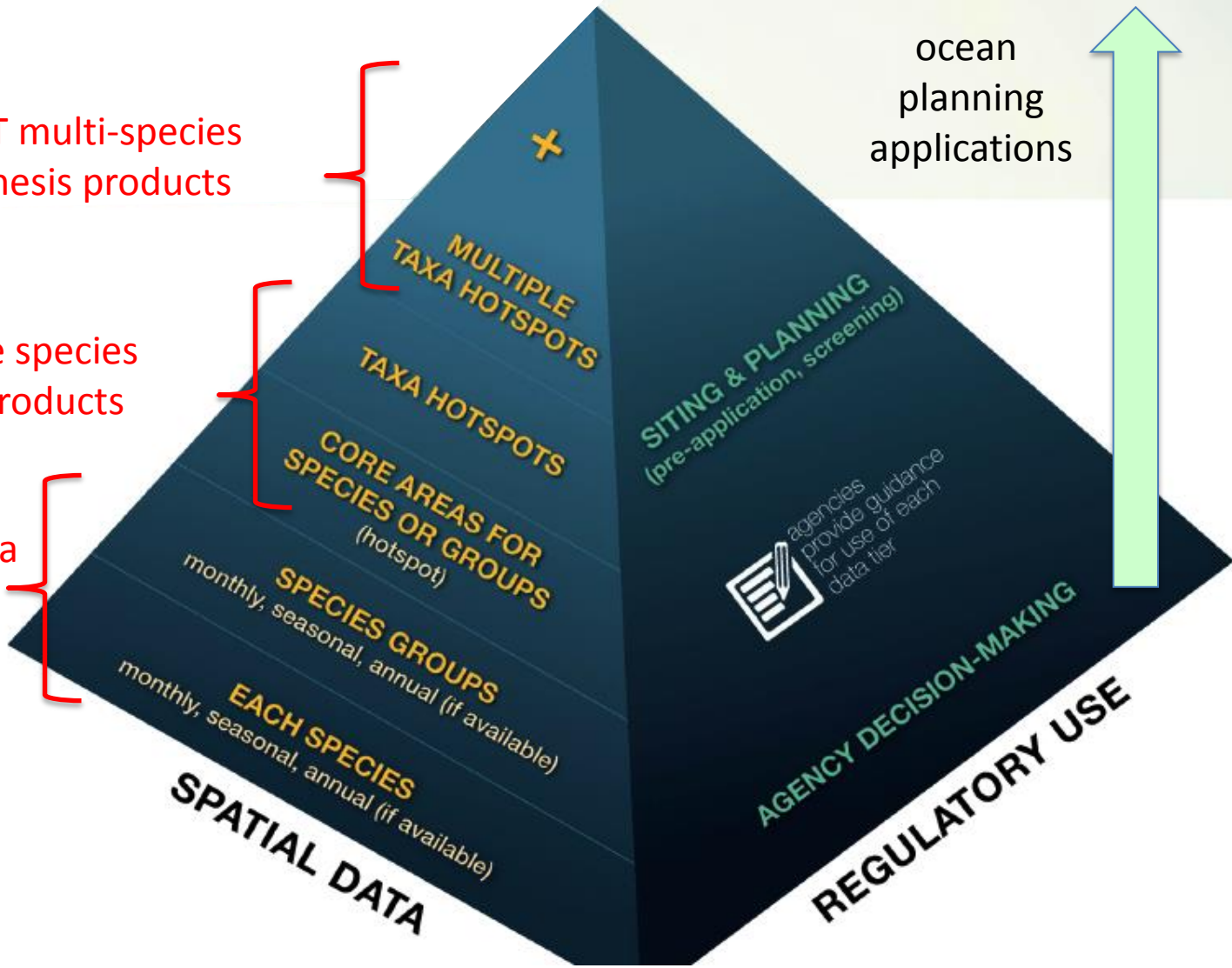


Hierarchy of marinelife data products & regulatory use

MDAT multi-species synthesis products

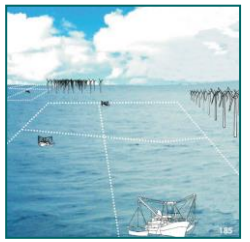
MDAT single species synthesis products

Initial MDAT species data & model products

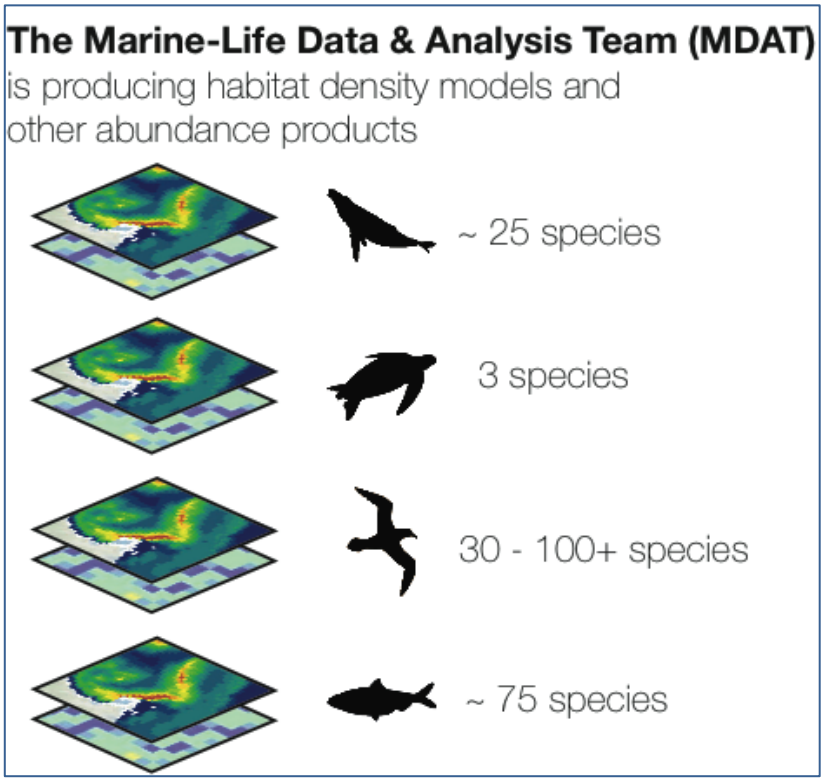


From: the Ocean Planning in the North East

MDAT Scope of Work

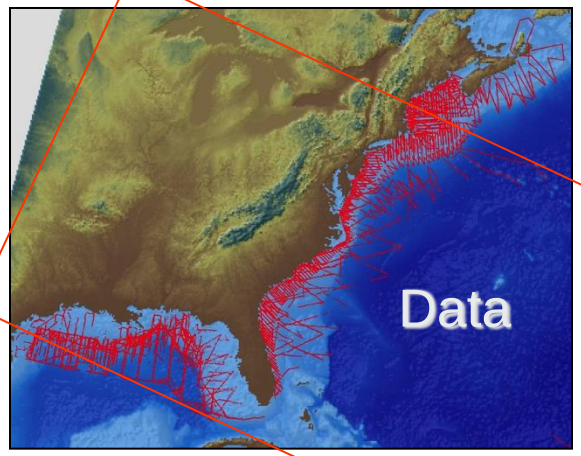


1. **Develop the Mid-Atlantic regional marine life database and web services** by hosting marine mammal, sea turtle, avian, and fish data products for use in desktop GIS systems and data portals, in particular the MARCO data portal.

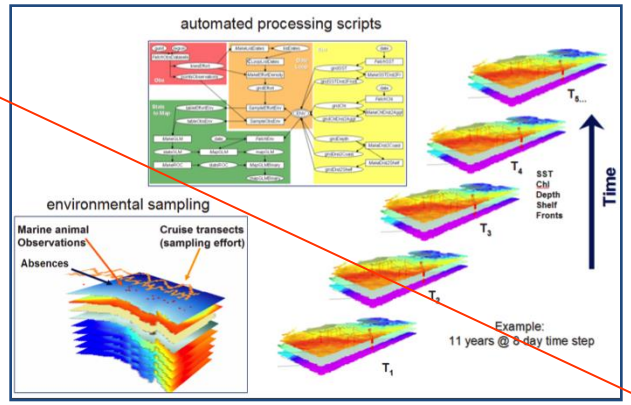


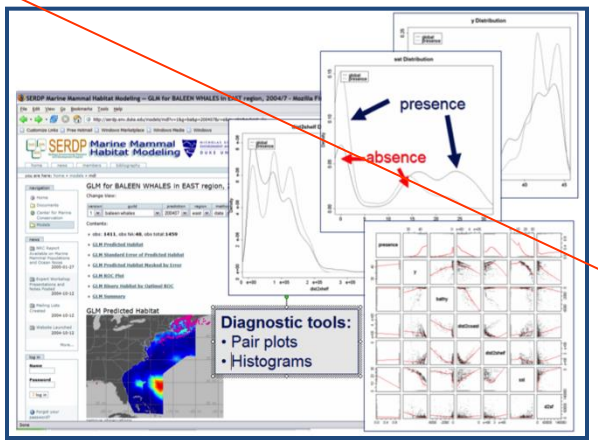
Marine habitat modeling process

1: observation data aggregation



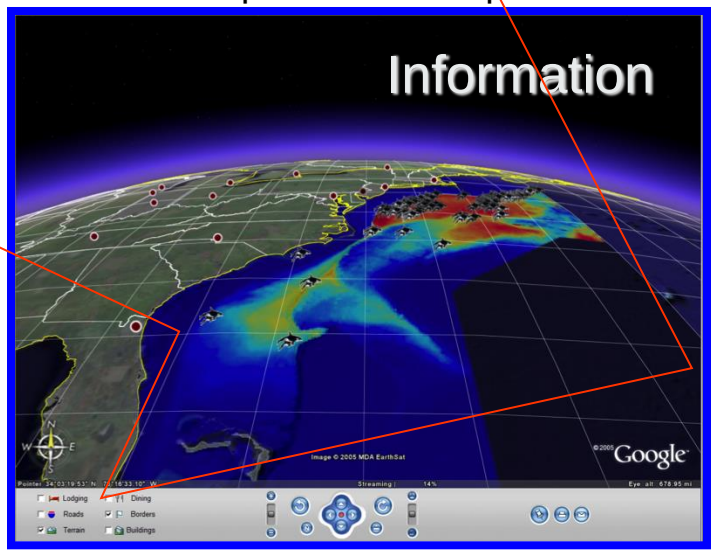
2: fusion with oceanographic data



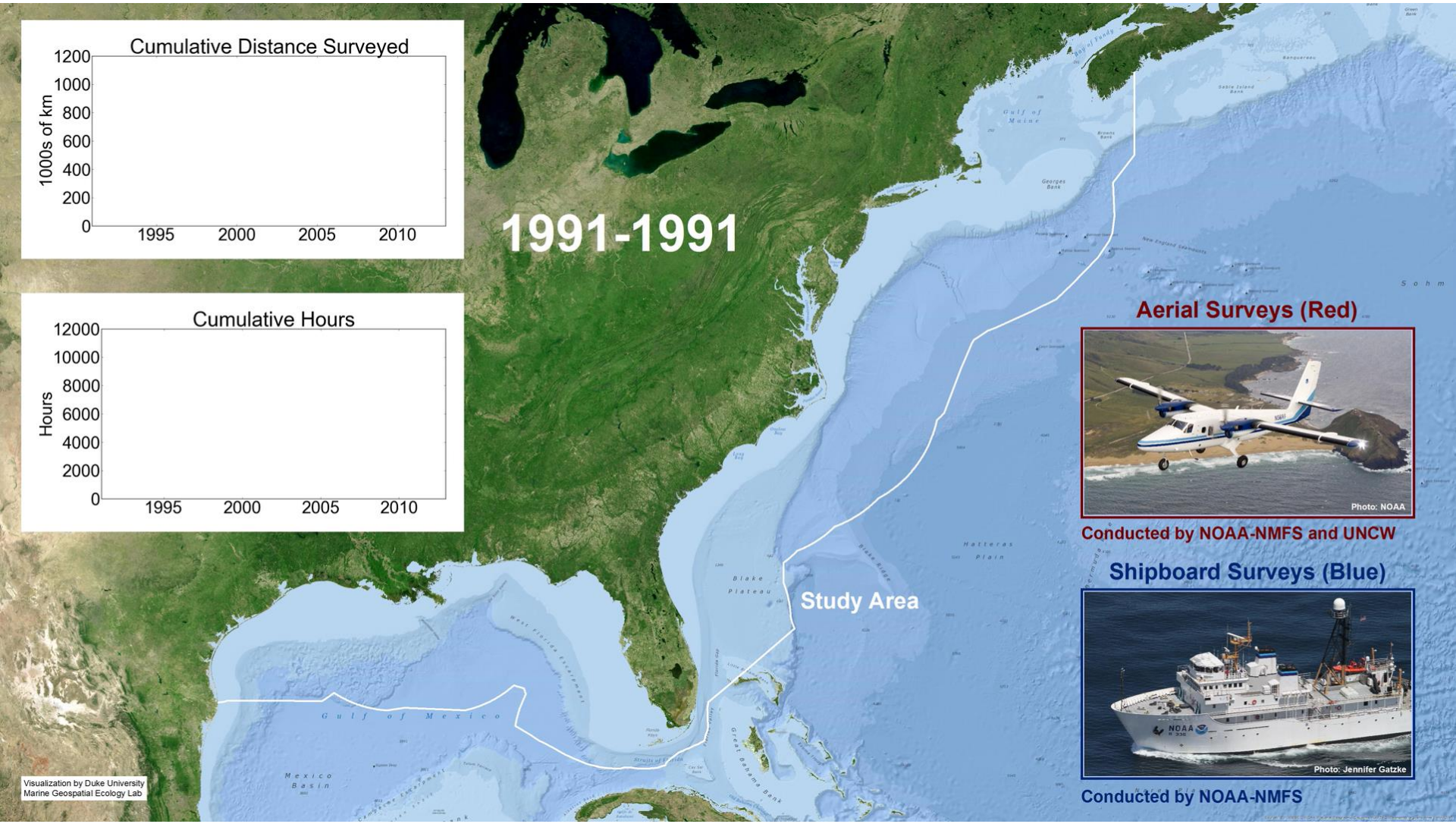


3: statistical modeling

4: model product development



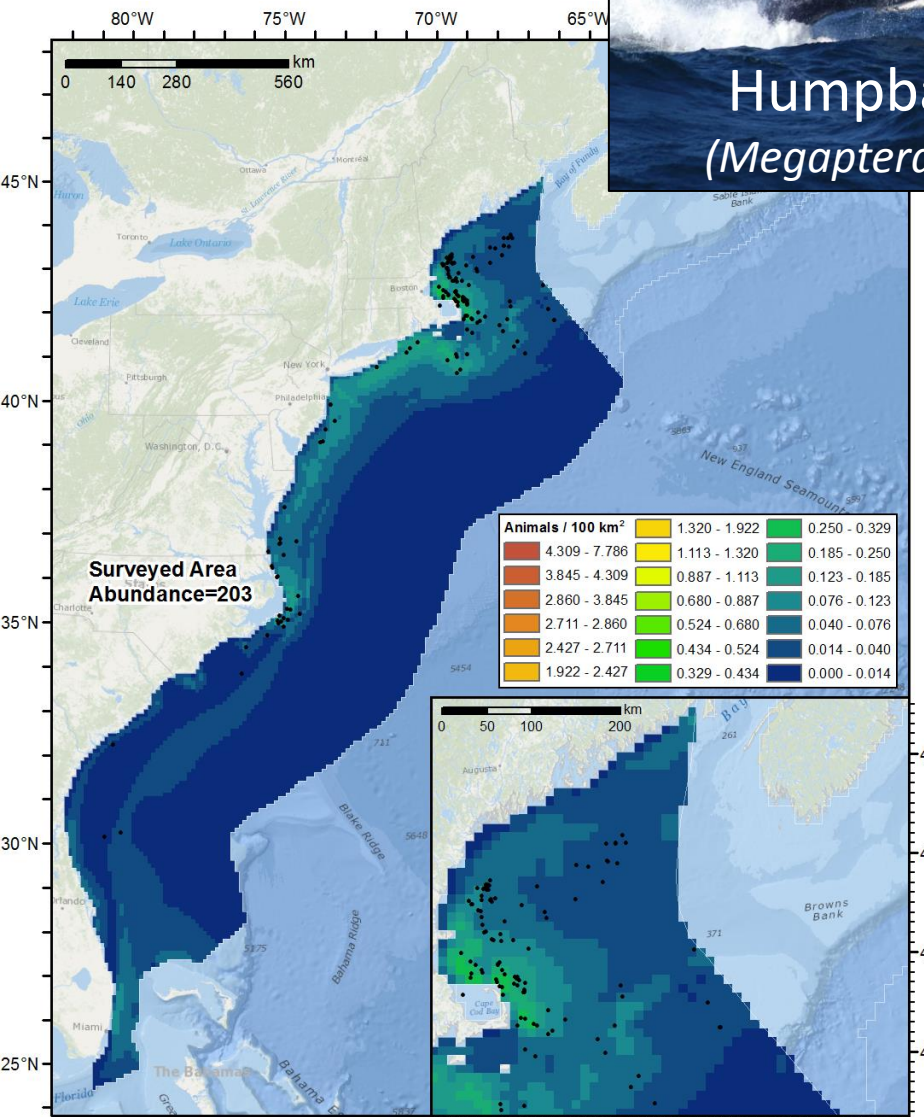
Marine mammal aggregation data overview

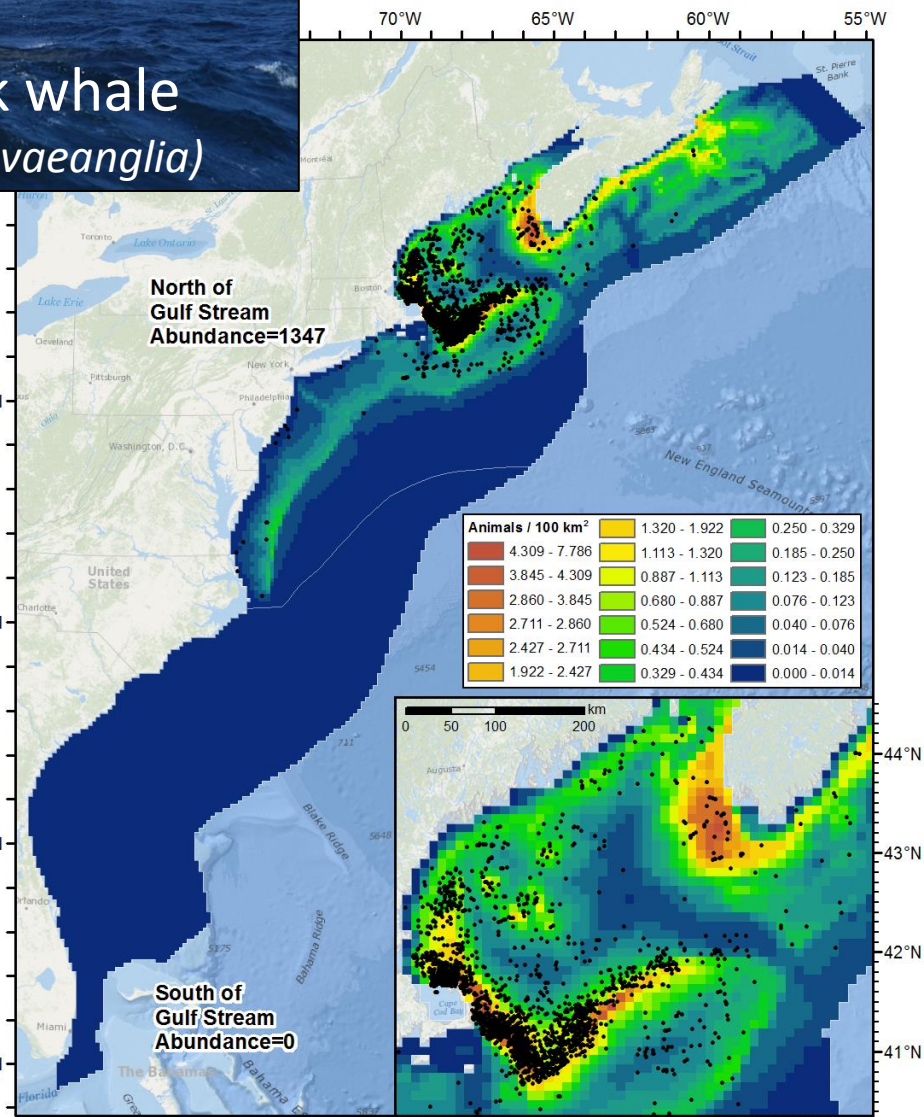


Humpback whale
(Megaptera novaeanglia)

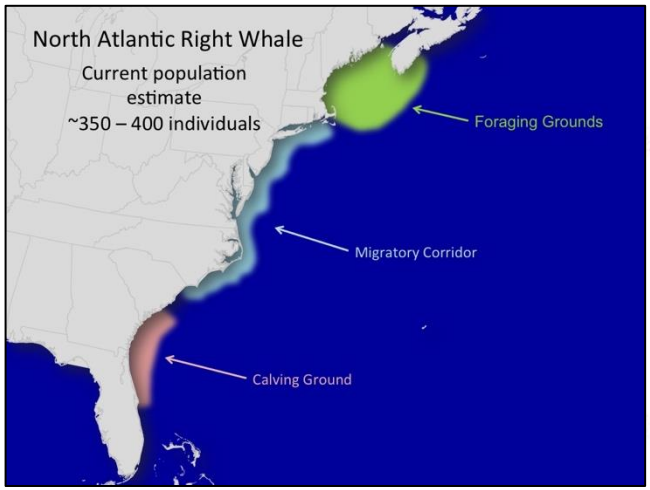
Winter

Summer





North Atlantic Right Whale
(*Eubalaena glacialis*)
Summer Season



Note: modeled abundance = ~379 animals

North of Gulf Stream Abundance=369

Shelf South of Gulf Stream Abundance=10

Off Shelf South of Gulf Stream Abundance=0

Animals / 100 km²

3.511 - 12.736	1.252 - 1.383	0.226 - 0.307
2.609 - 3.511	1.098 - 1.252	0.164 - 0.226
2.464 - 2.609	0.876 - 1.098	0.103 - 0.164
2.265 - 2.464	0.658 - 0.876	0.057 - 0.103
1.653 - 2.265	0.537 - 0.658	0.027 - 0.057
1.383 - 1.653	0.390 - 0.537	0.007 - 0.027
	0.307 - 0.390	0.000 - 0.007

km 0 125 250 500

km 0 50 100 200

80°W 75°W 70°W 65°W 60°W 55°W

45°N 40°N 35°N 30°N 25°N

71°W 70°W 69°W 68°W 67°W 66°W 65°W

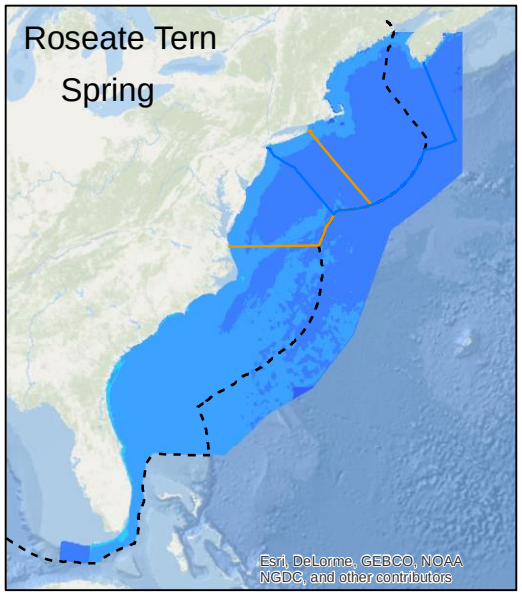
44°N 43°N 42°N 41°N

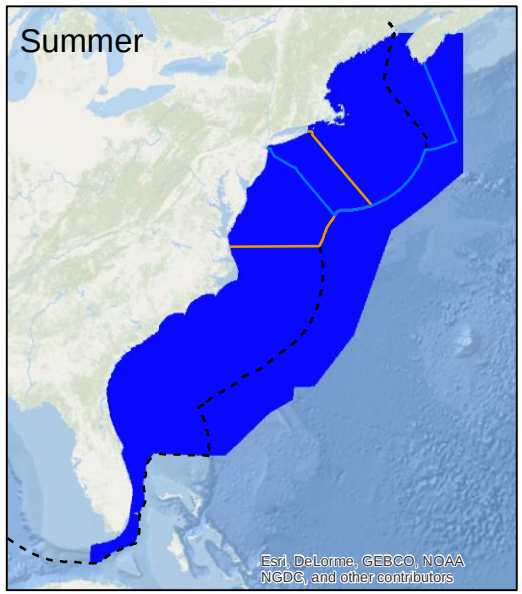
Species product updates:

Roseate Tern - abundance

(Sterna dougallii)

http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B07O



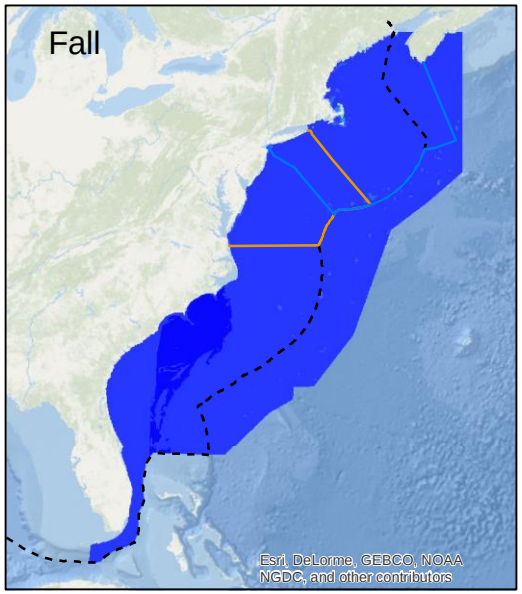


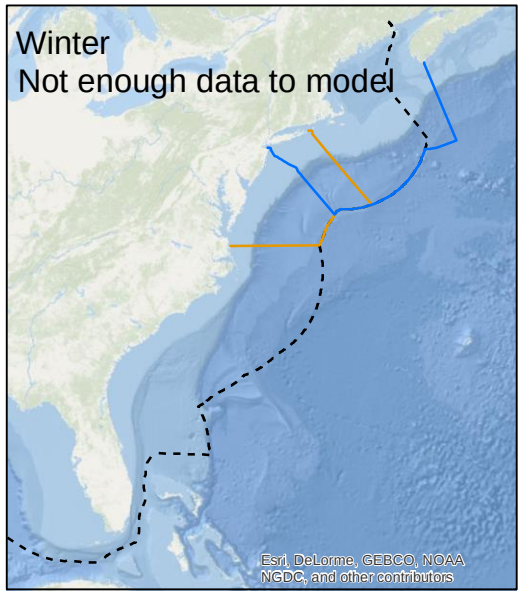
Relative abundance per standardized transect segment

1.5+	0.18 - 0.28	0.022 - 0.034	0.0027 - 0.0041
0.98 - 1.5	0.12 - 0.18	0.015 - 0.022	0.0018 - 0.0027
0.65 - 0.98	0.079 - 0.12	0.0096 - 0.015	0.0012 - 0.0018
0.42 - 0.65	0.052 - 0.079	0.0063 - 0.0096	0.00076 - 0.0012
0.28 - 0.42	0.034 - 0.052	0.0041 - 0.0063	0.0005 - 0.00076

Northeast
Mid-Atlantic
US EEZ

0 500 1,000 Km



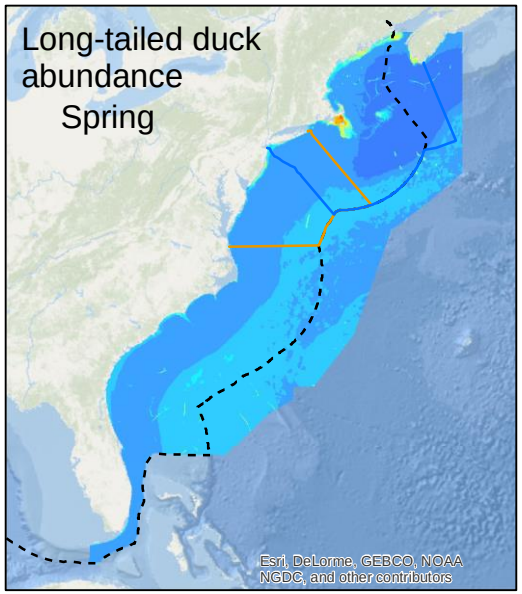


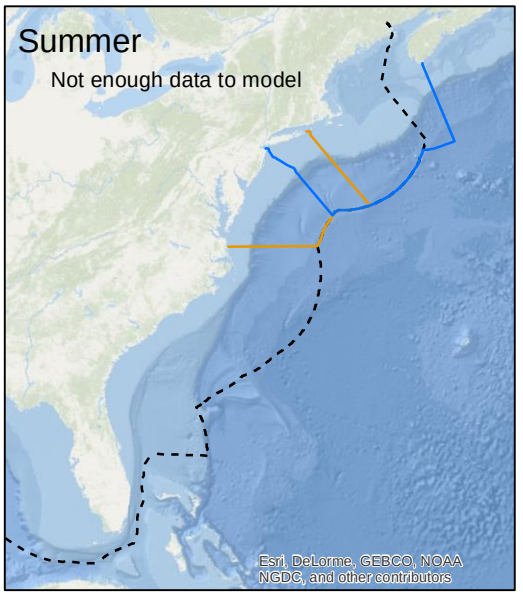
Species product updates:

Long-Tailed Duck - abundance

(Clangula hyemalis)

Wolfgang Wander -
http://www.pbase.com/image/70763534



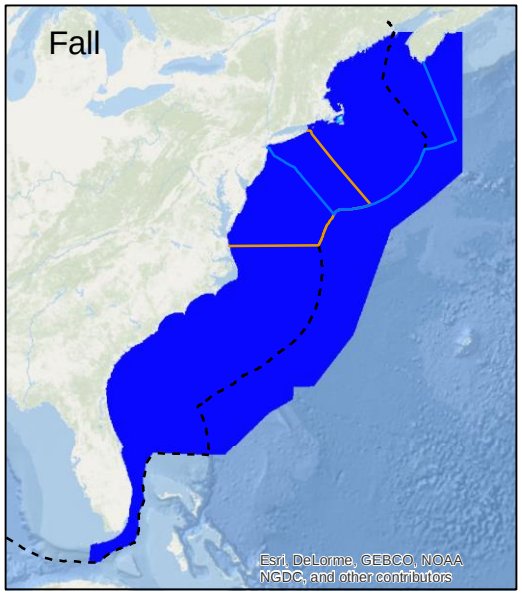


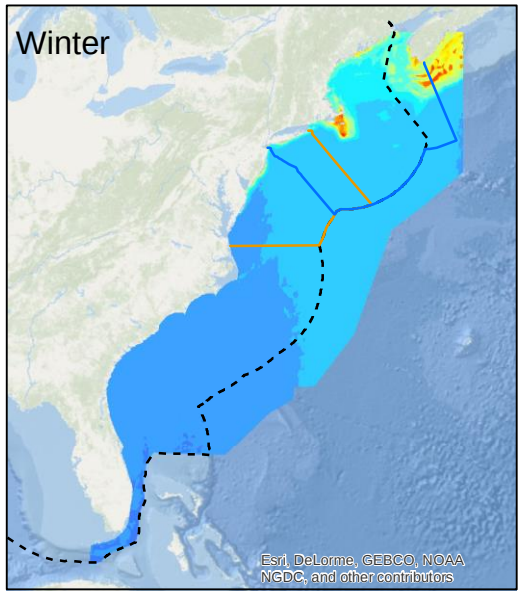
Relative abundance per standardized transect segment

0.01 - 0.016	0.101 - 0.16	1.01 - 1.6	10.1 - 16
0.0161 - 0.025	0.161 - 0.25	1.61 - 2.6	16.1 - 26
0.0251 - 0.04	0.251 - 0.4	2.61 - 4.1	26.1 - 41
0.0401 - 0.063	0.401 - 0.64	4.11 - 6.4	41.1 - 65
0.0631 - 0.1	0.641 - 1	6.41 - 10	65+

Northeast
Mid-Atlantic
US EEZ

0 500 1,000 Km

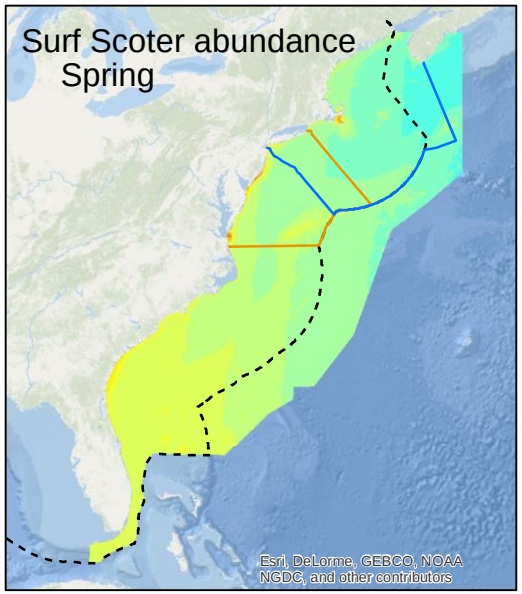


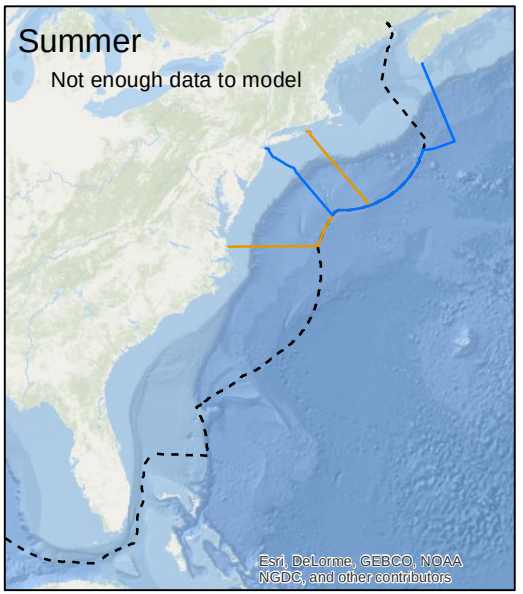


Species product updates:

Surf Scoter - abundance
(Melanitta perspicillata)

Alan D. Wilson - NaturesPicsOnline



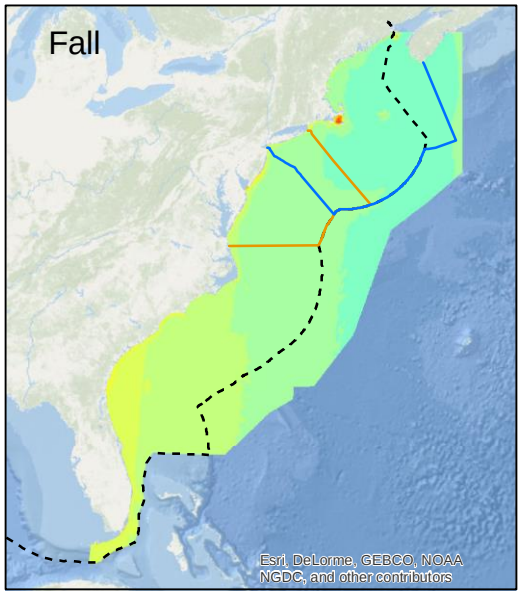


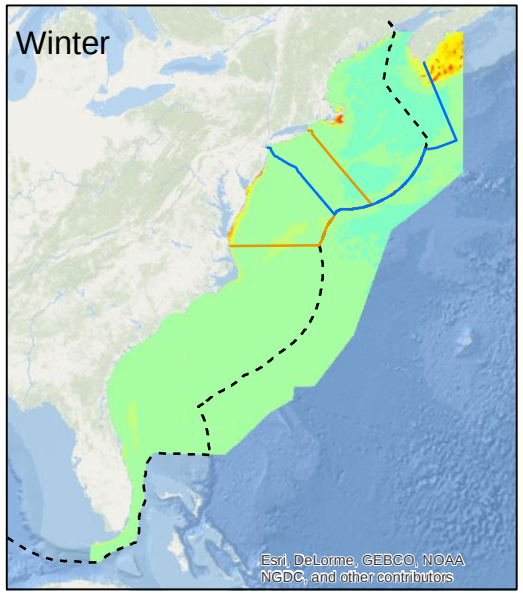
Relative abundance per standardized transect segment

0.001 - 0.0017	0.016 - 0.027	0.25 - 0.43	3.9 - 6.7
0.0017 - 0.003	0.027 - 0.047	0.43 - 0.74	6.7 - 12
0.003 - 0.0052	0.047 - 0.082	0.74 - 1.3	12 - 20
0.0052 - 0.009	0.082 - 0.14	1.3 - 2.2	20 - 35
0.009 - 0.016	0.14 - 0.25	2.2 - 3.9	35+

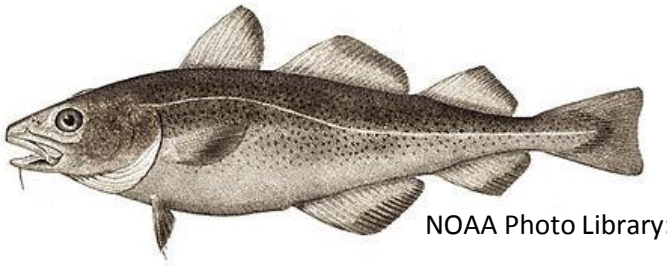
Northeast
Mid-Atlantic
US EEZ

0 500 1,000 Km





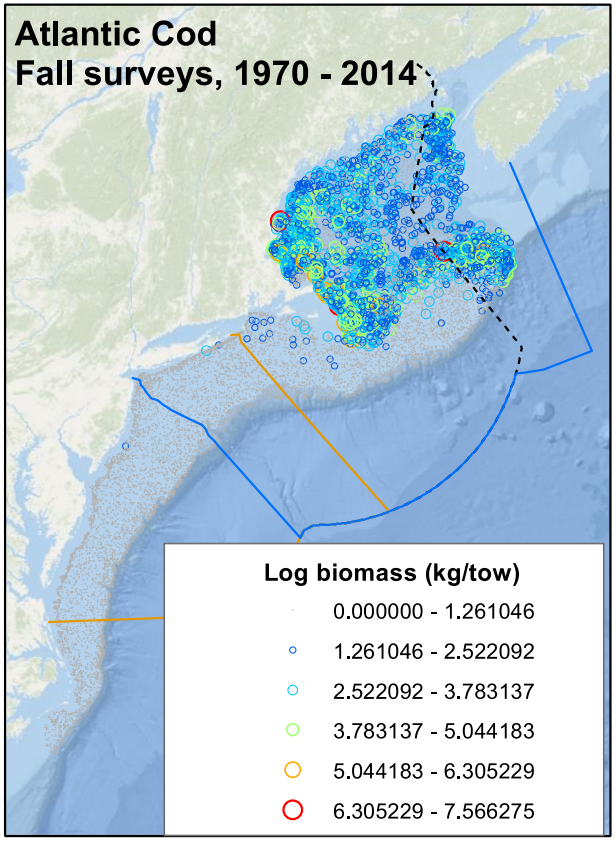
Species product updates:

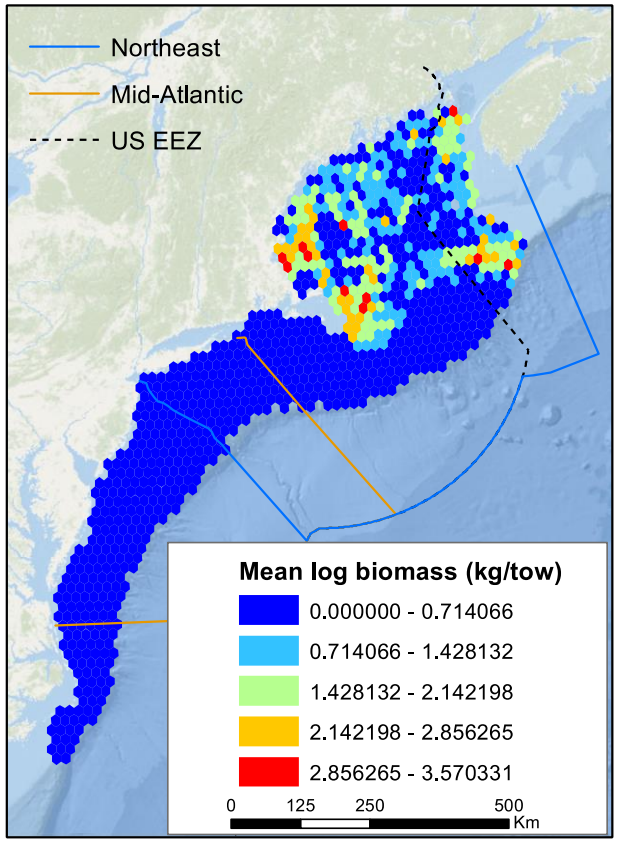


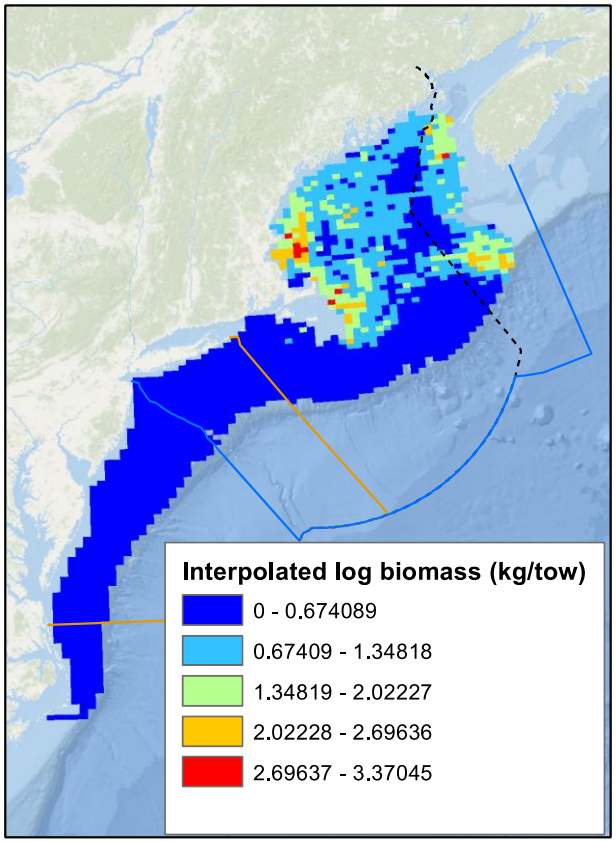
NOAA Photo Library:

Atlantic Cod - biomass

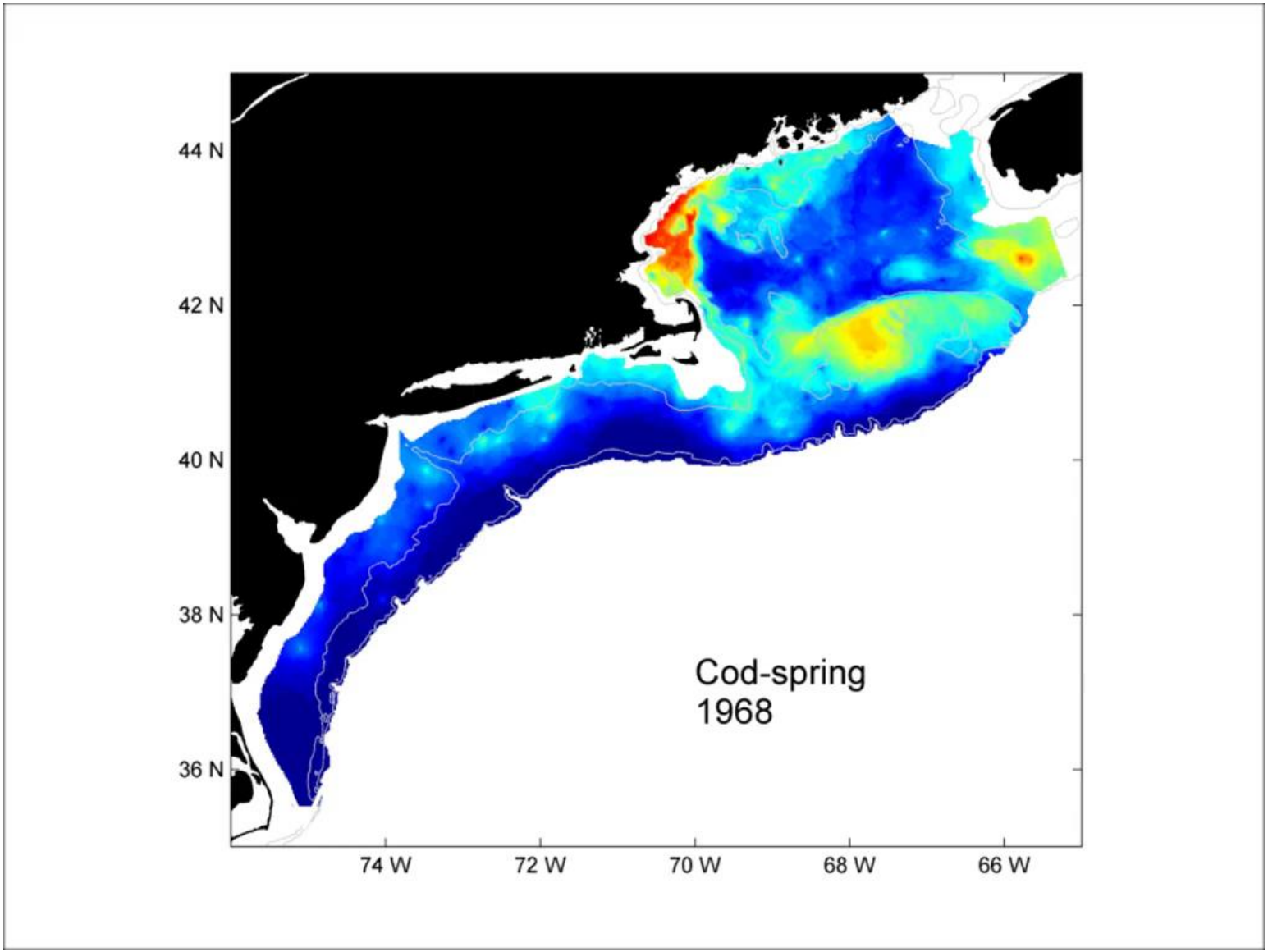
(Gadus morhua)







Atlantic Cod distribution over time



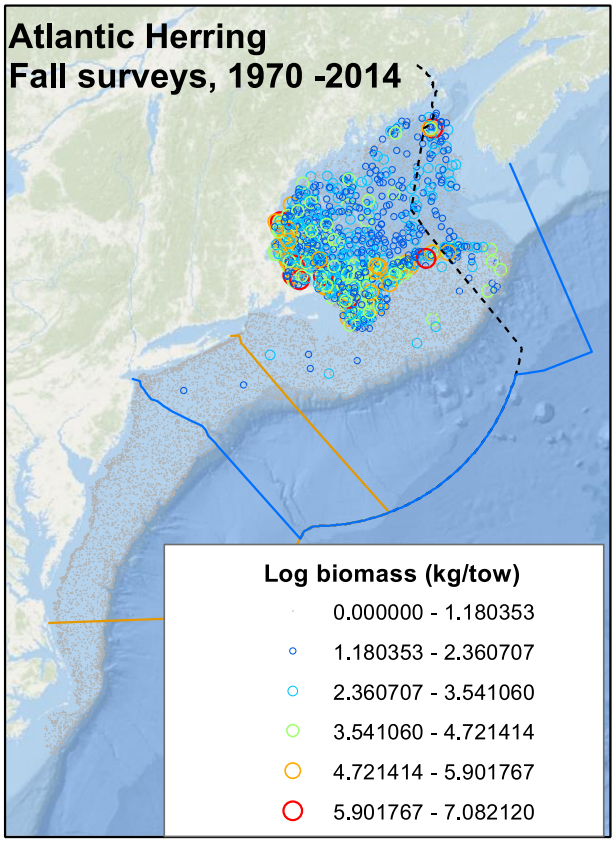
NEFSC Spring Bottom Trawl Survey 1968 – 2008

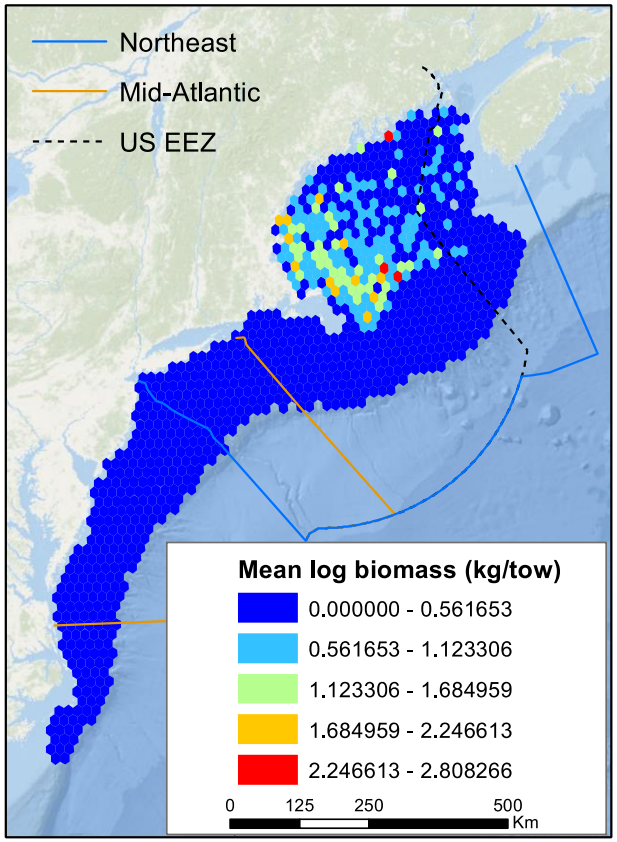
Species product updates:

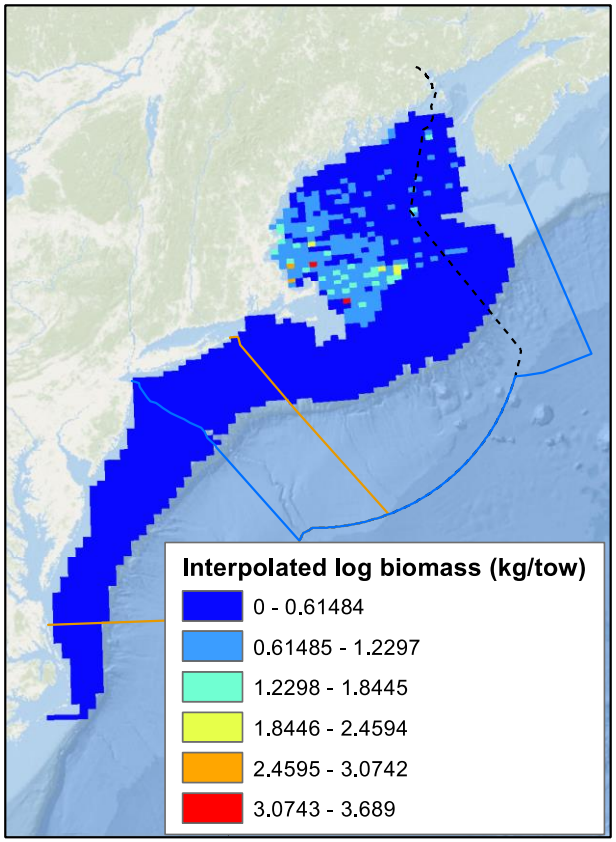
Atlantic Herring - biomass

(Clupea harengus)

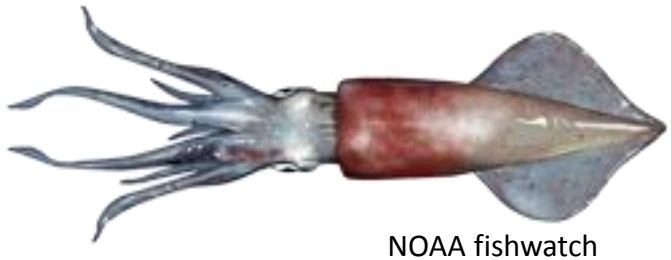
NOAA fishwatch







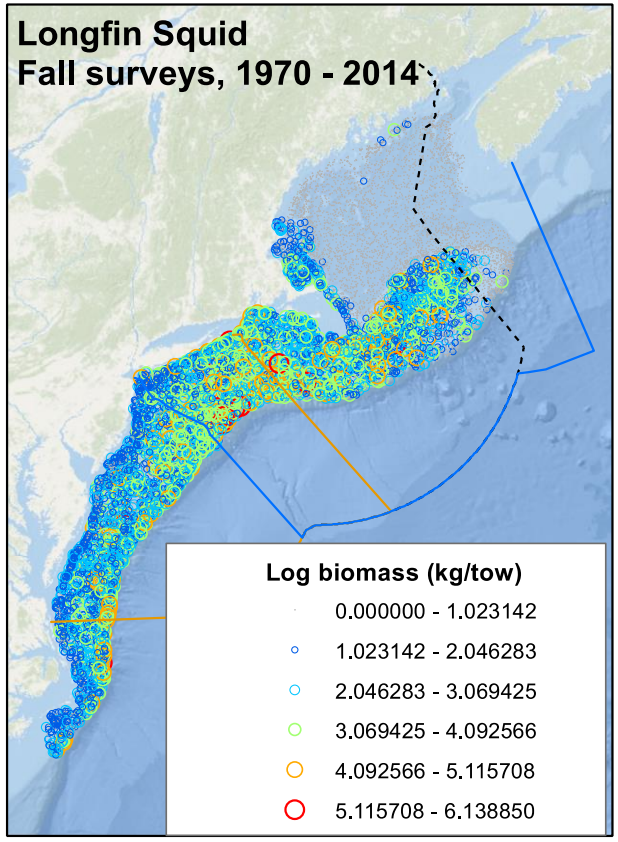
Species product updates:

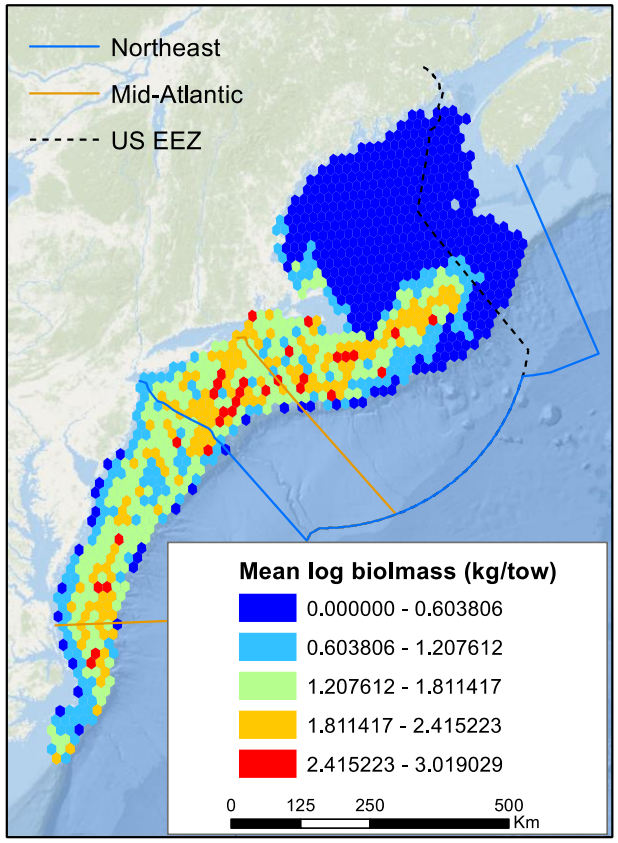


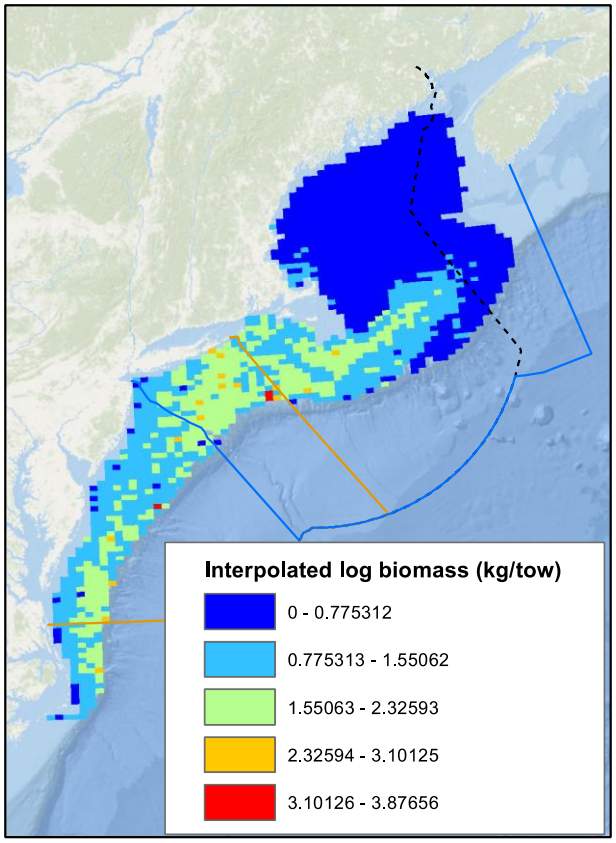
NOAA fishwatch

Longfin Squid- biomass

(Doryteuthis pealeii)





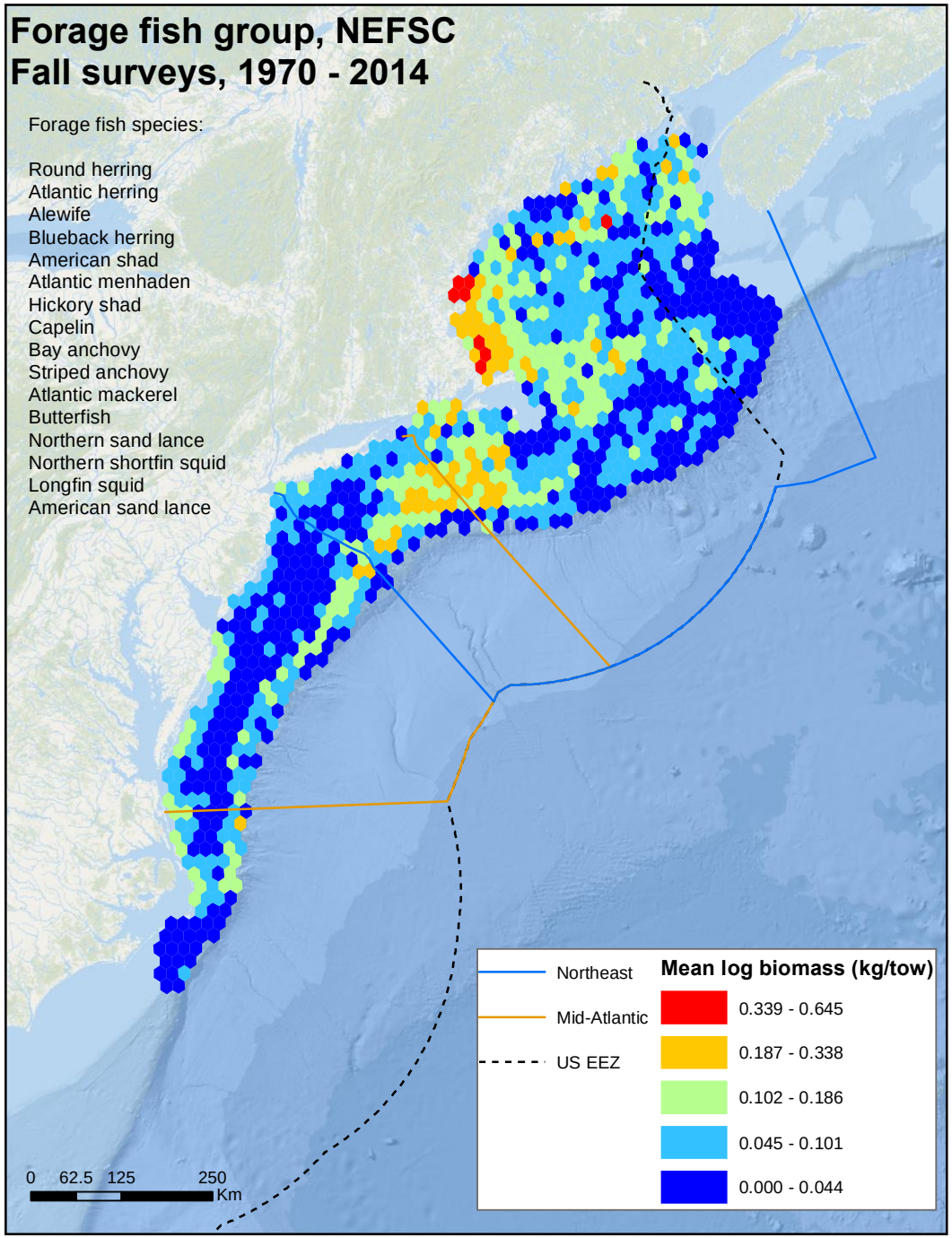


Species product updates:

Forage fish - biomass

Multi-species compilation

Photo: Brocken Inaglory





Species abundance products:

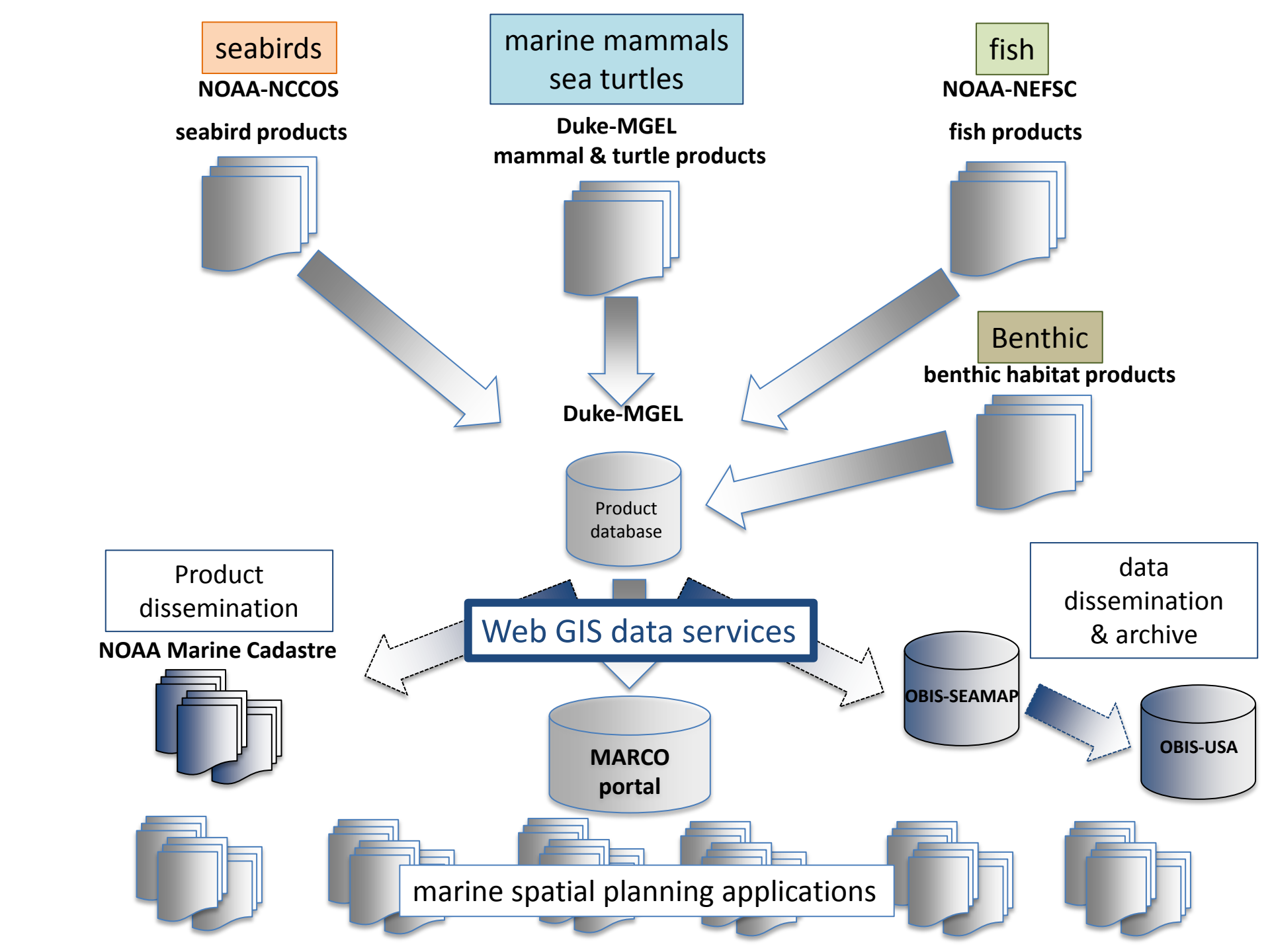
~740 mammal layers, + ~1308 avian layers, + ~1620 fish layers = ***~3668***

Question: *How do you deliver this volume of data to multiple data portals?*

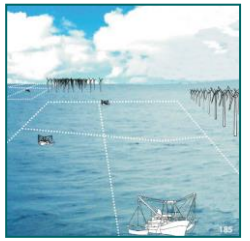
Answer: *through internet web services*

Benefits:

- Portals do not need to store or display all layers;
- Updates are passed to all portals & users

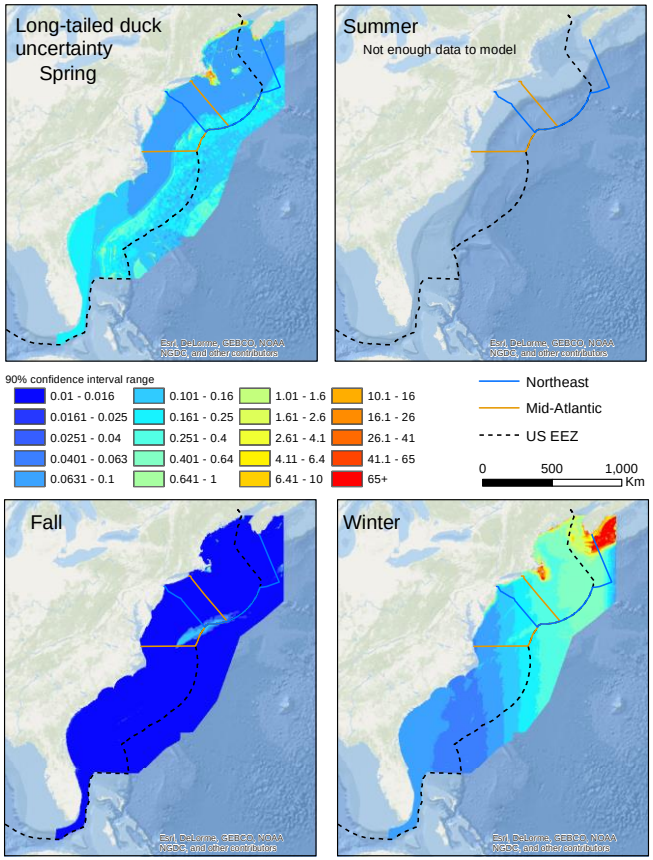

seabirds
NOAA-NCCOS
seabird products
marine mammals
sea turtles
Duke-MGEL
mammal & turtle products
fish
NOAA-NEFSC
fish products
Benthic
benthic habitat products
Duke-MGEL
Product
database
Product
dissemination
NOAA Marine Cadastre
Web GIS data services
data
dissemination
& archive
OBIS-SEAMAP
OBIS-USA
MARCO
portal
marine spatial planning applications

MDAT Scope of Work

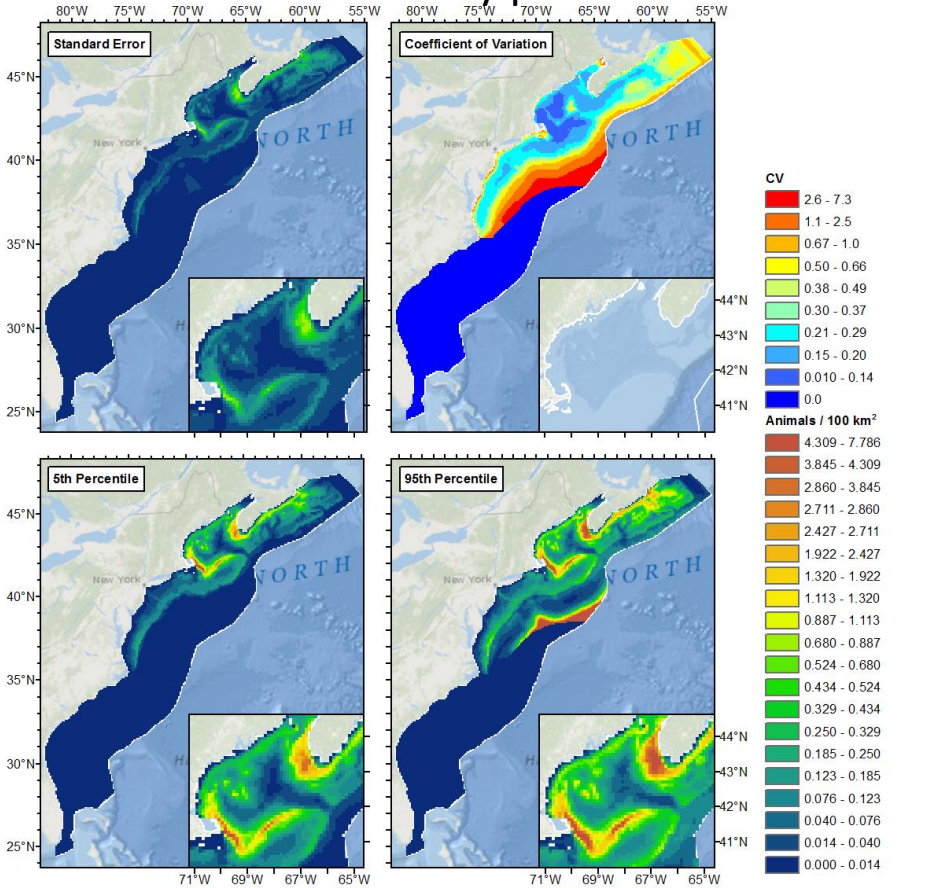


2. **Update models, model output and associated error and/or uncertainty products** using newly available data for individual species and species groups identified in each taxa Work Plan.

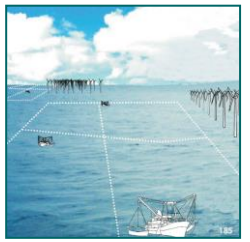
Avian: uncertainty products



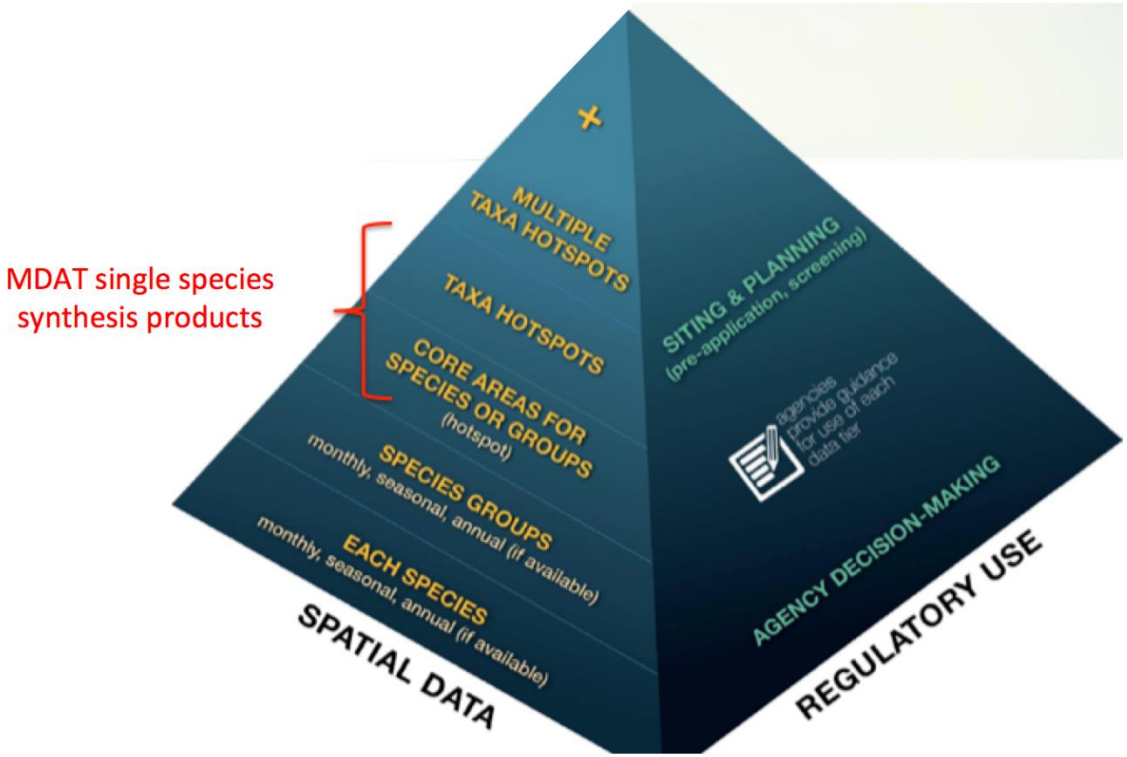
Cetacean: uncertainty products



MDAT Scope of Work



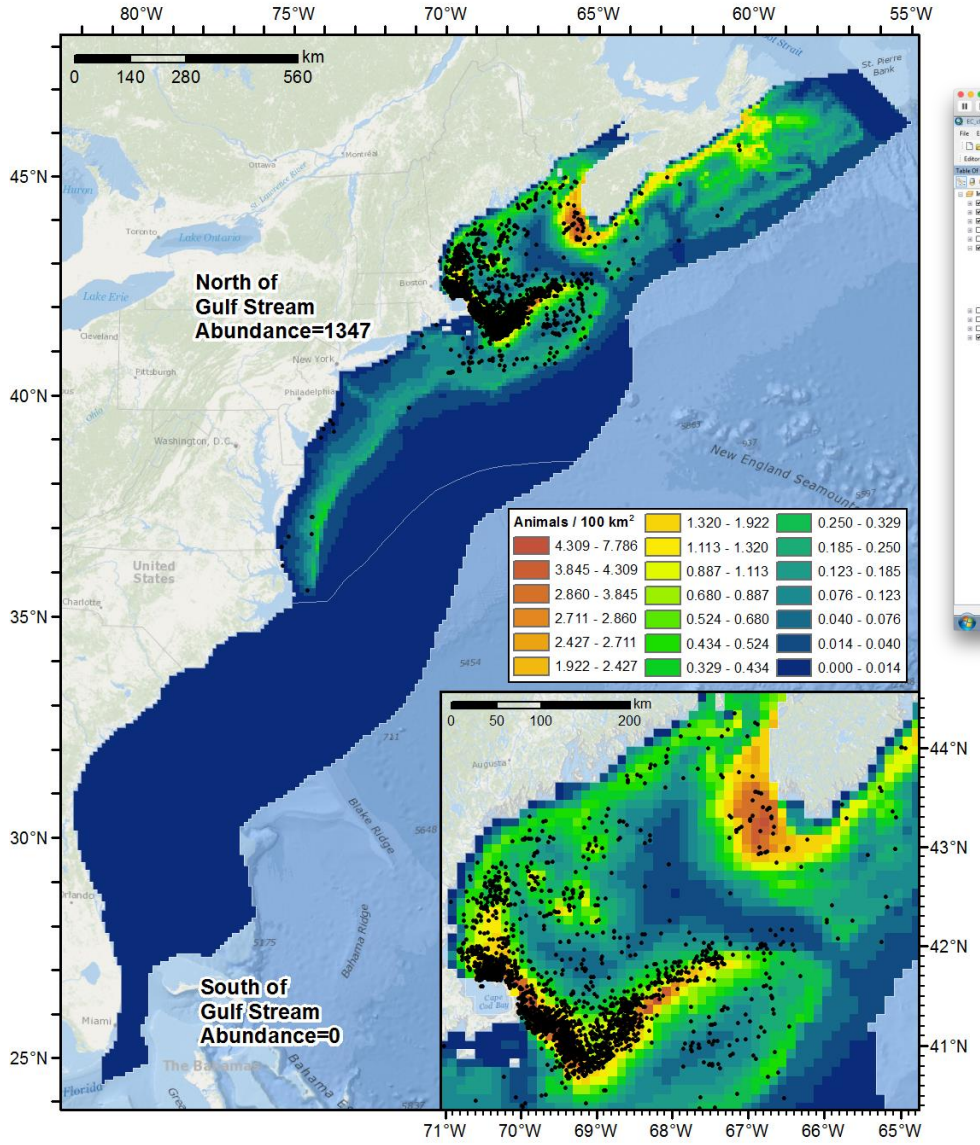
3. **Develop synthetic data products for individual or groups of species** within taxonomic groups (marine mammals, sea turtles, avian, fish). Provide technical support at MARCO and RPB-sponsored meetings with state and federal agencies to ensure the utility of the information for decision-making.



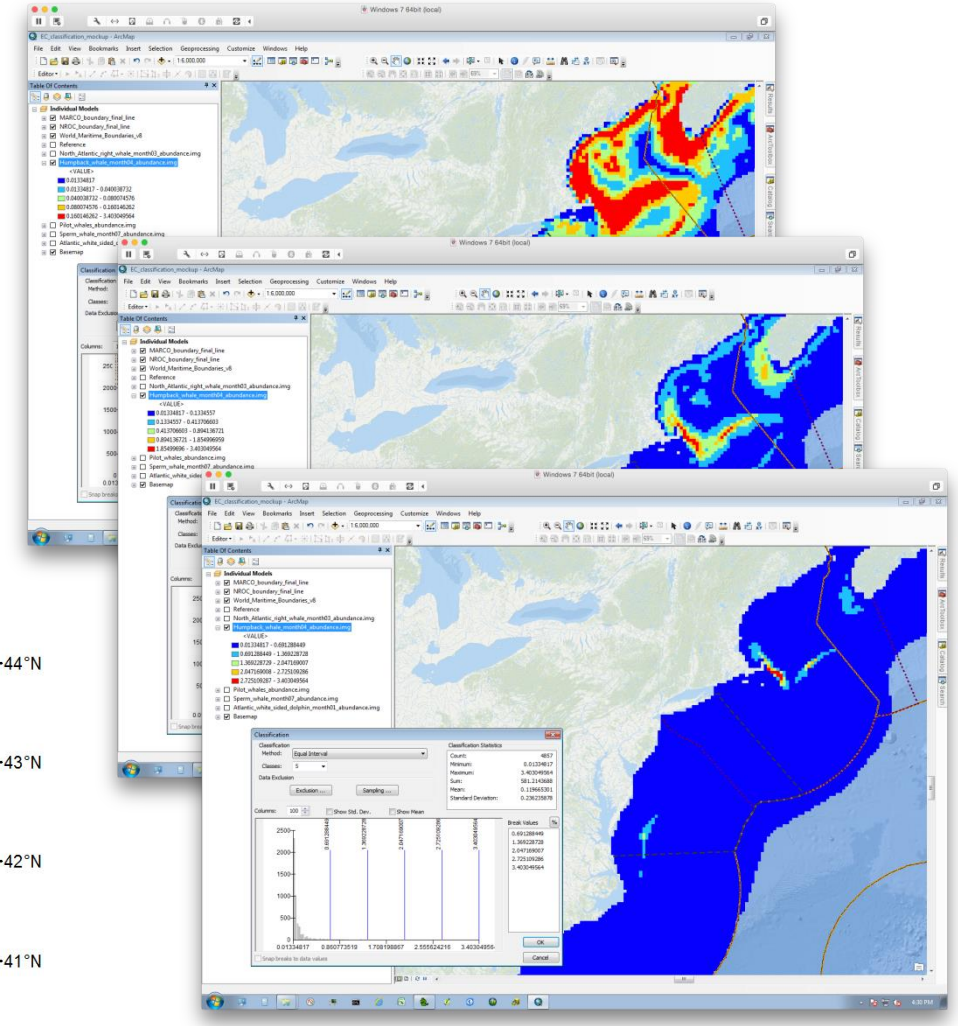
Synthesis products: single species abundance (1)

How you bin the data into categories is very important…

distribution / abundance

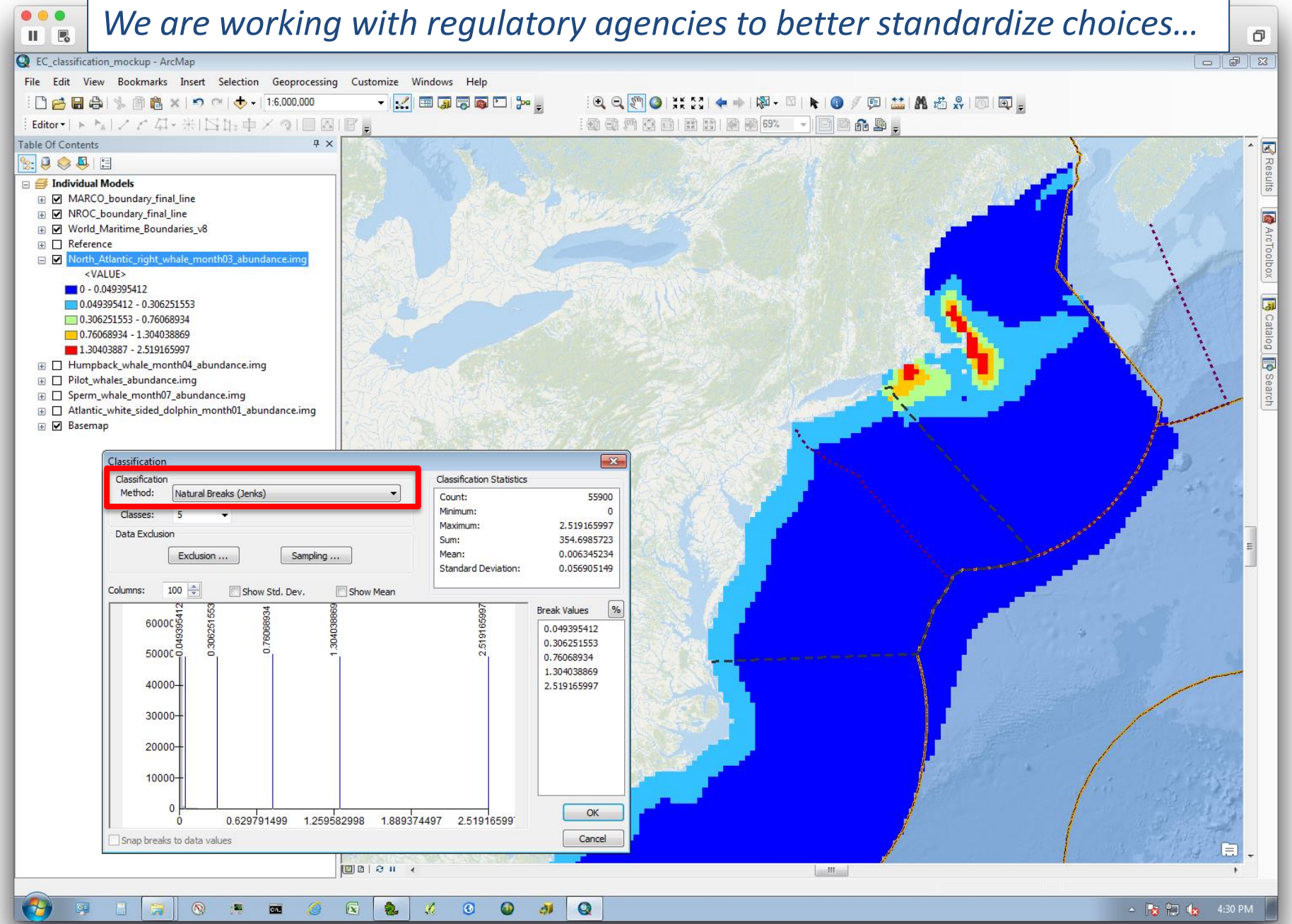


abundance threshold method

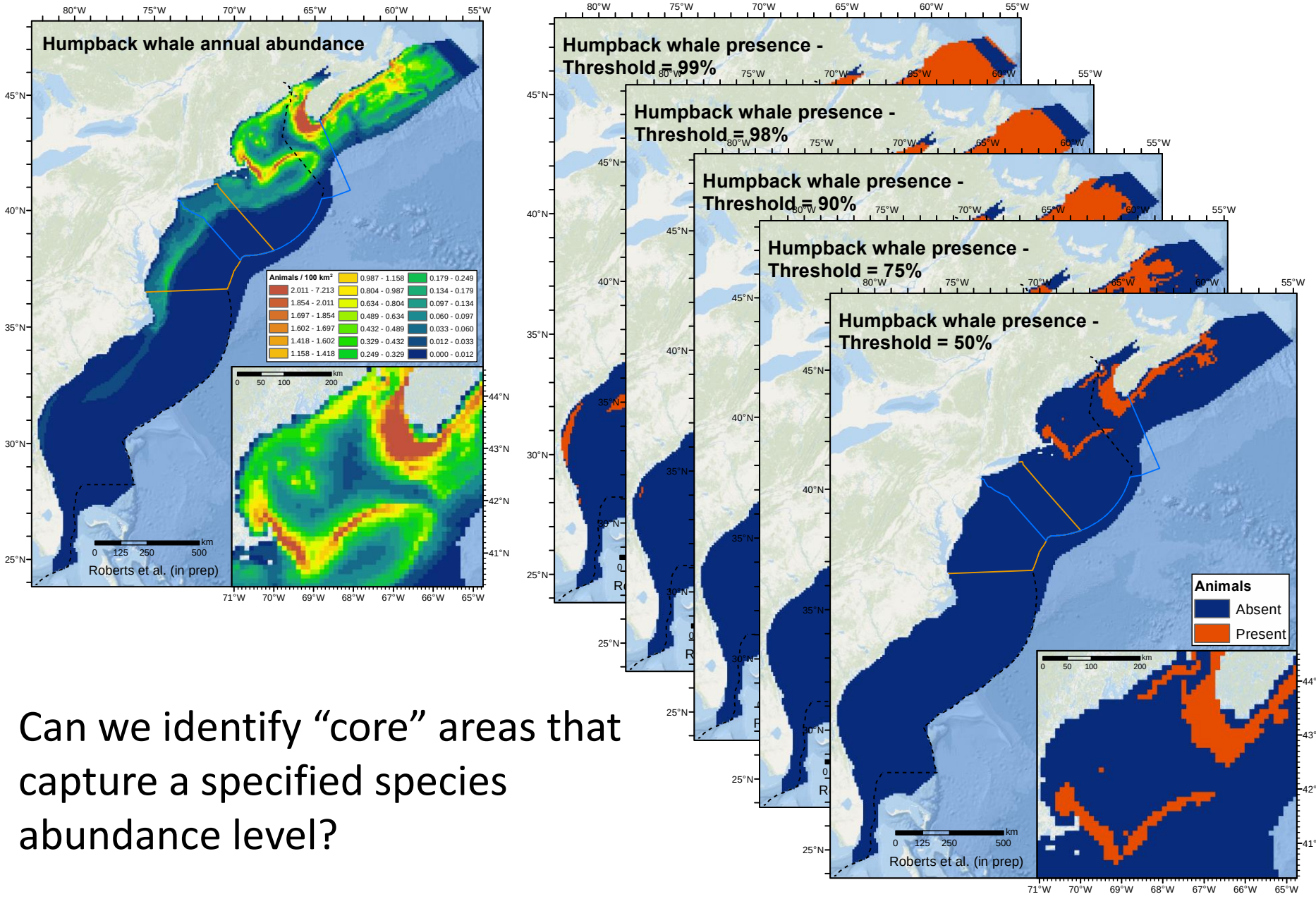


Example: North Atlantic Right Whale - March

We are working with regulatory agencies to better standardize choices…

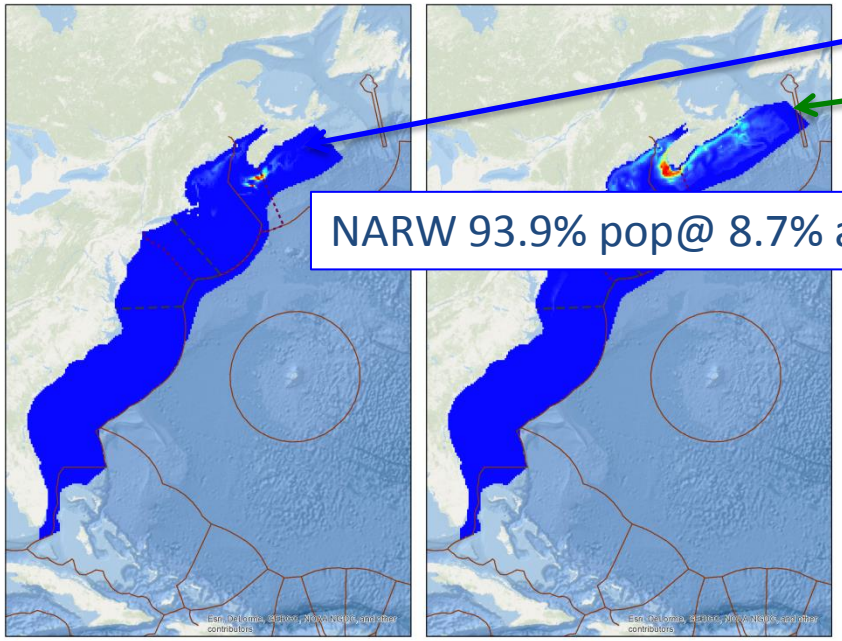


Synthesis products: species abundance (2)

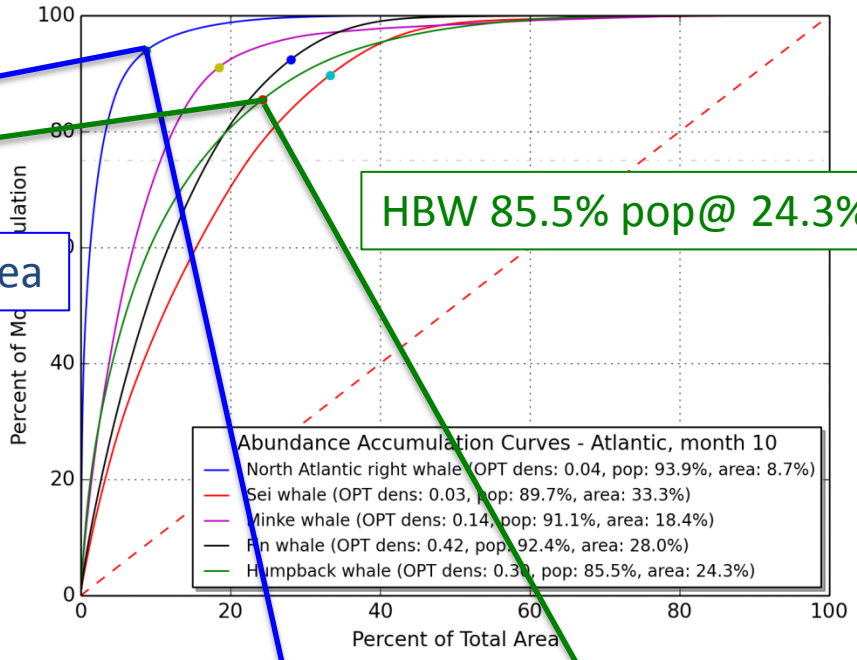


Can we identify “core” areas that capture a specified species abundance level?

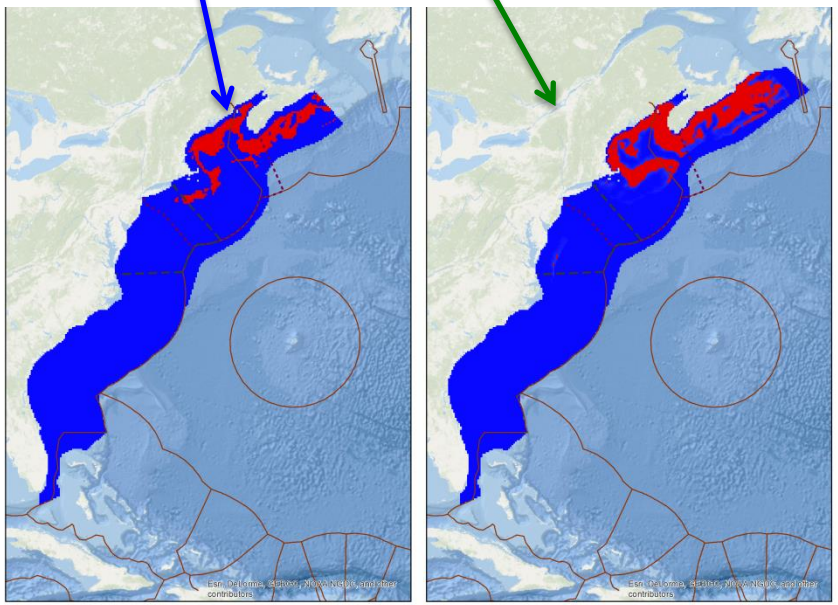
Synthesis products: species abundance (3)



NARW 93.9% pop@ 8.7% area



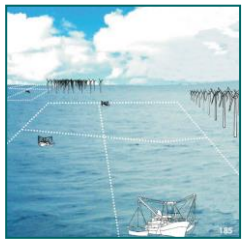
HBW 85.5% pop@ 24.3% area



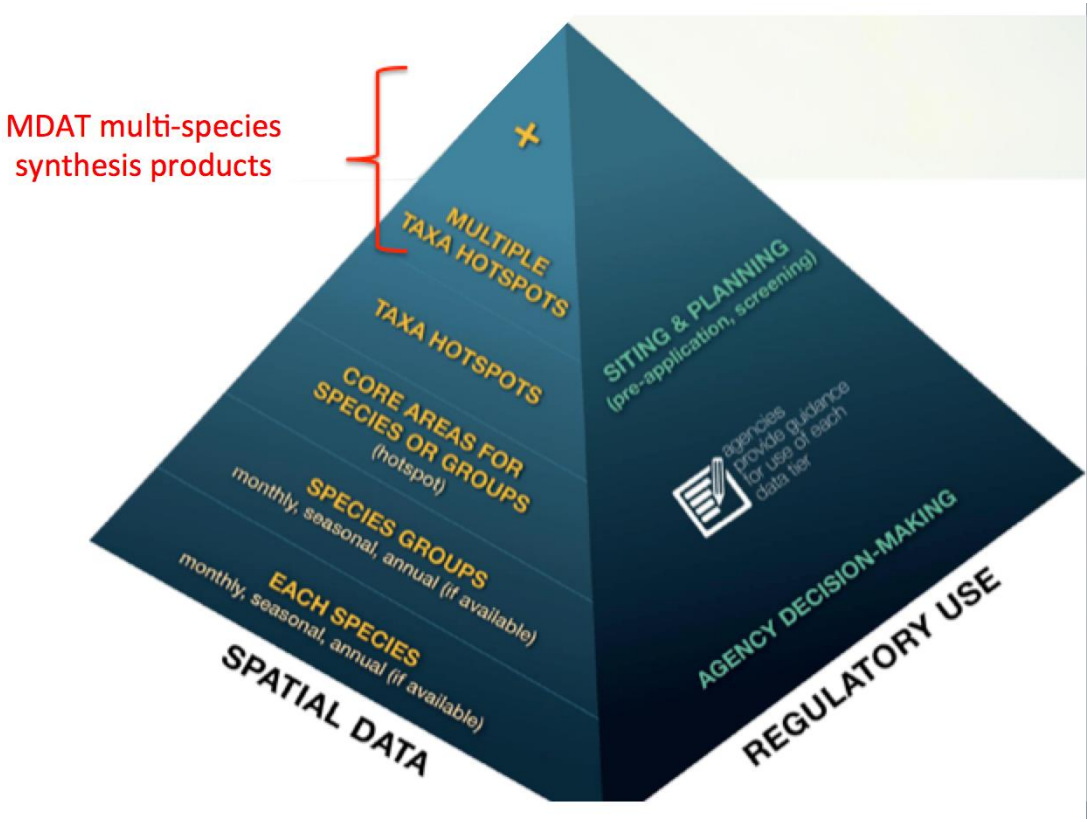
Can we identify “core” areas based on an ***optimized*** species abundance level?

Species may have more or less compact distributions, so the there is ***different efficiency*** in the amount of area required…

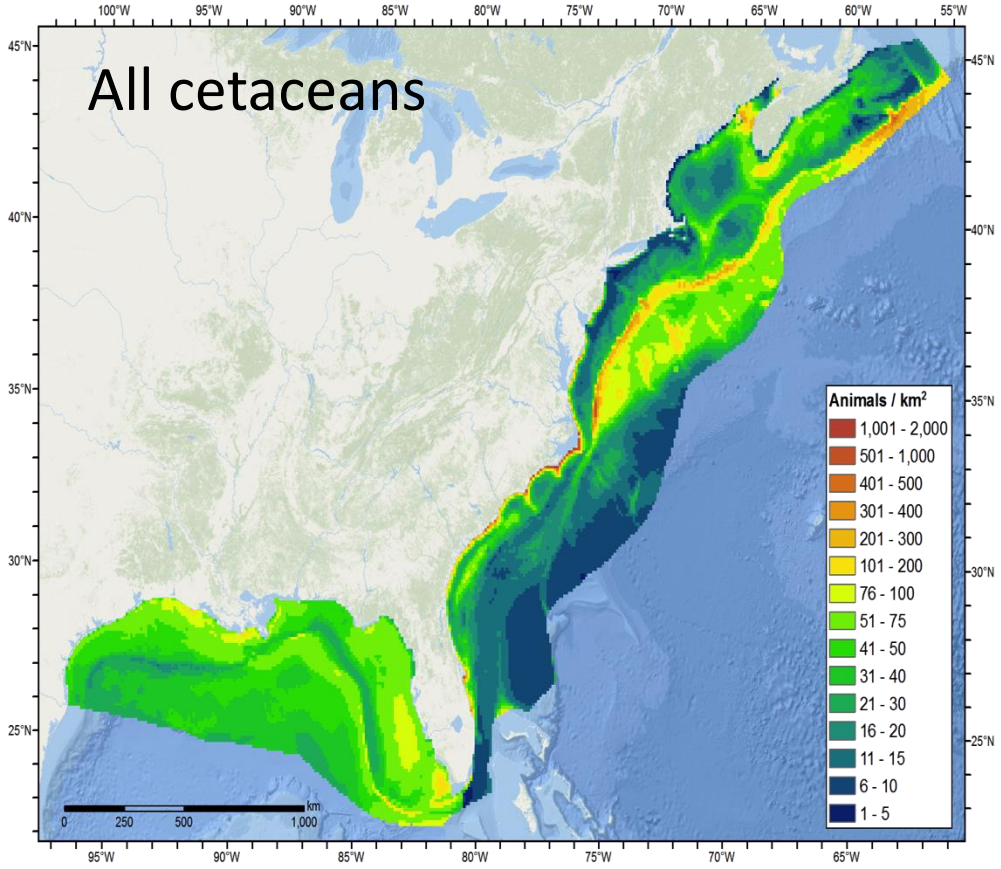
MDAT Scope of Work

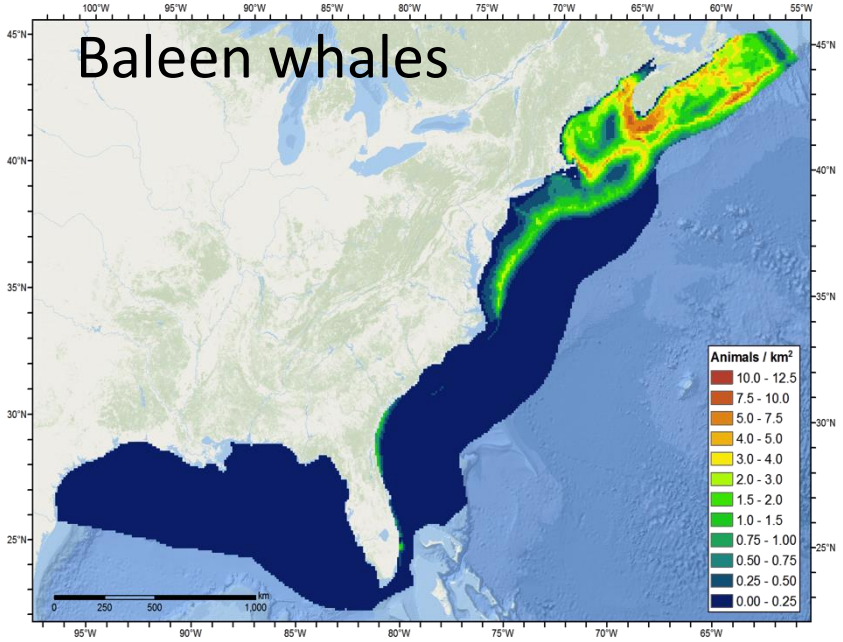


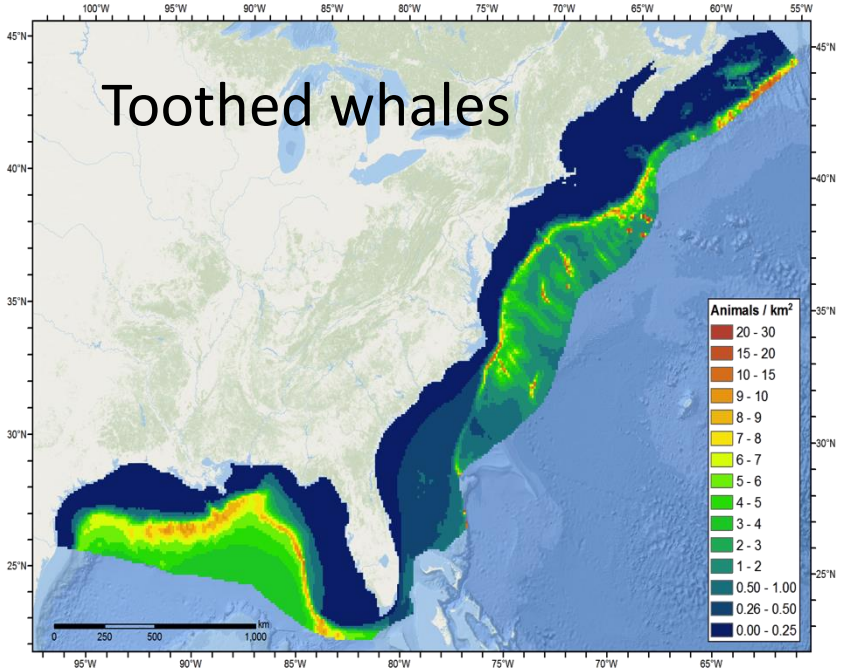
4. **Develop synthetic data products and overlays** to identify preliminary areas of ecological richness across multiple taxonomic groups, including additional habitat considerations



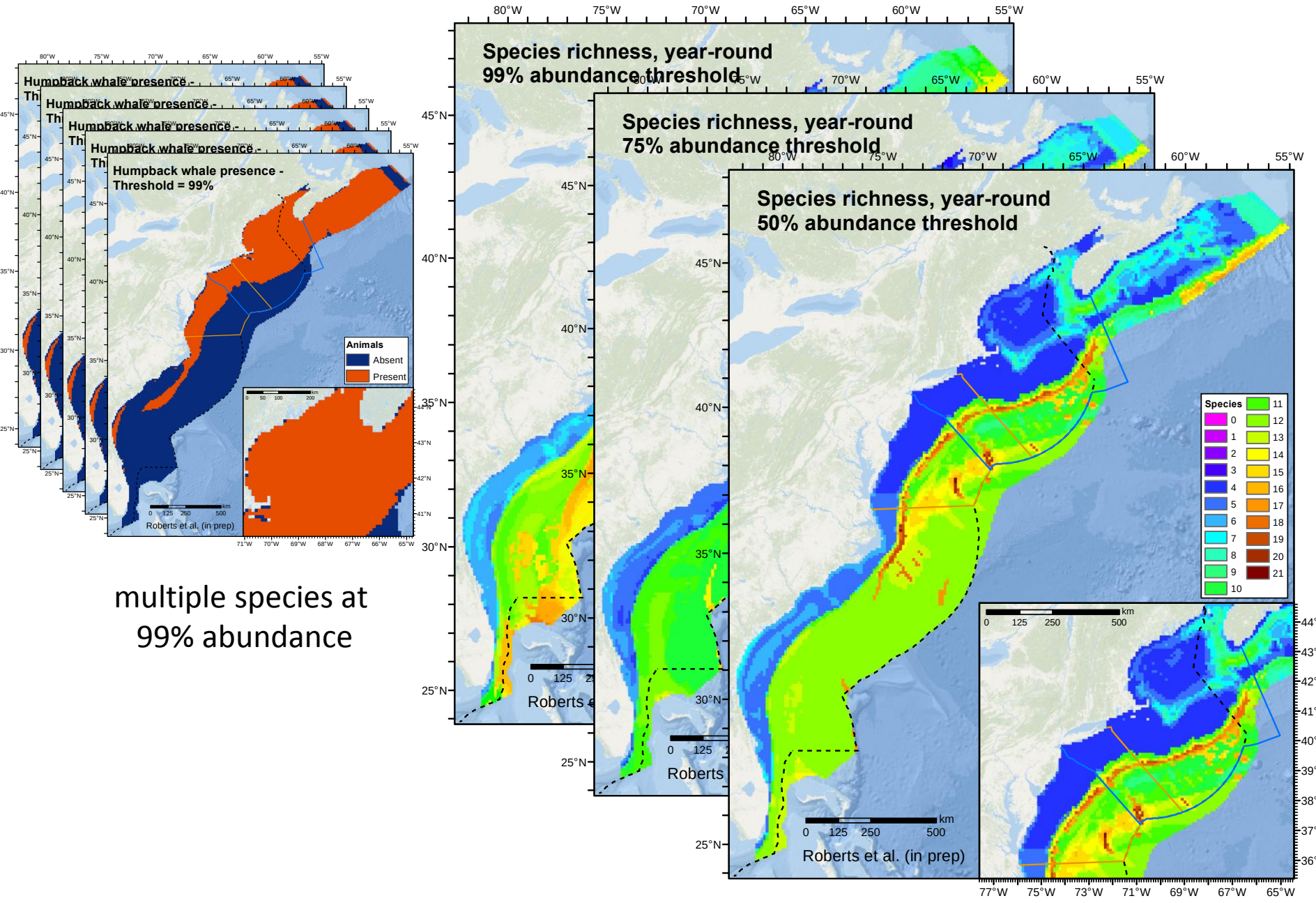
Synthesis products: multi-species abundance:







Ecologically Important Areas: species richness

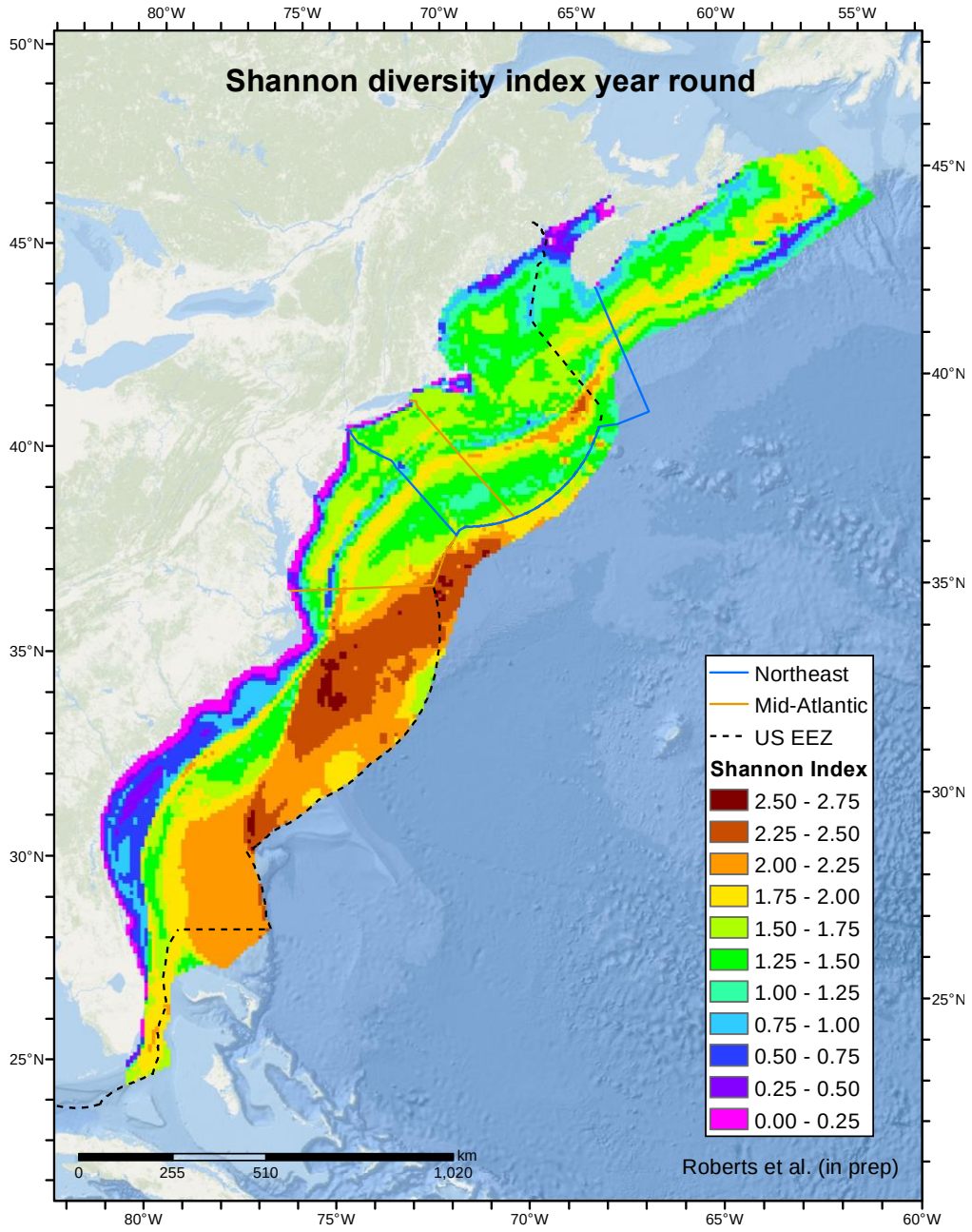


multiple species at
99% abundance

Ecologically Important Areas: species diversity

Shannon Diversity Index

$$H' = -\sum_{i=1}^{R} p_i \ln p_i$$





Overview

- MDAT Team
- Scope of Work
- Timeline & next steps

Timeline summary:

July 2015

- In-person workshop/webinar July 13 with the Mid-Atlantic (Meridian offices, Washington, D.C.)
- Webinar with NMFS Protected Resources Division (Mid-A) regarding Task 3
- Webinar with USFWS (Mid-A) regarding Task 3
- Webinar with NMFS Habitat Conservation Division (Mid-A) regarding Task **3**

August 2015

- Webinar with Northeast RPB representatives to prepare for upcoming in-person workshop

September 2015

- Mid-Atlantic stakeholder workshop to present draft example ecological synthesis products (Sep 21)
- Mid-Atlantic RPB Meeting (September 22-24)

October 2015

- Northeast Stakeholder Forum to review products from Task 3 and progress on Task 4

November 2015

December 2015

- Webinar with Mid-Atlantic to present draft final maps

Questions?


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE


LOYOLA
UNIVERSITY CHICAGO
1870
AD · MAJOREM · DEI · GLORIAM


Marine Geospatial
Ecology Lab
Duke University


NCCOS

MARCO

Mid-Atlantic Regional Council on the Ocean

Mid-Atlantic Regional Human Use Spatial Data Synthesis Project

Kelly Knee (RPS ASA)

Stephanie Moura (SeaPlan)

July 13, 2015

RPS asa

SeaPlan

Vibrant Economies • Healthy Oceans

Project Goals

- Assist MARCO in compiling human use spatial data and developing synthesized data products to advance ocean planning priorities in the Mid-Atlantic region.
- Support decision-makers' consideration of use data through effective coordination among MARCO, Regional Planning Body (RPB) workgroups, and Data Portal Team.
- Ensure credibility by vetting human use data sets, synthesis methods, and spatial data products through MARCO stakeholder engagement.
- Capitalize on feasible opportunities to develop and synthesize use data from the Mid-Atlantic and Northeast to support ocean planning priorities in both regions.
- Complete the project within MARCO's timeframe through effective project management and collaboration with related work.

Human Use Data Synthesis Contractor Team

RPS ASA, SeaPlan, SMEs

Project Manager

Melanie Schroeder Gearon, RPS ASA

Coordination with Related Efforts, Stakeholders, and IJC

SeaPlan

Stephanie Moura - Regional and Stakeholder Coordination

Deerin Babb-Brott - IJC Coordination

Spatial Data Compilation and Synthesis

SeaPlan

Andy Lipsky – Data Inventory/Criteria

Peter Zaykoski – Data Inventory/GIS Analysis/Criteria

Kate Longley-Wood - Data Inventory/GIS Analysis

RPS ASA

Kelly Knee - Data Criteria/Synthesis

Rachel Shmookler – GIS Analysis/Data Synthesis

Zach Singer Leavitt - GIS Analysis/Data Synthesis

Richard Balouskus – Data Synthesis/Ranking Methods

Subject Matter Experts (SMEs)

Dr. Linwood Pendleton
Duke University
Environmental Policy and Economics, Marine Ecosystem Service Assessment and Valuation

Dr. Theresa Goedeke
NOAA NCCOS Biogeography Branch
Human Use of Coastal and Marine Environments

Evan Matthews
Quonset Development Corp
Maritime Commerce/Ports Data Expert

Project Tasks Overview

Project Coordination with Related Efforts and Stakeholders

- Work closely with Project Steering Committee (PSC), members from MARCO, Regional Planning Body (RPB) , and the Data Portal Team
- Coordinate with RPB workgroups (Interjurisdictional Coordination, Data Synthesis, Regional Ocean Assessment)
- Vet human use data sets, synthesis methods, and spatial data products with MARCO stakeholders through SLC and other sector/stakeholder entities

Human Use Data Compilation and Development

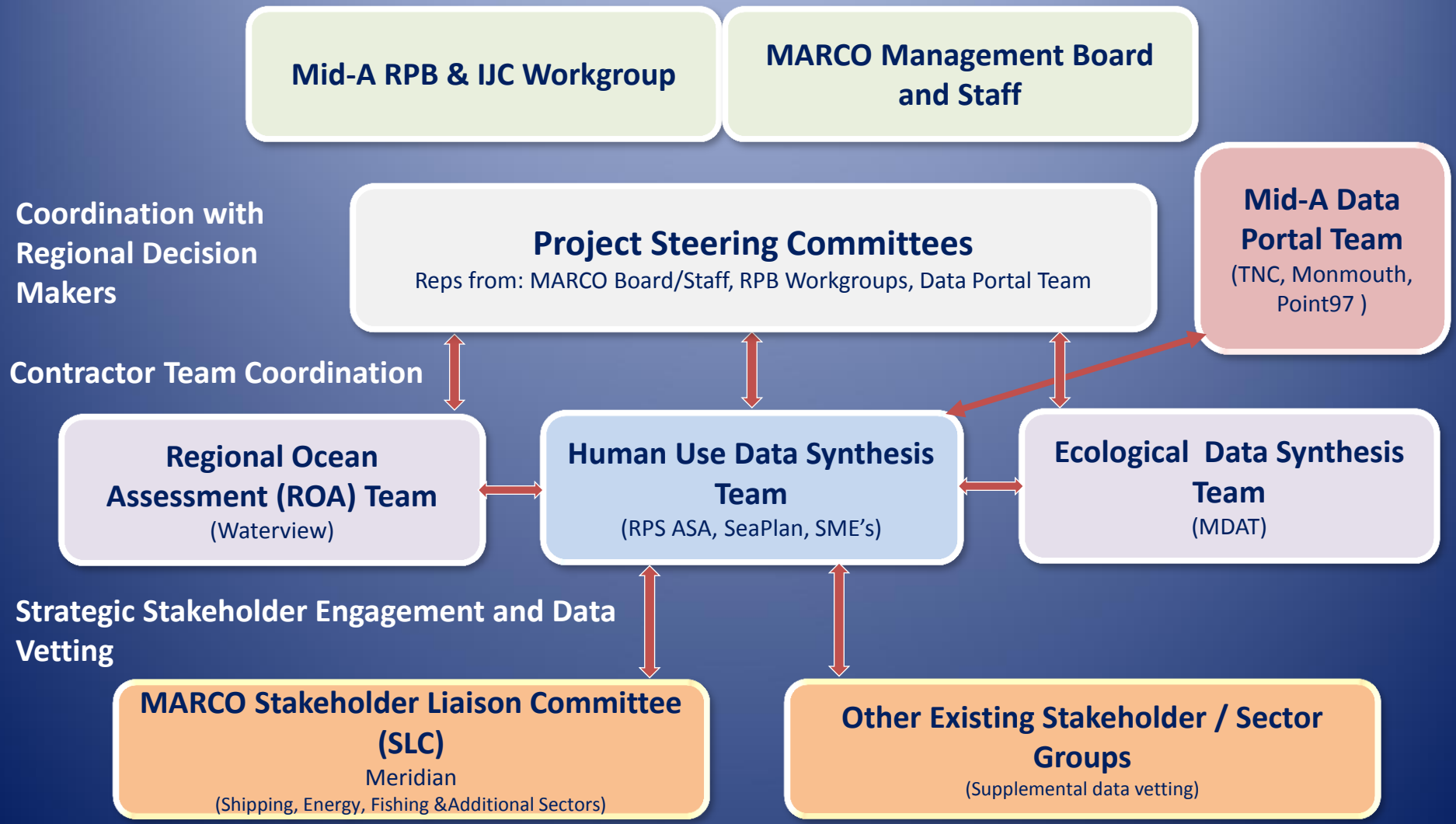
- Develop and vet data prioritization criteria
- Compile existing marine human use spatial data (economic, social, and cultural)

Development of Synthesized Human Use Maps

- Human use data will be synthesized at the activity or "component" level (e.g., fishing, recreation, cultural, energy production, maritime), and at a final level inclusive of multiple components.
- Synthesized data products will:
  - Highlight locations where multiple uses occur,
  - Identify patterns of use intensity, and
  - Illustrate where improved Inter-jurisdictional Coordination (IJC) will benefit ocean health and promote sustainable use.

Final Report and Fact Sheets

Coordination with Stakeholders and Other Efforts (SeaPlan Lead)



Data Compilation and Development (SeaPlan Lead)

Development of Data Prioritization Criteria

Required

- Relevance for Regional Planning
  - Mid-Atlantic Priorities
  - Priorities for Adjacent Planning Initiatives
- Methodological Rigor
  - Type
  - Scale / Information Density
  - Granularity / Precision
  - Collection Method
  - Degree of Certainty
  - Industry / Stakeholder Acceptance

Discretionary

- Data & Metadata Standards
  - Spatial Standards
  - Metadata Standards
  - Use Limitations
  - Synthesizability / Compatibility with Other Datasets
- Geographical Extent
  - Area
  - Uniformity
- Currency
  - Modernity
  - Length of Coverage
  - Seasonality
  - Uniformity

Data Compilation and Development (SeaPlan Lead)

Existing and upcoming MARCO portal data such as:

- Artificial Reefs
- Communities at Sea Commercial Fishing Maps
- Coastal Recreation Surveys
- Maritime layers including Automatic Identification System (AIS)
- Recreational Boating Surveys

Other potential data sources to review and vet:

- US Navy Marine Resource Assessments
- National Ocean Economics Project
- NOAA's Economics National Ocean Watch

Updates to existing portal data and customized or hybrid products:

- More recent AIS data (2013, 2014)
- Fishing Vessel Trip Report (VTR) and Vessel Monitoring System (VMS)

Development of Synthesized Maps

Outline of General Steps:

1. Identify appropriate individual data layers to aggregate at the activity or "component" level (establish data typologies)
2. Normalize/standardize/reclassify individual data layers within a component (e.g., log transform to produce standard deviations, 0-1 scaling)
3. Grid individual data layers to the approved planning area grid dimensions
4. Aggregate individual gridded data layers to create component level synthesis products. Apply a weighting or ranking scheme between individual gridded data layers (if necessary/applicable).
5. Aggregate components to a final synthesized human use product. Apply a weighting or ranking scheme between components (if necessary/applicable).
6. If possible, reclassify values of final human use layer to interpretable categories (e.g., low, medium, high).

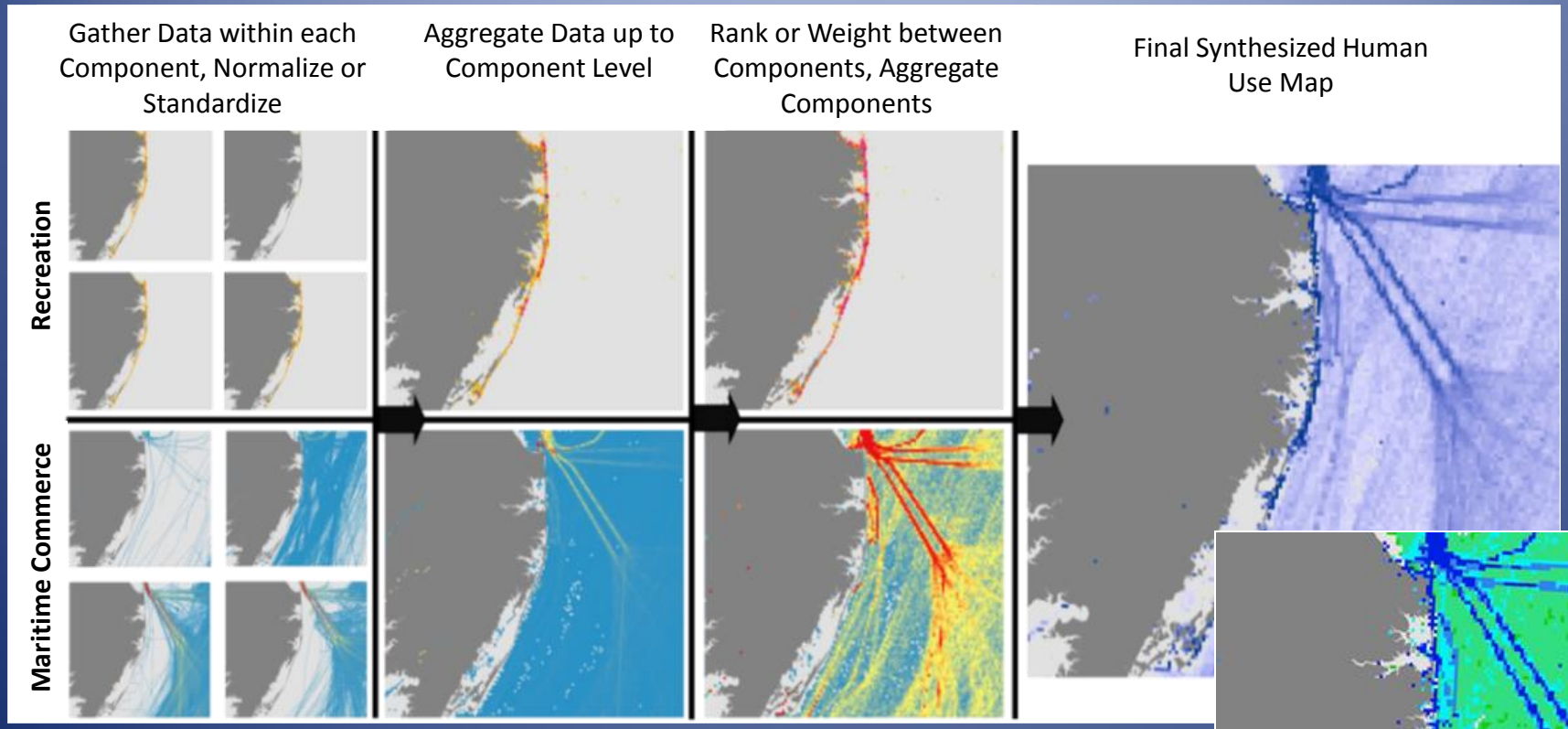
Development of Synthesized Maps

Example Data Typology Table

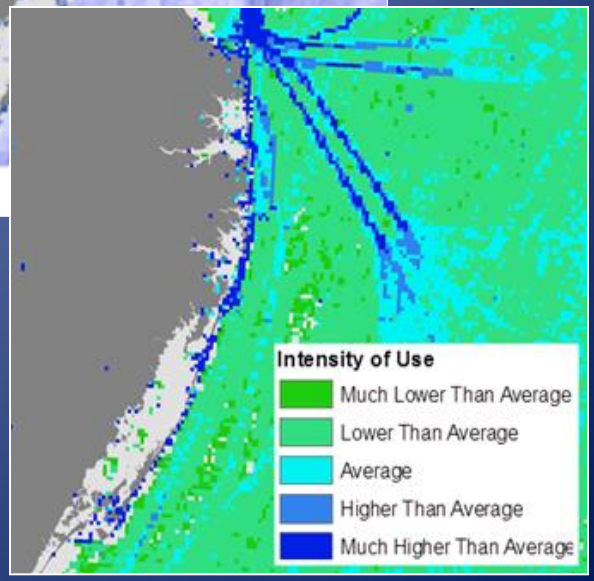
Component product	Individual data products	Source
Maritime	2011-2012 AIS	MARCO
Commerce	2013 AIS	RPS ASA/NOAA
	Shipping Lanes, Pilot Boarding Areas, Anchorages	MARCO
Recreation	PGIS Recreational Fishing	MARCO
	Boater Survey	MARCO
Fishing	Recreational Fishing	MARCO
	Communities at Sea	MARCO
	VMS Commercial Fishing Density	RPS ASA/NROC
	Artificial Reefs	MARCO
Energy	BOEM Planning and Lease Areas	MARCO/BOEM
Infrastructure	Shipwreck Density	MARCO
	Submarine Cables	MARCO
Aquaculture		MARCO
Culture		MARCO
Defense/Security	Department of Defense	Navy

Development of Synthesized Maps

Example Data Synthesis Workflow



Reclassified values of Human Use Intensity



Final Report and Fact Sheets

Final Report:

- Summary of human use data prioritization criteria
- Summary of vetted human use spatial data sets
- Documentation of data gaps
- Summary of Identified potential future human use data
- Data synthesis methods and summary of data products

Fact Sheets:

- The Team will develop clear user-friendly fact sheets for all synthesis products that describe the human use data sets and explains caveats, collection methods, interpretability, and any classification or scaling techniques that were applied.

Project Schedule at a Glance

Project Coordination with Related Efforts and Stakeholders

- July – November 2015 (ongoing throughout project)

Human Use Data Compilation and Development

- July – September 2015

Development of Synthesized Human Use Maps

- Mid-August – November 2015

Final Report and Fact Sheets

- October – December 2015

Project Completion Target: January 1, 2016

Mid-Atlantic Regional Human Use Spatial Data Synthesis Project

Thank You!

RPS asa

SEAPLAN
VIBRANT ECONOMIES • HEALTHY OCEANS

Mid-Atlantic Regional Ocean Assessment

for

MARCO
Mid-Atlantic Regional Council on the Ocean

Peter Taylor
Waterview Consulting

Emily Shumchenia
E&C Enviroscape

July 13, 2015 / Washington, DC

Scopes and methods for information synthesis to support Mid-Atlantic regional ocean planning

Who are we?

Peter Taylor, Waterview Consulting

- 20 years experience in strategic science-based communications to advance ocean and coastal management
- Developed MARCO and NROC (Northeast Regional Ocean Council) websites, designed Northeast Ocean Data Portal
- On the Northeast Ocean Data Working Group

Emily Shumchenia, E&C Enviroscape

- 10 years experience translating marine science into actionable management and policy
- Produced assessment of best available marine life data for Northeast, options for ecological synthesis and measuring ocean health
- Coordinator for NROC Marine-life Data & Analysis Team (MDAT), on Northeast Ocean Data Working Group

Waterview Consulting
waterviewconsulting.com

E&C ENVIROSCAPE
www.eshumchenia.com

Goals

images: MAMFC

Characterize ocean uses and resources in the Mid-Atlantic with a priority focus on two broad ocean planning goals:

- Healthy Ocean Ecosystems
- Sustainable Ocean Uses

Develop an innovative, dynamic, attractive, and easily updated web-based system to deliver the final Regional Ocean Assessment (ROA)report

How?

Gather, integrate, and distill the best available information from publications, data sources, subject-matter experts, and related MARCO projects to characterize:

Biological, chemical, ecological, physical, cultural, economic, and historical conditions of the Mid-Atlantic Ocean

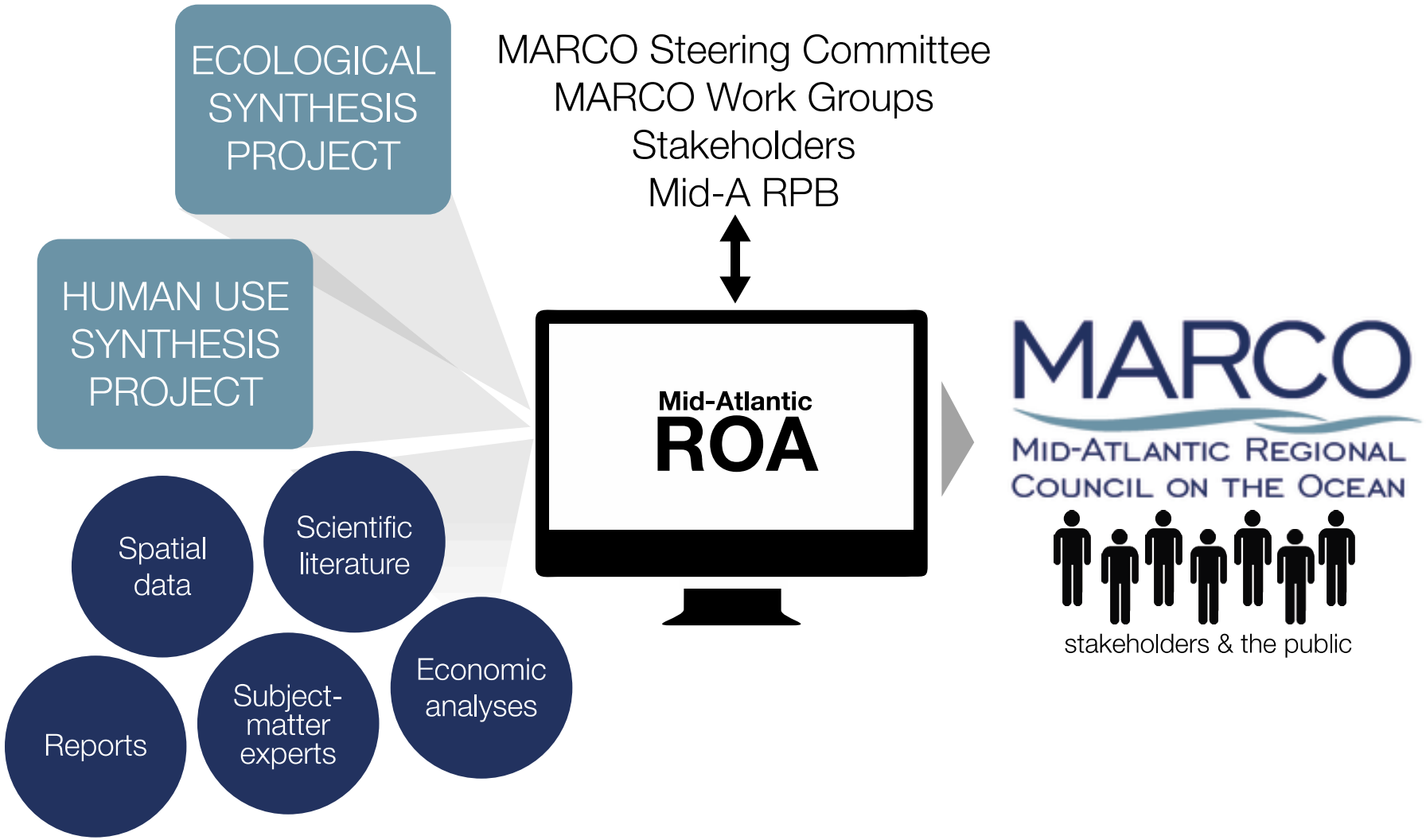
In an accessible digital format that can be revised and updated over time; also suitable for printing

Example data

- The ocean environment
- Habitats
- Marine life
- Reefs
- Beaches, harbors
- Commercial and recreational fishing
- Recreation and tourism

- Coastal population
- Tribal resources
- Ports and cargo
- Marine construction
- Sand management
- Undersea infrastructure
- Ocean energy

Process

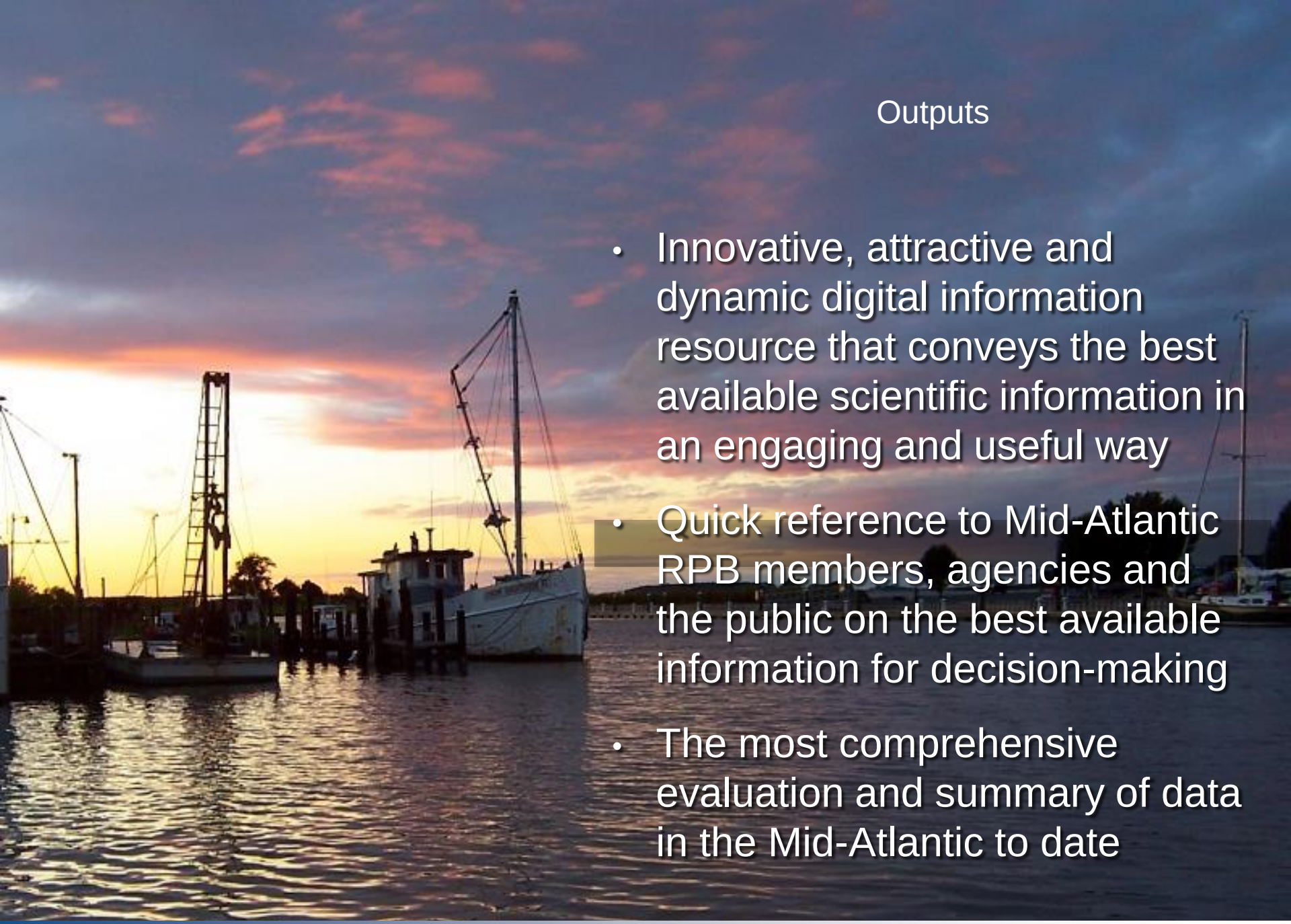

ECOLOGICAL SYNTHESIS PROJECT
HUMAN USE SYNTHESIS PROJECT
MARCO Steering Committee
MARCO Work Groups
Stakeholders
Mid-A RPB
Mid-Atlantic
ROA
MARCO
MID-ATLANTIC REGIONAL COUNCIL ON THE OCEAN
stakeholders & the public
Spatial data
Scientific literature
Reports
Subject-matter experts
Economic analyses

Objectives

- Highlight **relationships and potential linkages** between and among ecosystem features and human uses
- Highlight **knowledge/data gaps** by assessing data using a common framework and metrics
- Suggest appropriate **scales of interpretation**, analysis and application of data for decision-making
- Provide information needed to **jumpstart new synthetic data products** that address ecosystem services valuation, definition of ecologically important areas, cumulative impact analysis and/or vulnerability and resilience assessments

Timeline

	2015						2016	
	June - July	Aug 1	Sept 1	Oct 1	Nov 1	Dec 1	Jan 1	Feb 1
Task 1 - Project planning	▪ Review w/ MARCO & WG: existing data sources, proposed work plan, milestones ▲ Final workplan							
Task 2 - Initial research	▲ **Complete initial research**							
Task 3 - Coordination	< MARCO and WG coordination - monthly or as necessary > ▪ Present at RPB meeting; feedback from stakeholders & RPB ▪ Input/revisions from Steering Committee & RPB work groups							
Task 4 - Develop ROA content	▪ Review/approval of content outline(s) & design concepts ▪ **Revise ROA content/design**							
Task 5 - Final report	▲ Draft ROA report ▪ Review/approval draft ROA ▲ Final ROA report Review/approval of final products ▲							



Outputs

- Innovative, attractive and dynamic digital information resource that conveys the best available scientific information in an engaging and useful way
- Quick reference to Mid-Atlantic RPB members, agencies and the public on the best available information for decision-making
- The most comprehensive evaluation and summary of data in the Mid-Atlantic to date

Questions and comments?

Please feel free to direct any additional questions or comments to the Mid-Atlantic Regional Planning Body at MidAtlanticRPB@boem.gov or MARCO at info@midatlanticocean.org.

MARCO
Mid-Atlantic Regional Council on the Ocean