



# The MiCO System

On April 1st, 2019 the MiCO System launches at the 2nd Intergovernmental Conference on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ).

[Learn more and explore the system](#) 

Leatherback

Long, Lat: 3.58178, -7.94489

Node / Corridor		Desc	Sex	Age	Tag	Type
Leatherback	Migrating	Post-nesting Migration	F	A	PTT	Dist.
Leatherback	Migrating	Post-nesting Migration	F	A	PTT	Dist.

[mico.eco/system](http://mico.eco/system)

Ocean  
Award  
2020

New Study  
on  
Connectivity

What is  
migratory  
connectivity?

**The MiCO  
System**

Management  
implications

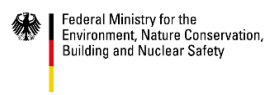
# MiCO IS A CONSORTIUM



Led by



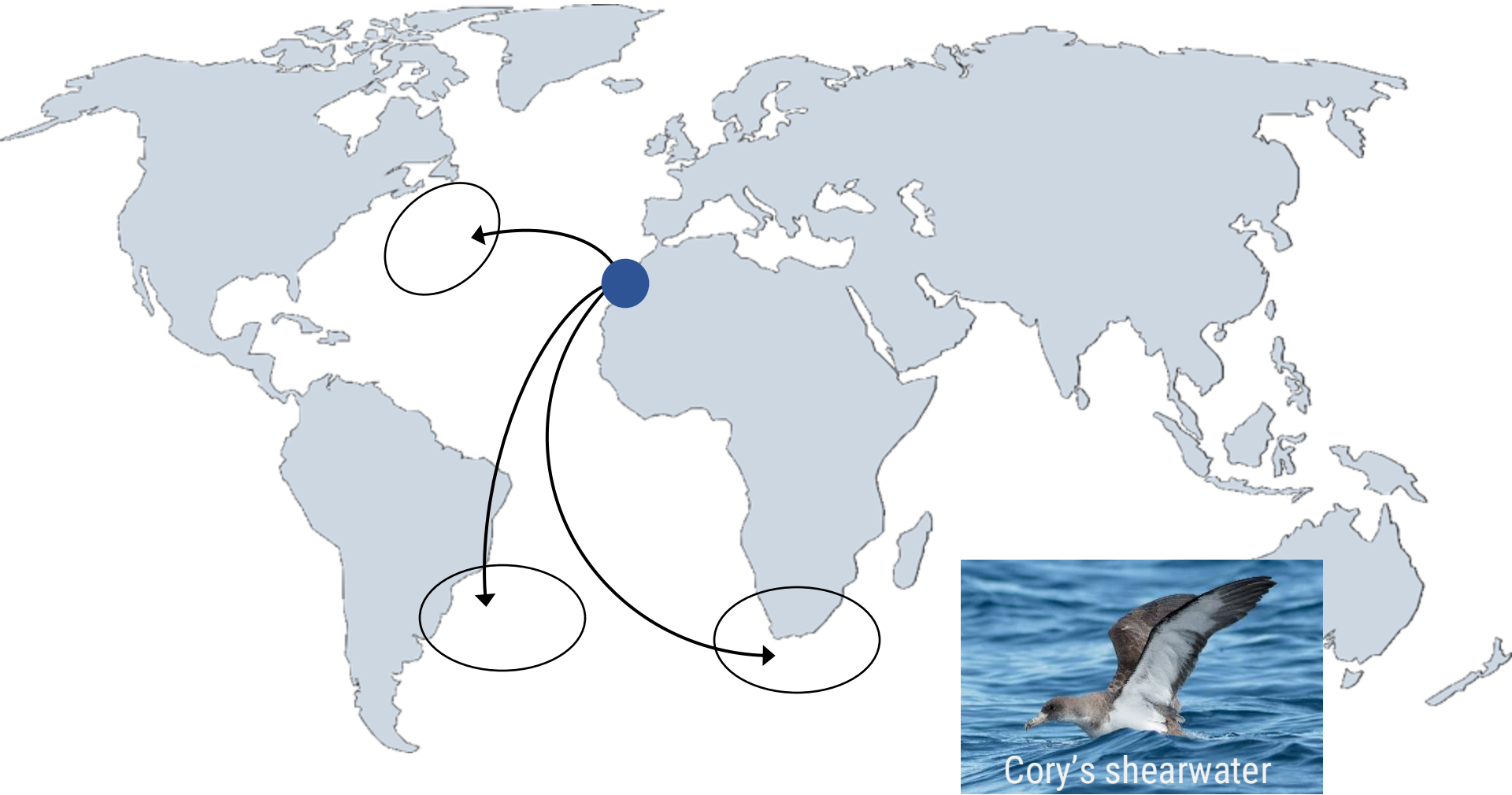
Supported by



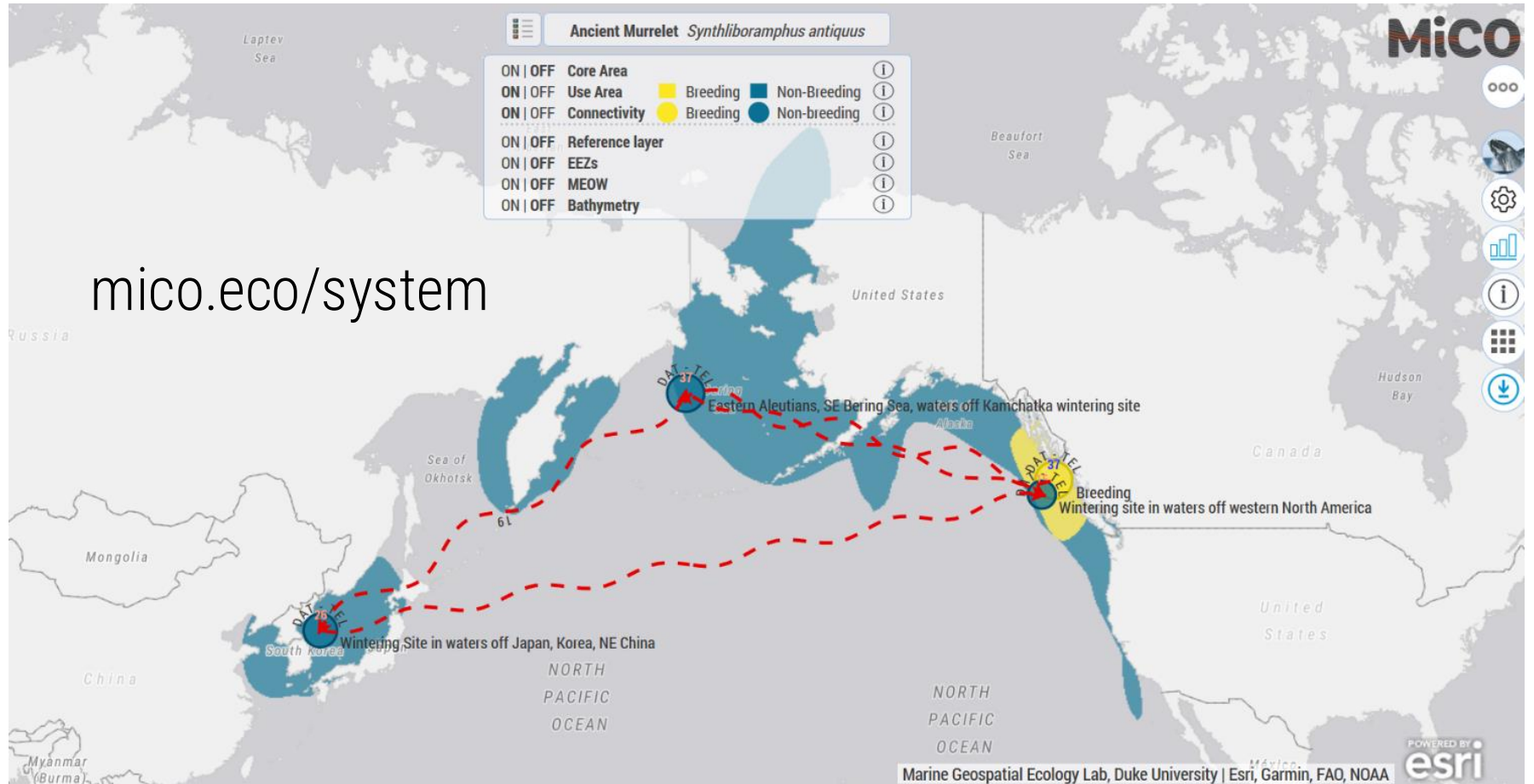
based on a decision of the German Bundestag



# What is Migratory Connectivity?



# The MiCO System



# Usable Knowledge for Industry

## Leatherback Sea Turtles

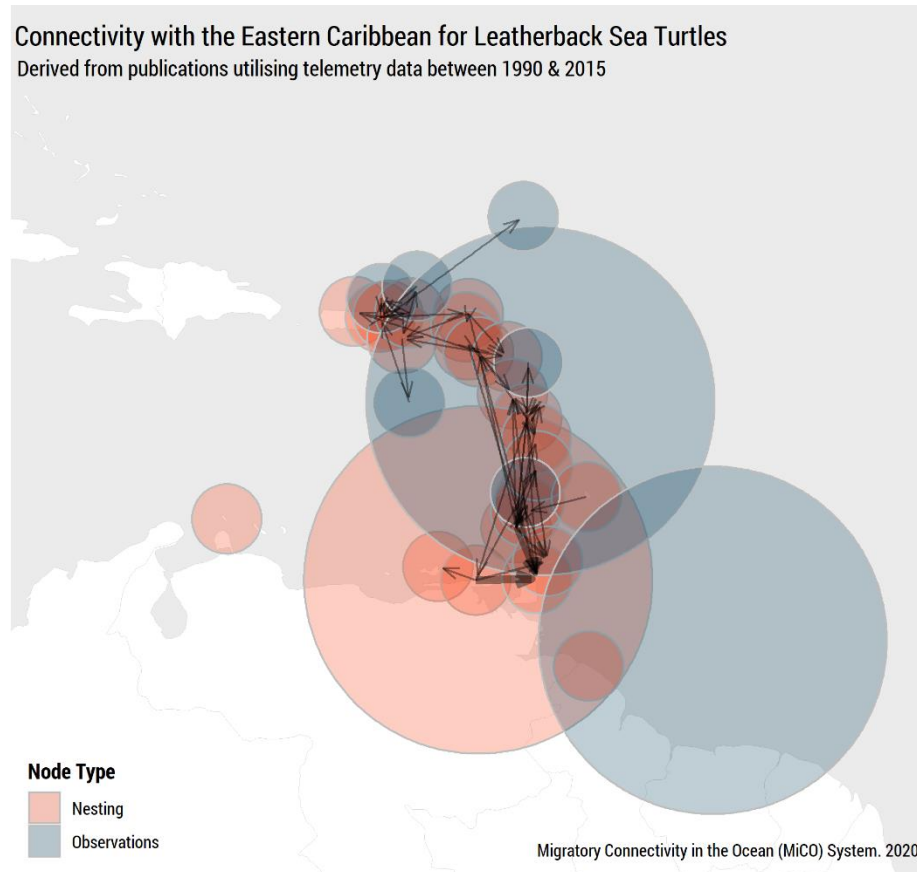


### Raw data

- 96 papers
- 397 sites
- 321 connections

### Synthesized network

- 133 meta-sites
- 205 meta-connections



# Usable Knowledge for Industry

## Leatherback Sea Turtles



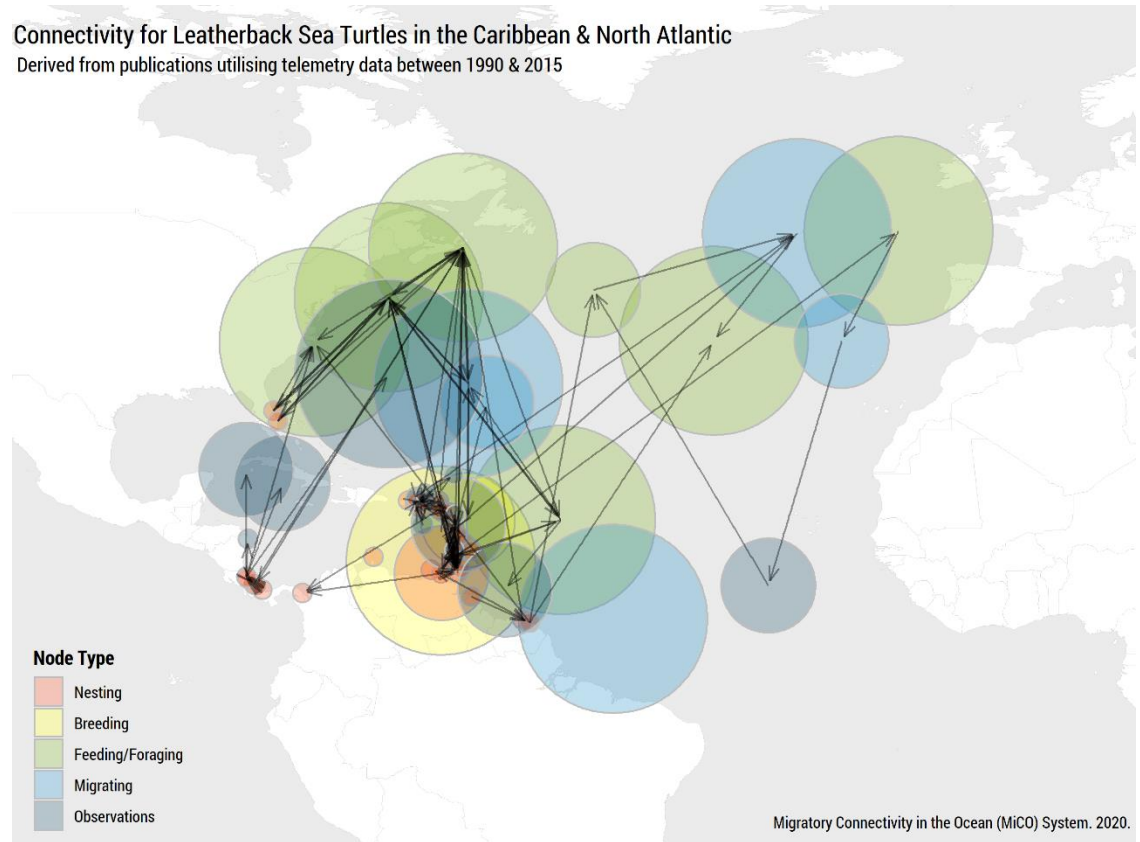
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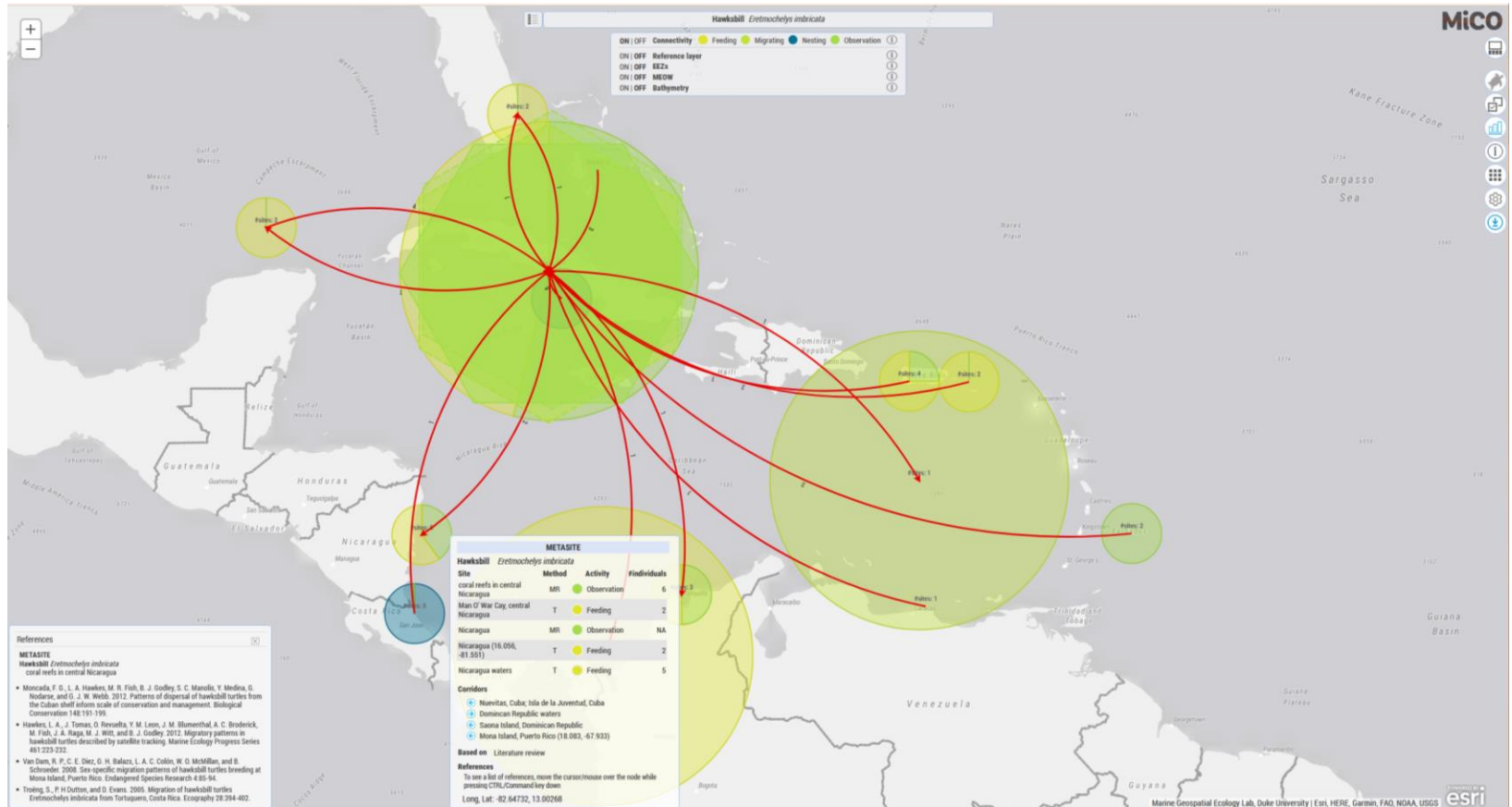
### Synthesized network

- 133 metasites
- 205 meta-connections

Connectivity for Leatherback Sea Turtles in the Caribbean & North Atlantic  
Derived from publications utilising telemetry data between 1990 & 2015



# New Features/Developments



# New features:

- Automated aggregation of lit review information = expedited delivery of new products
- Should have 80+ species in the next 2-3 months
  - Only looking at telemetry papers, more info in papers using mark/recapture, stable isotope, genetic and acoustic sampling methods
  - Hundreds more species to be addressed
- New visualization tools to more easily communicate/investigate the network models
- Ongoing development of download tools for the network model

## Fish (35)

Albacore Tuna  
Atlantic Bluefin Tuna  
Basking Shark  
Bigeye Thresher Shark  
Bigeye Tuna  
Black Marlin  
Blackfin Tuna  
Blue Marlin  
Chilean Devil Ray  
Common Dolphinfish  
Common Thresher Shark  
Dugong  
European Eel  
Giant Manta Ray  
Great Hammerhead  
Great White Shark  
Killer Whale  
Longbill Spearfish  
Longfin Mako  
Pacific Bluefin Tuna  
Porbeagle  
Reef Manta Ray  
Sailfish  
Scalloped Hammerhead  
Shortfin Mako  
Silky Shark  
Skipjack Tuna  
Southern Bluefin Tuna  
Spinetail Devil Ray  
Striped Marlin  
Swordfish  
Wahoo  
Whale Shark  
White Marlin  
Yellowfin Tuna

## Seabirds (16)

Amsterdam Albatross  
Arctic Tern  
Black-browed Albatross  
Black-footed Albatross  
Grey-headed Albatross  
Hawaiian Petrel  
Laysan Albatross  
Light-mantled Albatross  
Northern Giant Petrel  
Short-tailed Albatross  
Sooty Albatross  
Southern Giant Petrel  
Southern Royal Albatross  
Wandering Albatross  
White-chinned Petrel  
Yellow-billed Loon

## MarineMammals (26)

American Manatee  
Atlantic White-sided Dolphin  
Beluga  
Blue Whale  
Bowhead Whale  
Bryde's Whale  
Cuvier's Beaked Whale  
Fin Whale  
Grey Seal  
Heaviside's Dolphin  
Humpback Whale  
Long-finned Pilot Whale  
Narwhal  
North Atlantic Bottlenose Whale  
North Atlantic Right Whale  
North Pacific Right Whale  
Pantropical Spotted Dolphin  
Polar Bear  
Risso's Dolphin  
Sei Whale  
Short-beaked Common Dolphin  
South American Fur Seal  
South American Manatee  
Southern Right Whale  
Sperm Whale  
White-beaked Dolphin

## SeaTurtles (all 7)

Flatback  
Green  
Hawksbill  
Kemp's Ridley  
Leatherback  
Loggerhead  
Olive Ridley



# Future Directions

## Uptake by Google/Global Fishing Watch

- Identify connectivity between MPAs, and between MPAs and extractive activities

## Uptake by SeaBoS (major fishing corporations)

- Identify biodiversity hotspots for threatened migratory species

## Co-develop proposals for industry-academia collaborations (e.g., ARC Linkage grant)

- Test in EIA and siting workflows



# Thanks!

**Daniel Dunn**

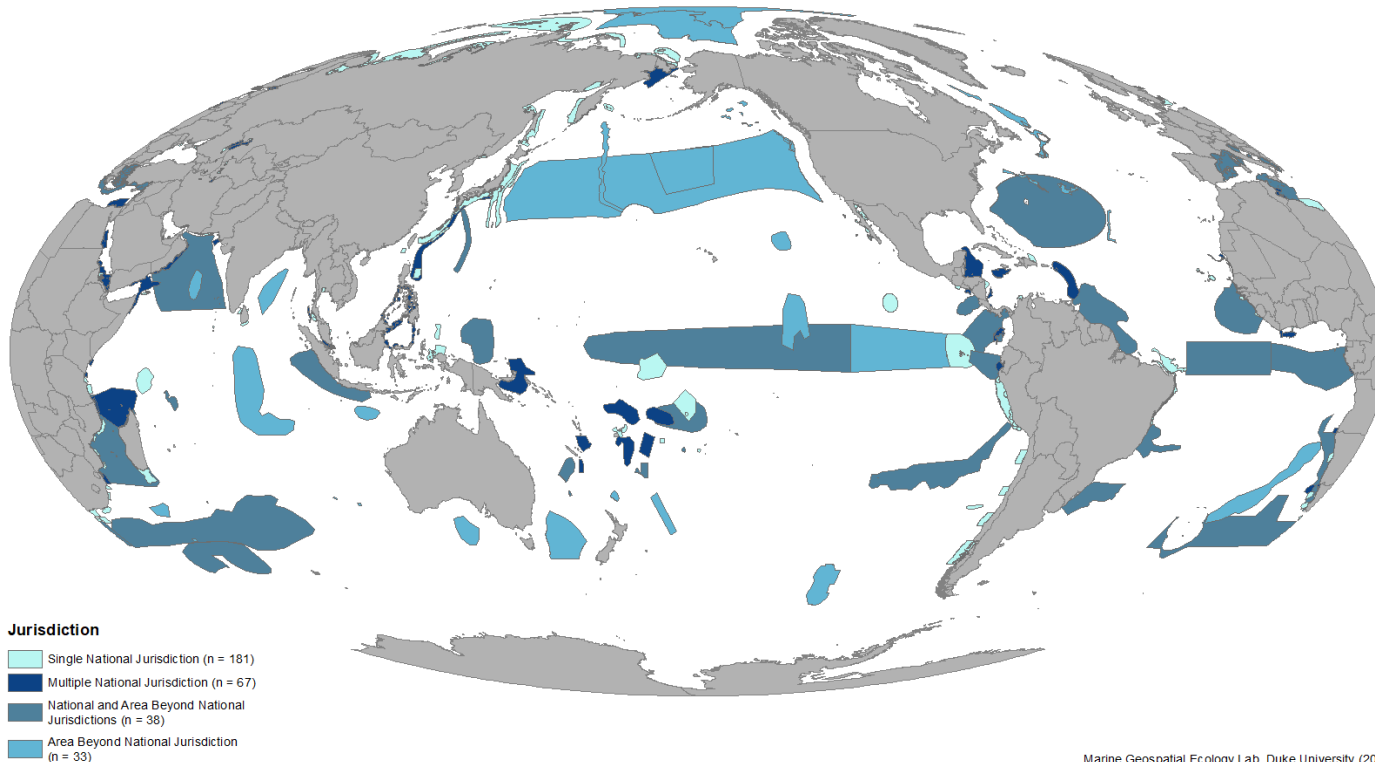
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School of Earth and Environmental Sciences  
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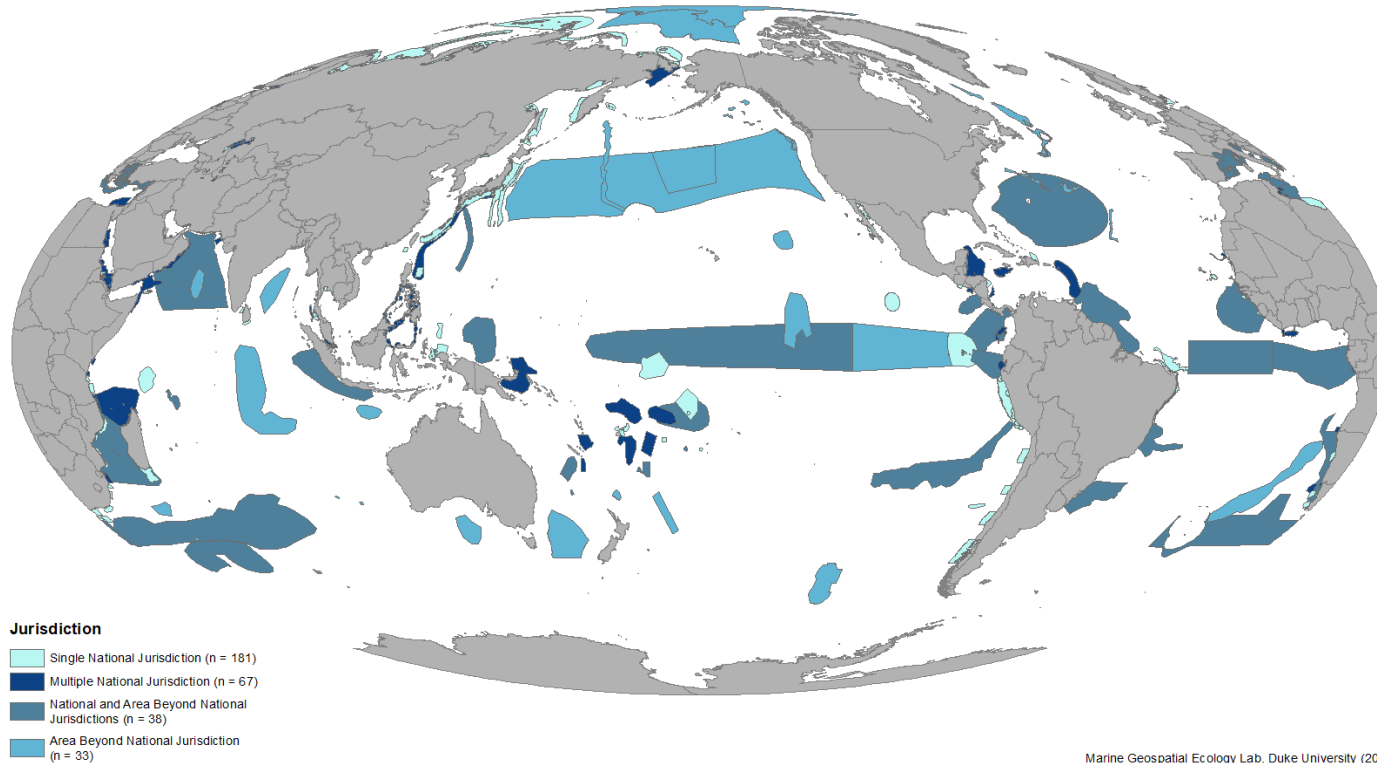


Marine Geospatial Ecology Lab, Duke University (2018)

# EBSAs: Ecologically or Biologically Significant Areas

Proteus Data Forum on Marine Environmental Screening:  
22 April, 2021

Patrick N Halpin  
Marine Geospatial Ecology Lab  
Duke University, USA

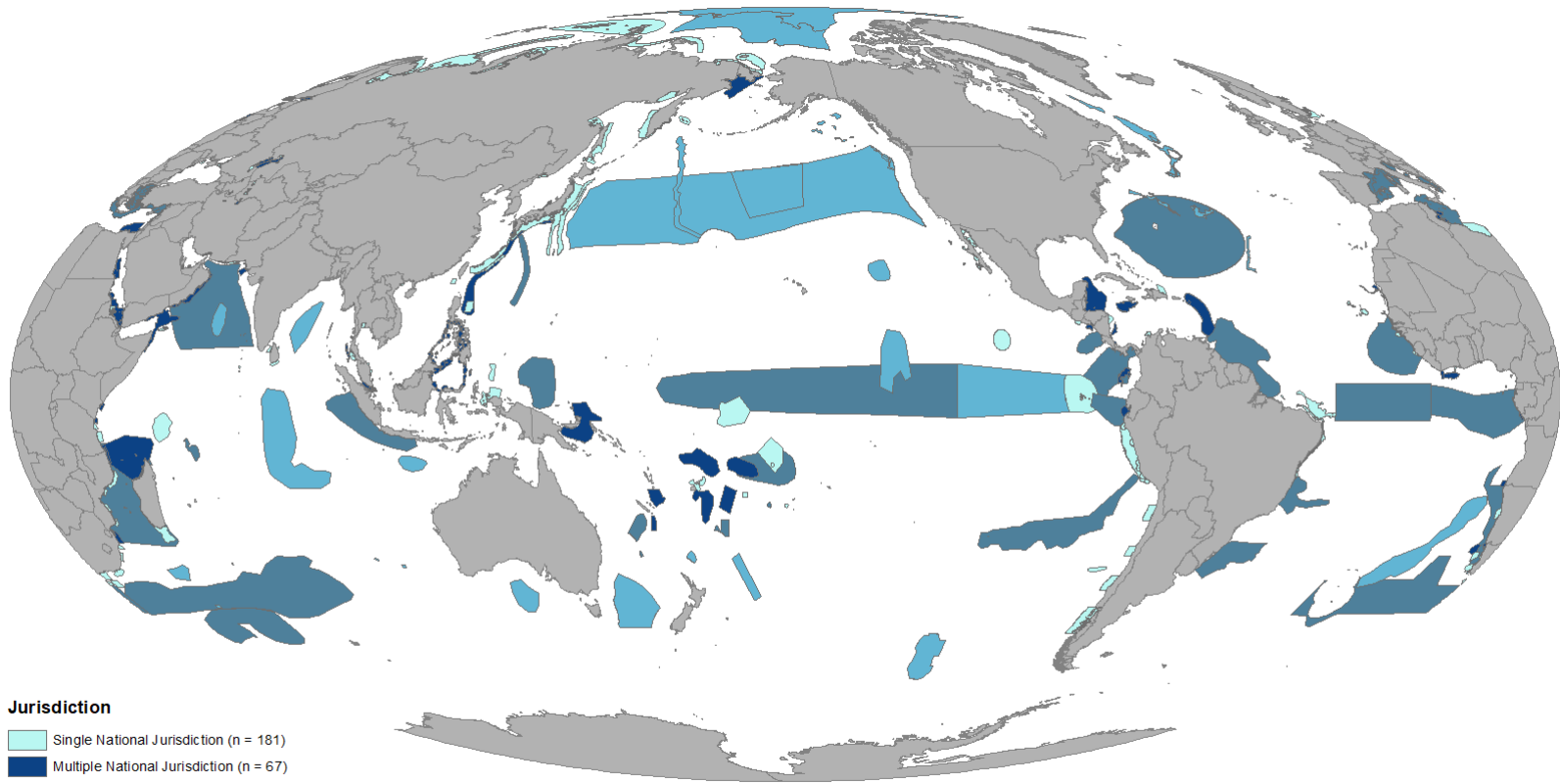


# EBSAs: Ecologically or Biologically Significant Areas

- 
- Overview of the dataset
  - New features/developments
  - Future direction
  - Relevance to Proteus Partners

# Overview of the dataset

## EBSAs are expert described important areas (...not a scientific “database” *per se*)



### Jurisdiction

- Single National Jurisdiction (n = 181)
- Multiple National Jurisdiction (n = 67)
- National and Area Beyond National Jurisdictions (n = 38)
- Area Beyond National Jurisdiction (n = 33)

# Ecologically or Biologically Significant Areas (EBSAs) are...

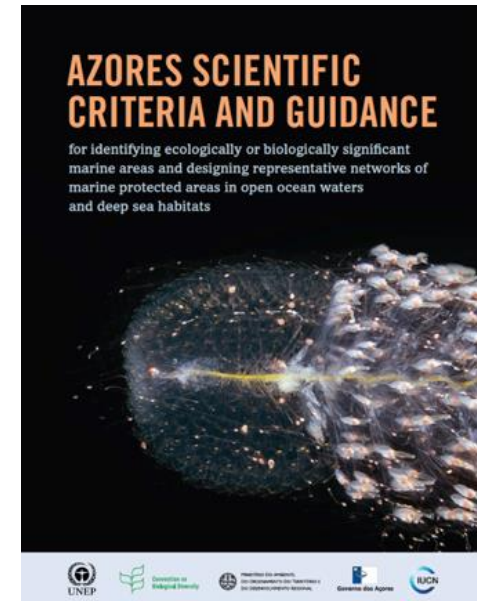
A synthesis of best available scientific and technical information to support expert scientific judgment on areas meeting the EBSA criteria



A regional *scientific expert* process

## EBSA Criteria (Decision IX/20 Annex I)

- Uniqueness or rarity
- Special importance for life history of species
- Importance for threatened, endangered or declining species and/or habitats
- Vulnerability, fragility, sensitivity, slow recovery
- Biological productivity
- Biological diversity
- Naturalness



2008 COP9



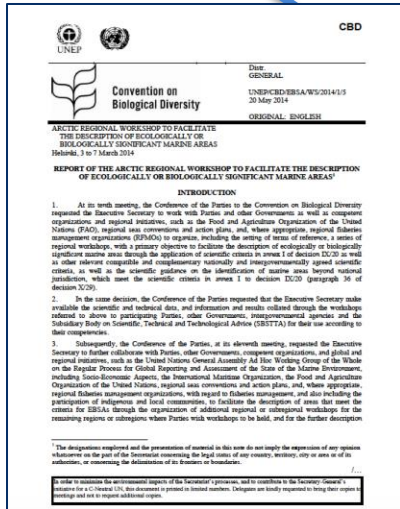
# Workshop Process

*Two ways data enter the process*

Submissions of potential areas meeting EBSA criteria

Compilation of scientific data & information

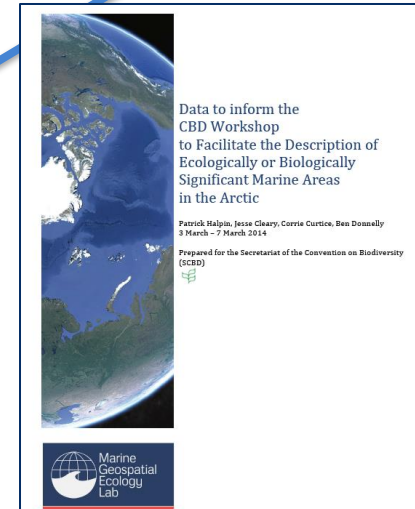
Analysis & interpretation required



Workshop description of areas meeting EBSA criteria

Adoption of workshop report

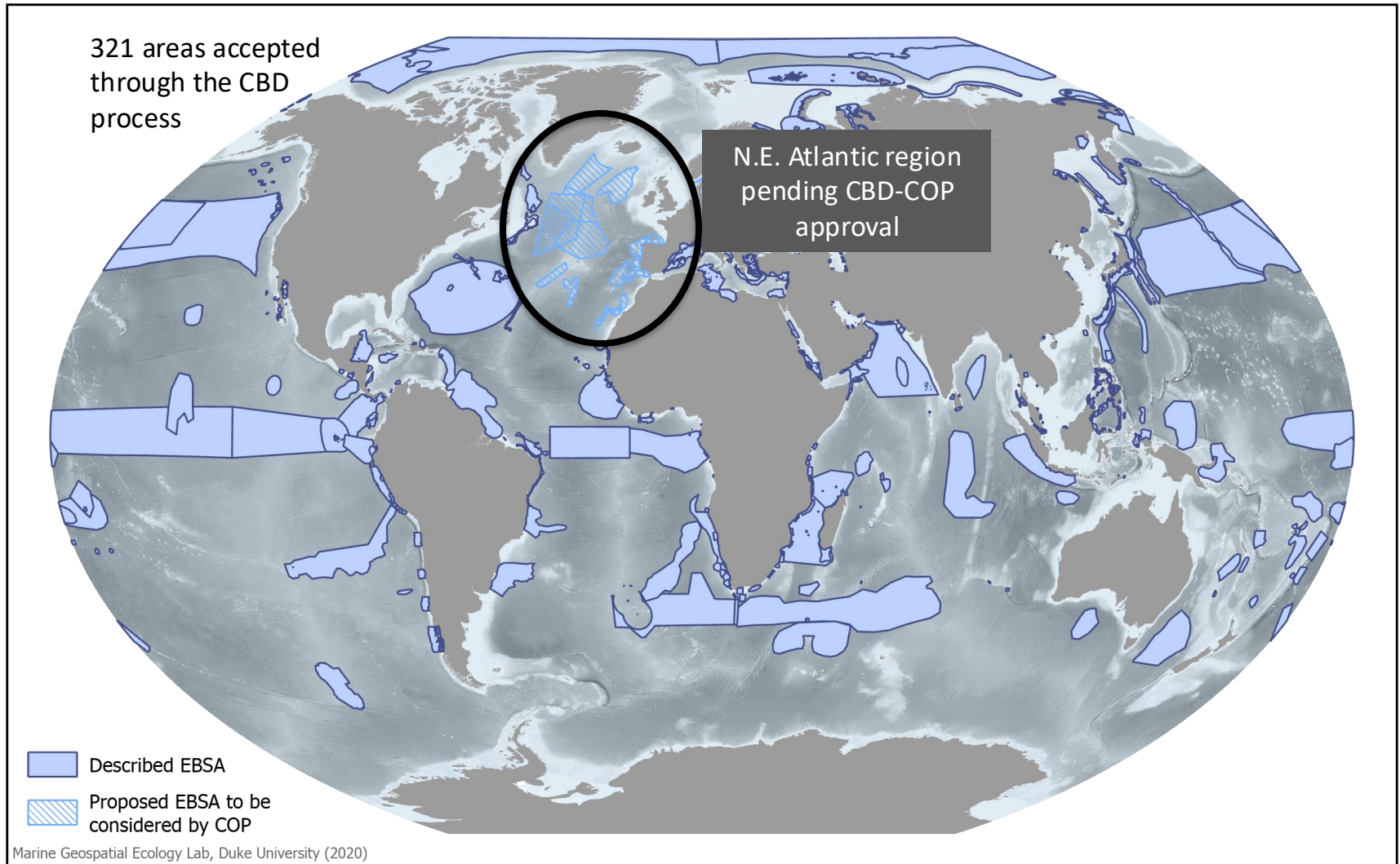
Final report



*Regional expertise & knowledge*

*General scientific data*

# New Developments: 338 EBSAs currently described



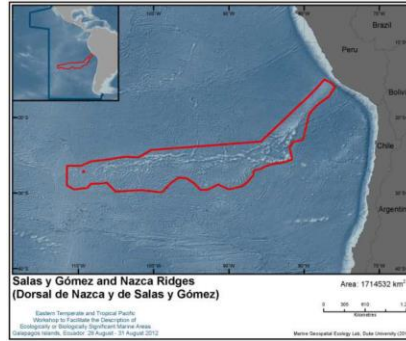
# Importance of classifying types of EBSAs

- Classifying EBSAs into types helps add **precision to their definition and monitoring**
- Classifying EBSAs into types helps us better understand what **tools and technologies are needed to monitor** the ecological condition and human uses at these sites

Type 1: static features



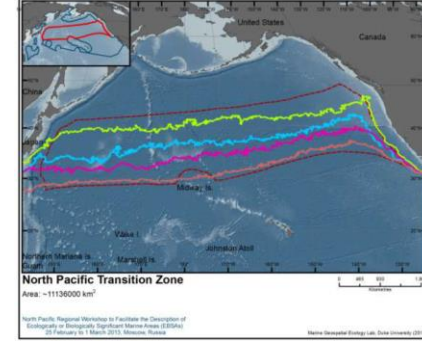
Type 2: groups of features



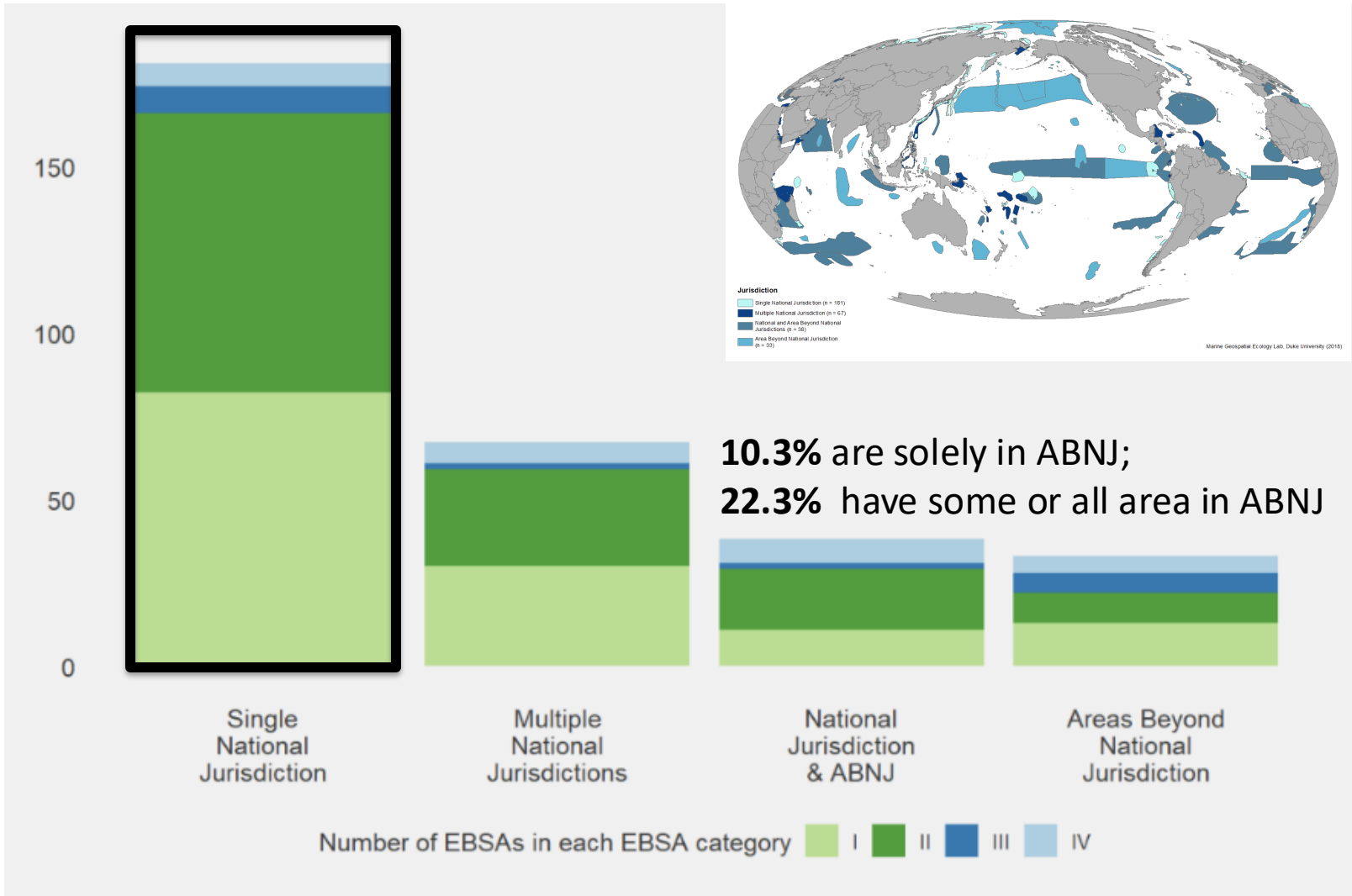
Type 3: ephemeral features



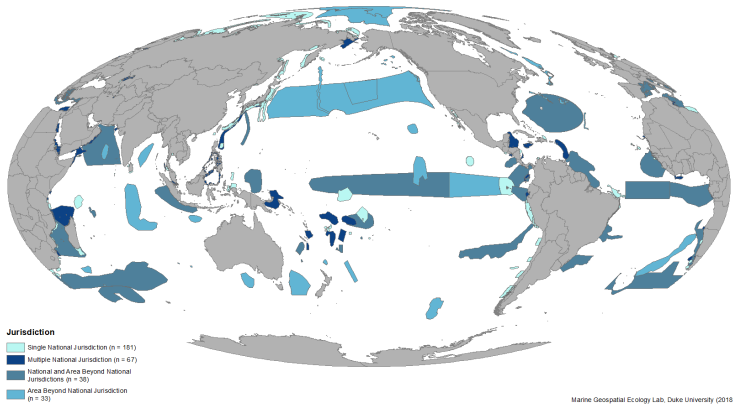
Type 4: dynamic features



# EBSA jurisdictional distribution frequency

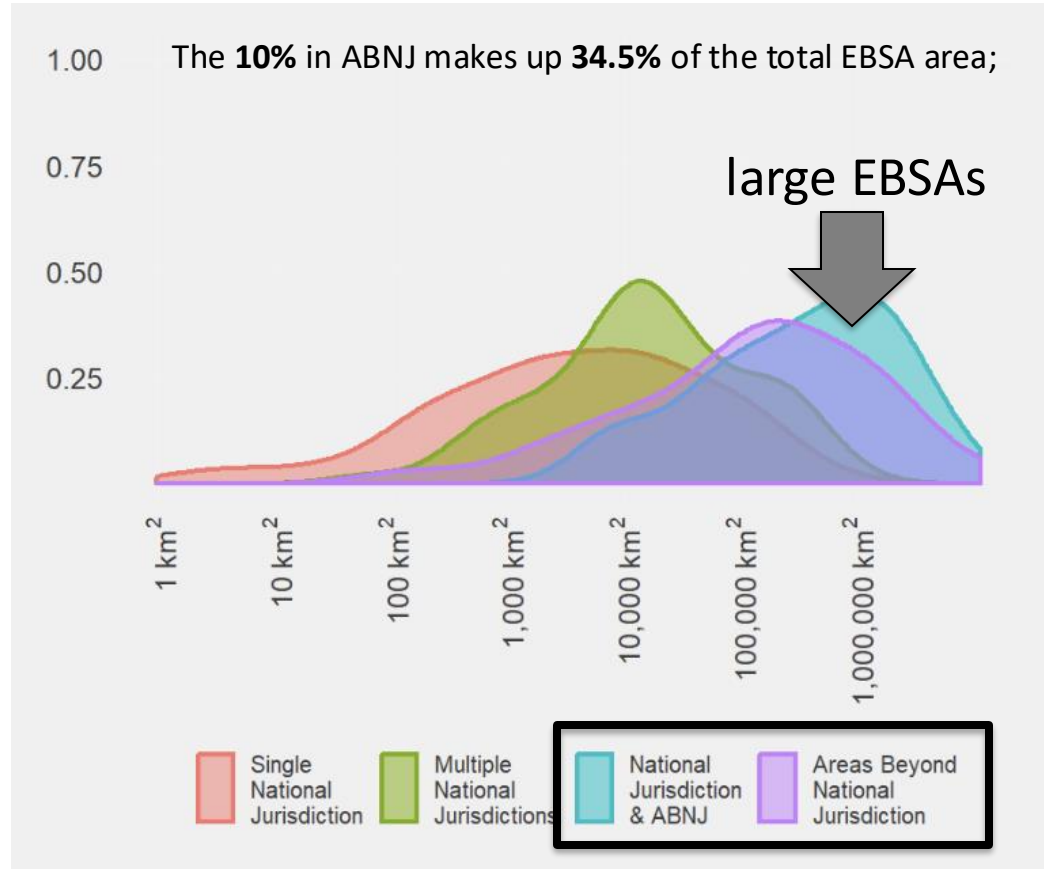


# EBSA jurisdiction & size distribution

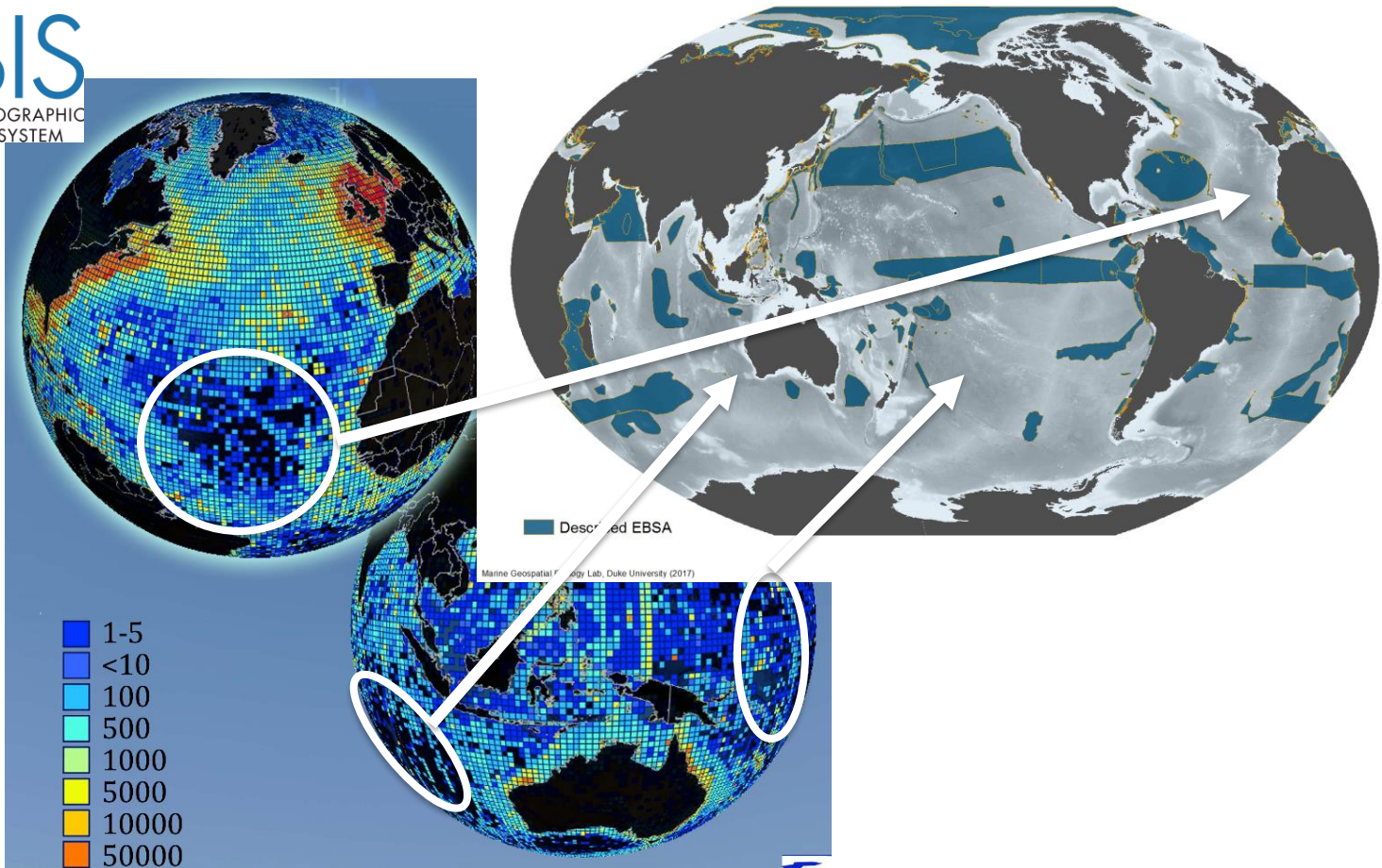


## Jurisdiction

- Single National Jurisdiction (n = 181)
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# Data available to the EBSA workshop is not uniform



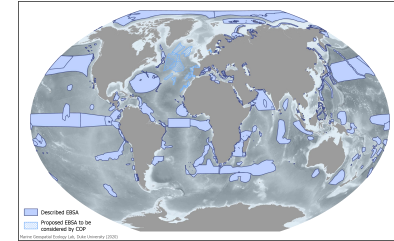
(Berlin EBSA next steps meeting, December 2017)

## **Future Directions:**

### **Identifying the scientific needs for updating EBSA descriptions**

- New data has become available;
- New regional expertise & knowledge has been identified;
- New analysis methods have been identified
- New EBSA classifications or categories have been promulgated;
- Spatial gaps need to be filled;
- Taxonomic (species) gaps need to be filled;
- Regional workshop edge-matching identifies gaps;
- Sufficient time has passed that an update appears to be prudent;
- Significant environmental change;
- Consideration of Annex II network criteria (representativity, connectivity...)
- ....

# Relevance to Proteus Partners



- EBSAs do not prescribe management actions, but...;
- Many EBSAs do represent existing management areas;
- EBSAs can provide regional & global scale description of important features and species use areas;
- EBSAs may identify fixed areas, collections of areas, temporally ephemeral features and spatially dynamic features;
- EBSA workshop reports can be used to identify the criteria used for description as well as the scientific justification;
- The network of EBSAs will require updates and re-evaluation as new data and information become available.

# Discussion

