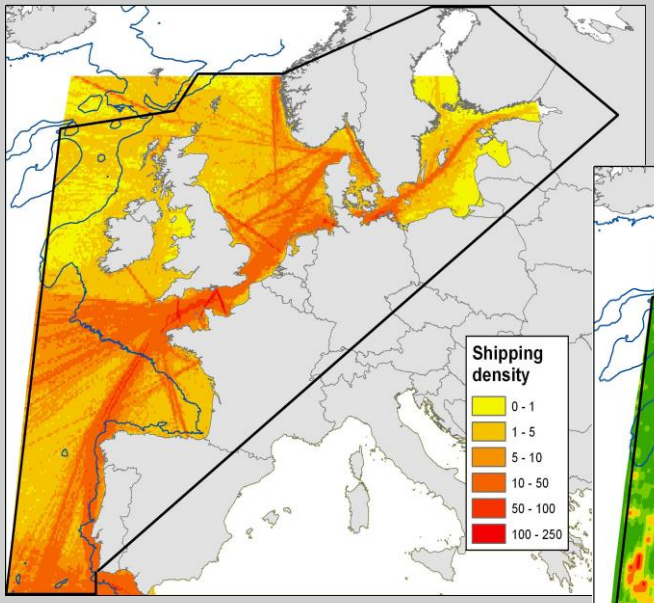
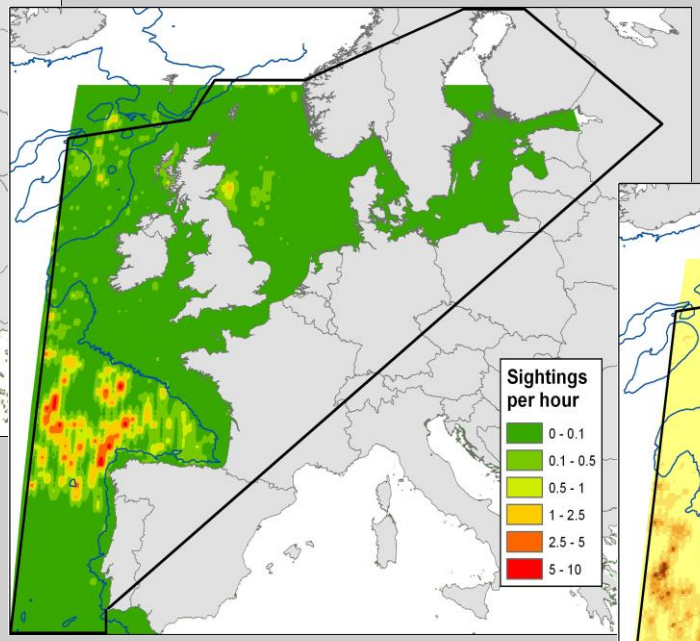
Area-based Measures for Mobile Species

Peter G.H. Evans &
Giuseppe Notarbartolo di Sciara

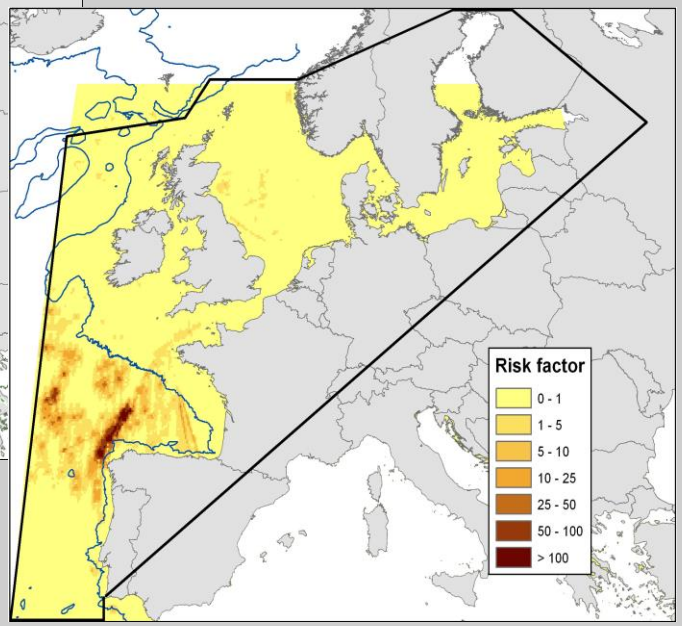
SHIPPING ACTIVITY & COLLISION RISK IN NORTHERN EUROPE



a) Shipping Density



b) Whale Density

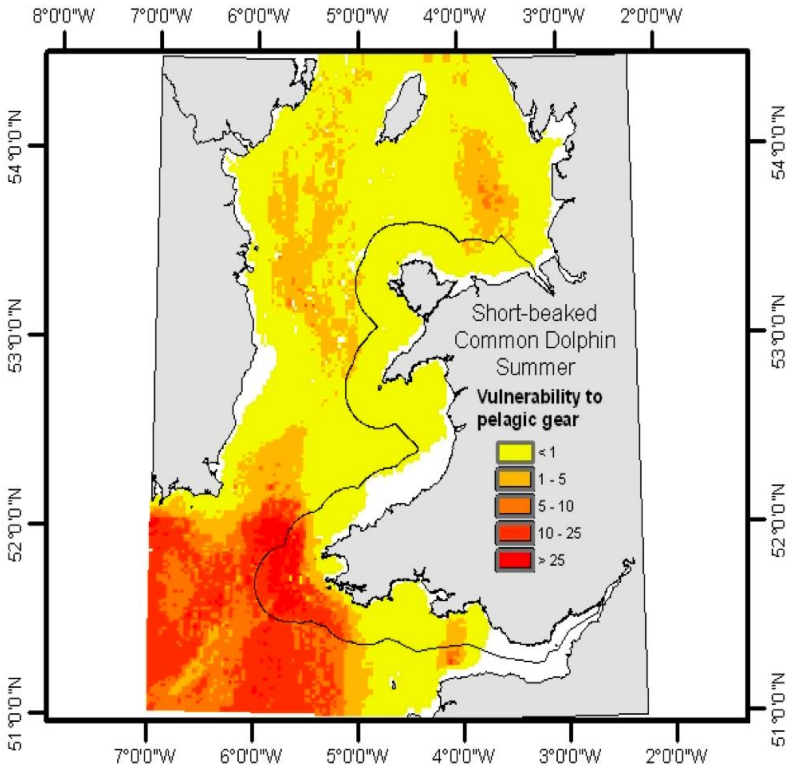


c) Collision Risk

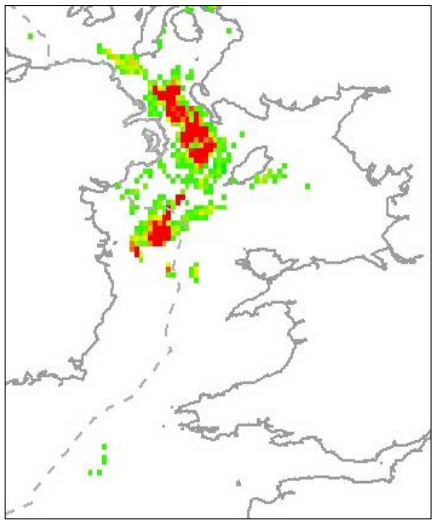
Source: Evans & Baines (2011)

RISK MAPS: COMMON DOLPHINS IN THE IRISH SEA

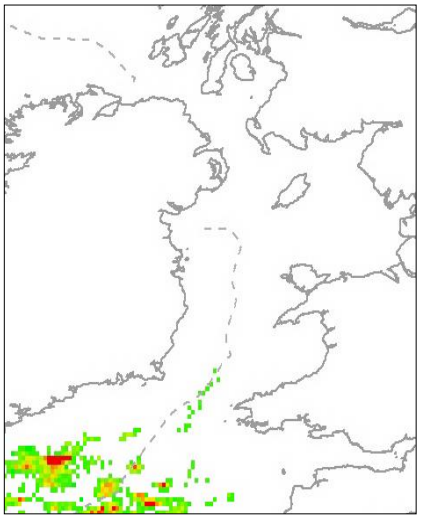
a) Vulnerability to bycatch in pelagic trawls



b) Distribution of fishing effort from VMS data



Pelagic trawls



Gill nets

• The map on the left takes predicted densities from surveys and incorporates a biosensitivity weighting that includes life history parameters & conservation status as well as known susceptibility to bycatch from these particular fishing gears

Area-based measures require identification of locations important to cetaceans, where human activities would have a particularly negative impact upon populations

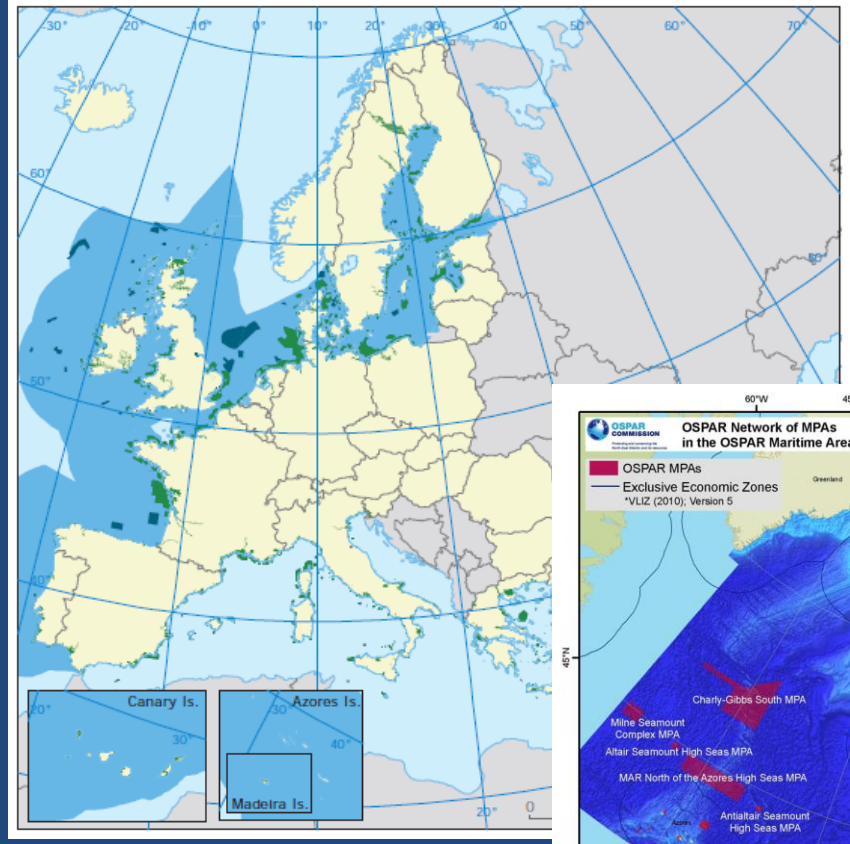
The question is:
Can that best be achieved by establishing an MPA or to track human activities likely to have negative impacts and apply mitigation measures accordingly?

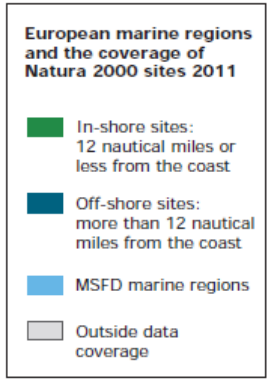
Almost all management measures have a spatial component; resources are always limited so need to focus on high risk areas

MPAs as “Spatial Management”

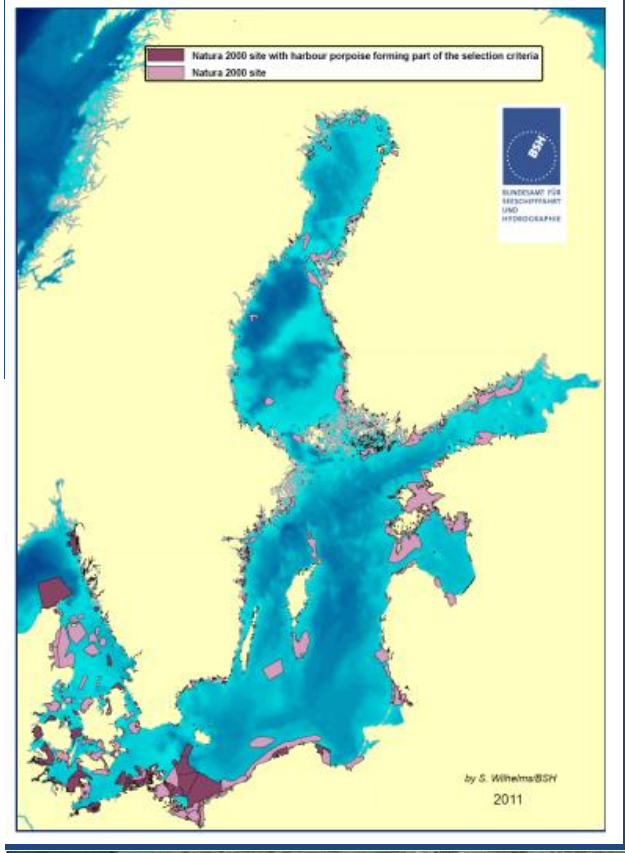
The US National Marine Sanctuary System

HABITATS DIRECTIVE

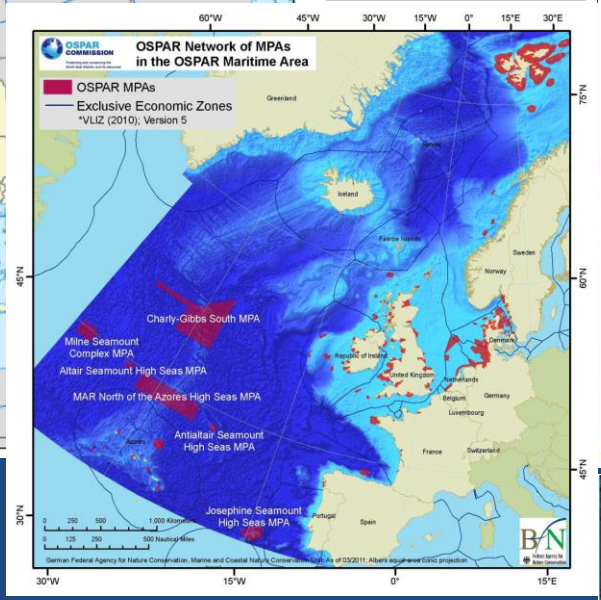




HELCOM



OSPAR



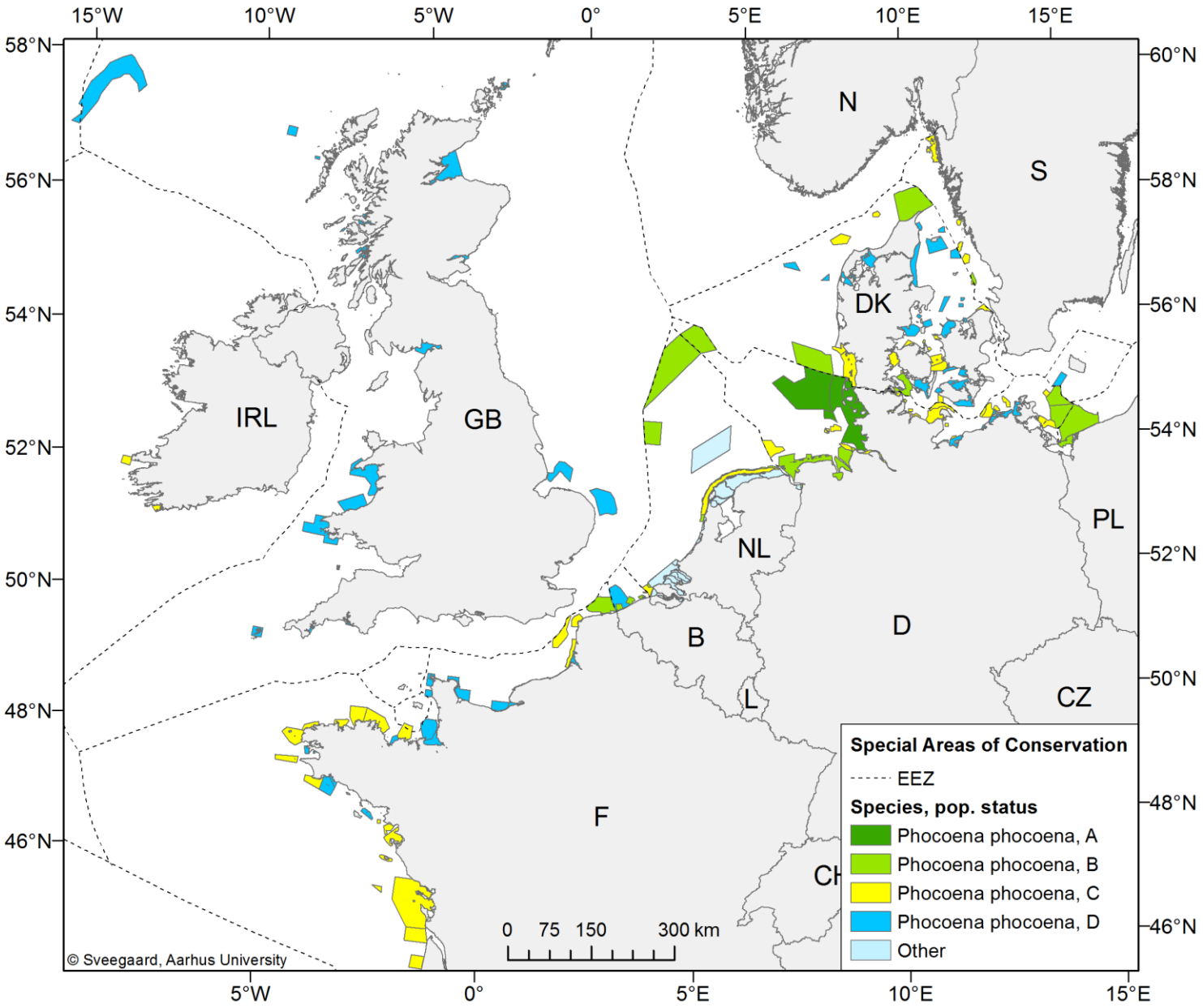
BARCELONA CONVENTION

Key principles of Natura 2000

- Conservation of species & habitats across entire natural range in EU - irrespective of political boundaries
- Site selection is exclusively scientific
- Sites have strong legal protection
- Not a system of nature reserves – management in collaboration with stakeholders
- Promotes sustainable development : new activities or development affecting N2000 are not automatically excluded

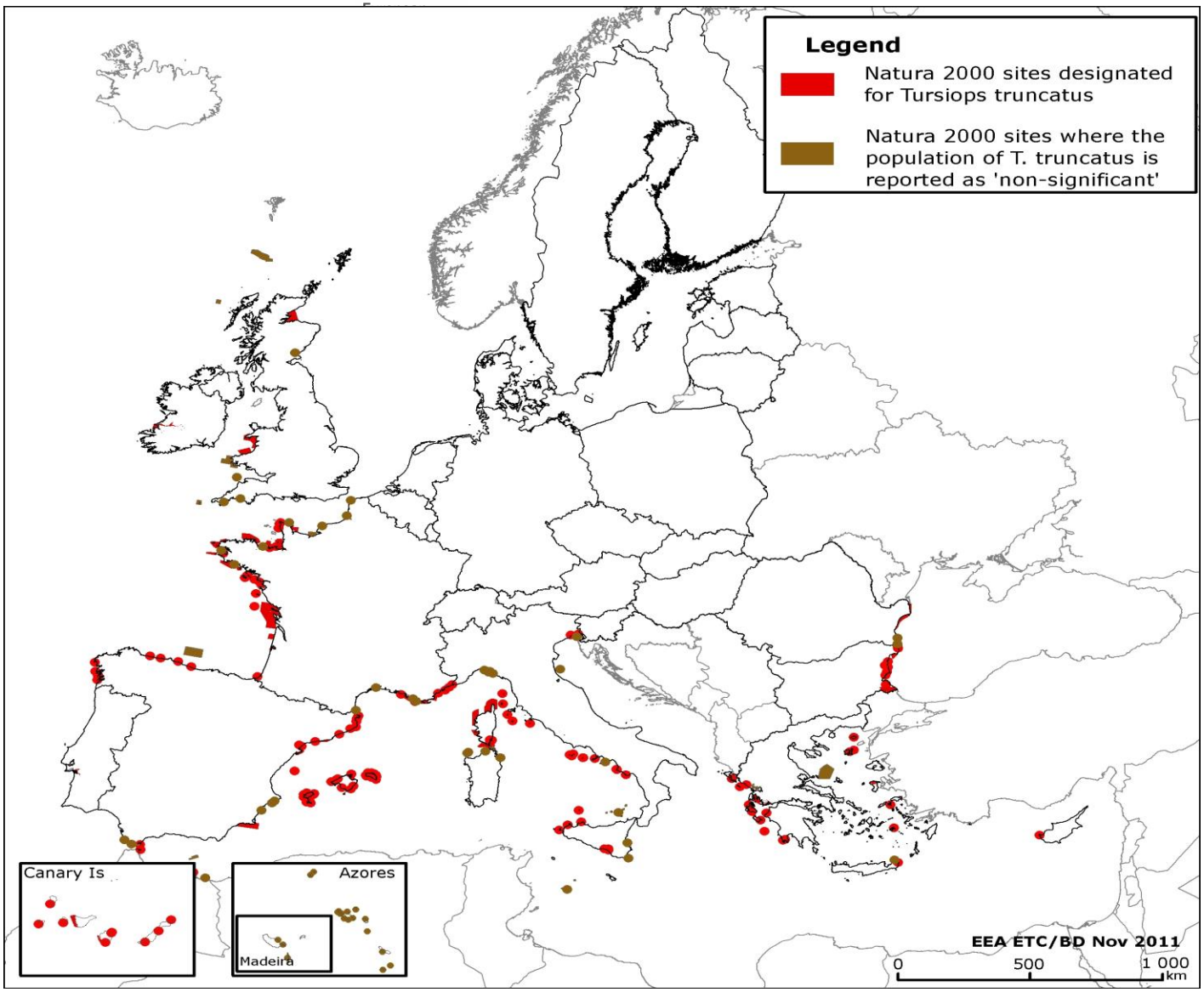
Source: *European Commission*

DESIGNATED SACs CONTAINING HARBOUR PORPOISE



Natura 2000 sites hosting Bottlenose Dolphin *Tursiops truncatus*

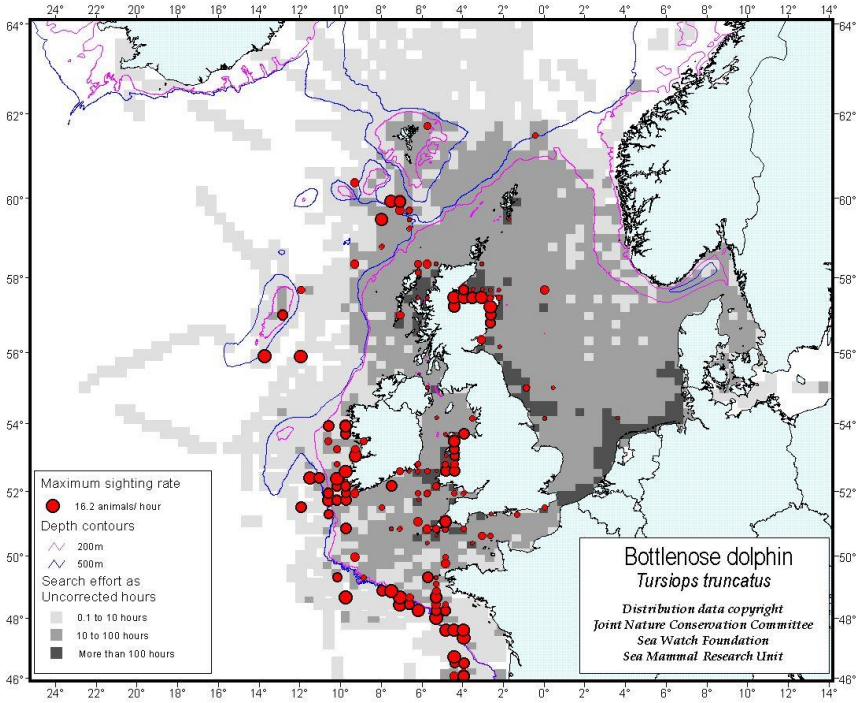
274 sites in ten Member States (but 74 sites classified as ‘D’)



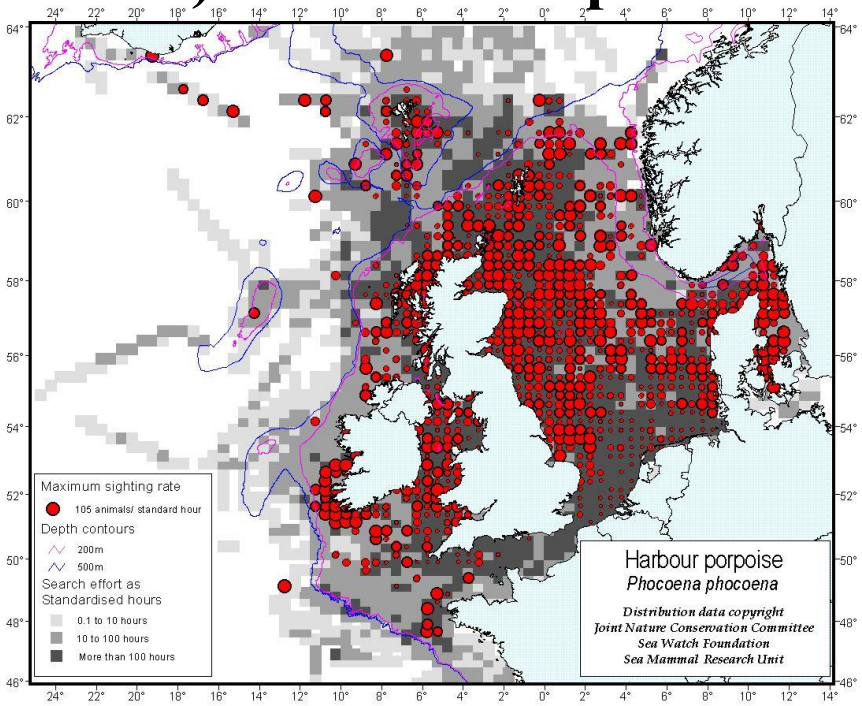
Source:
European Commission

BOTTLENOSE DOLPHIN & HARBOUR PORPOISE DISTRIBUTIONS IN NW EUROPEAN SEAS: 1980-2000

a) Bottlenose Dolphin



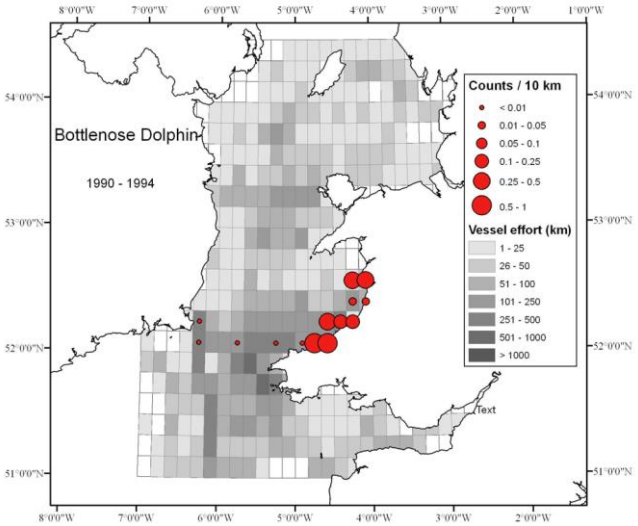
b) Harbour Porpoise



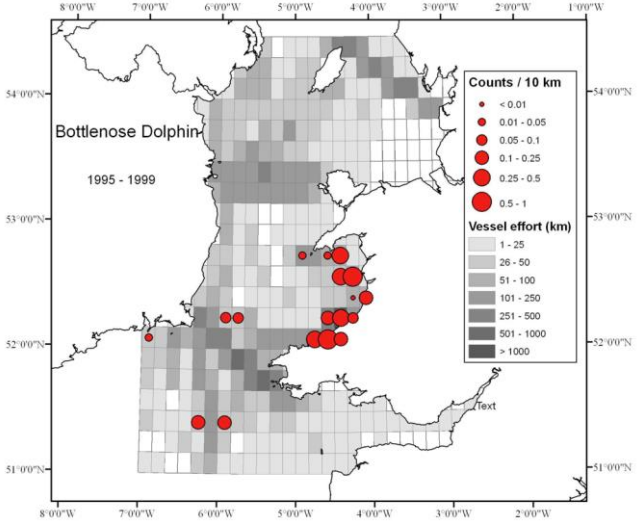
Source: Reid, Evans & Northridge (2003)
Atlas of Cetacean Distribution in north-west European waters

BOTTLENOSE DOLPHIN DENSITIES IN THE IRISH SEA

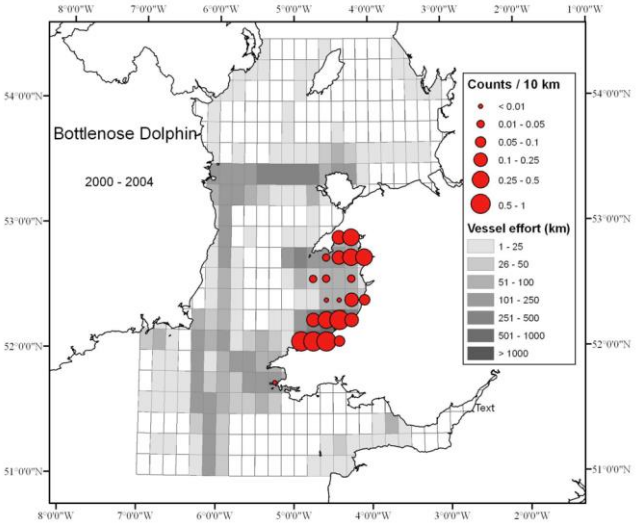
1990-1994



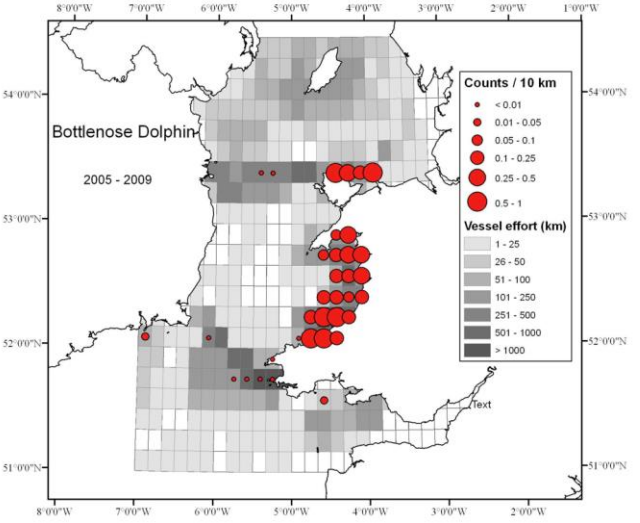
1995-1999



2000-2004

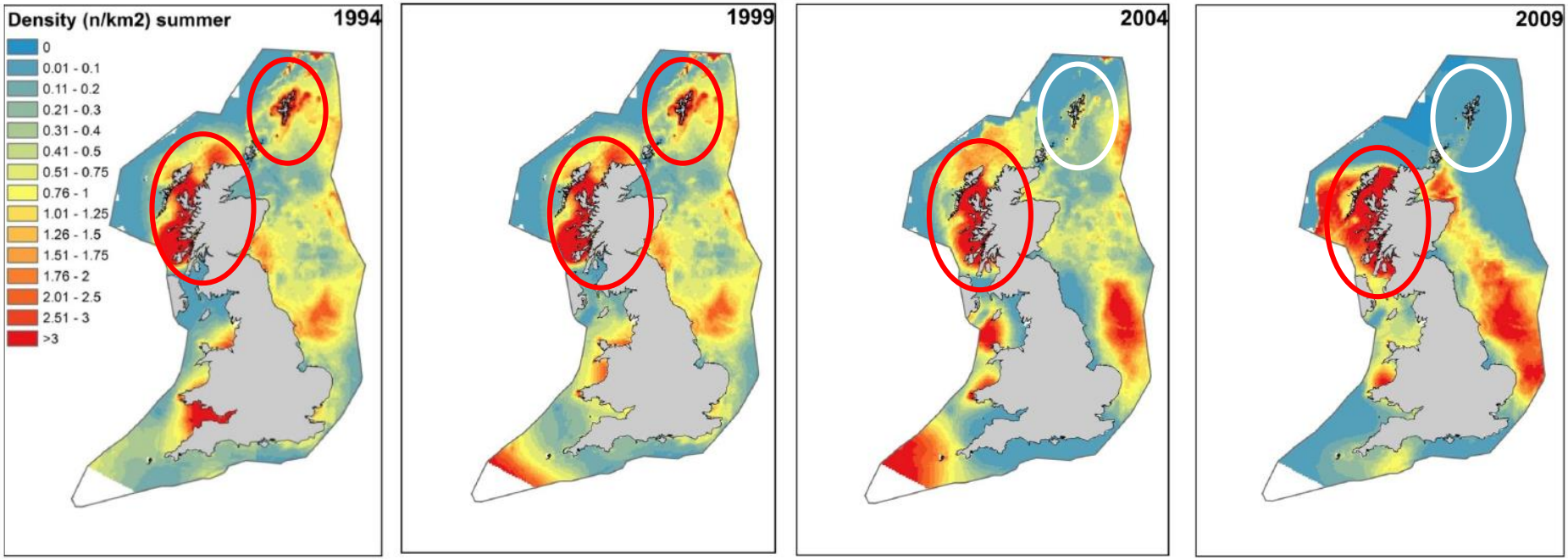


2005-2009



Source: Baines & Evans (2012) *Atlas of Marine Mammals of Wales*

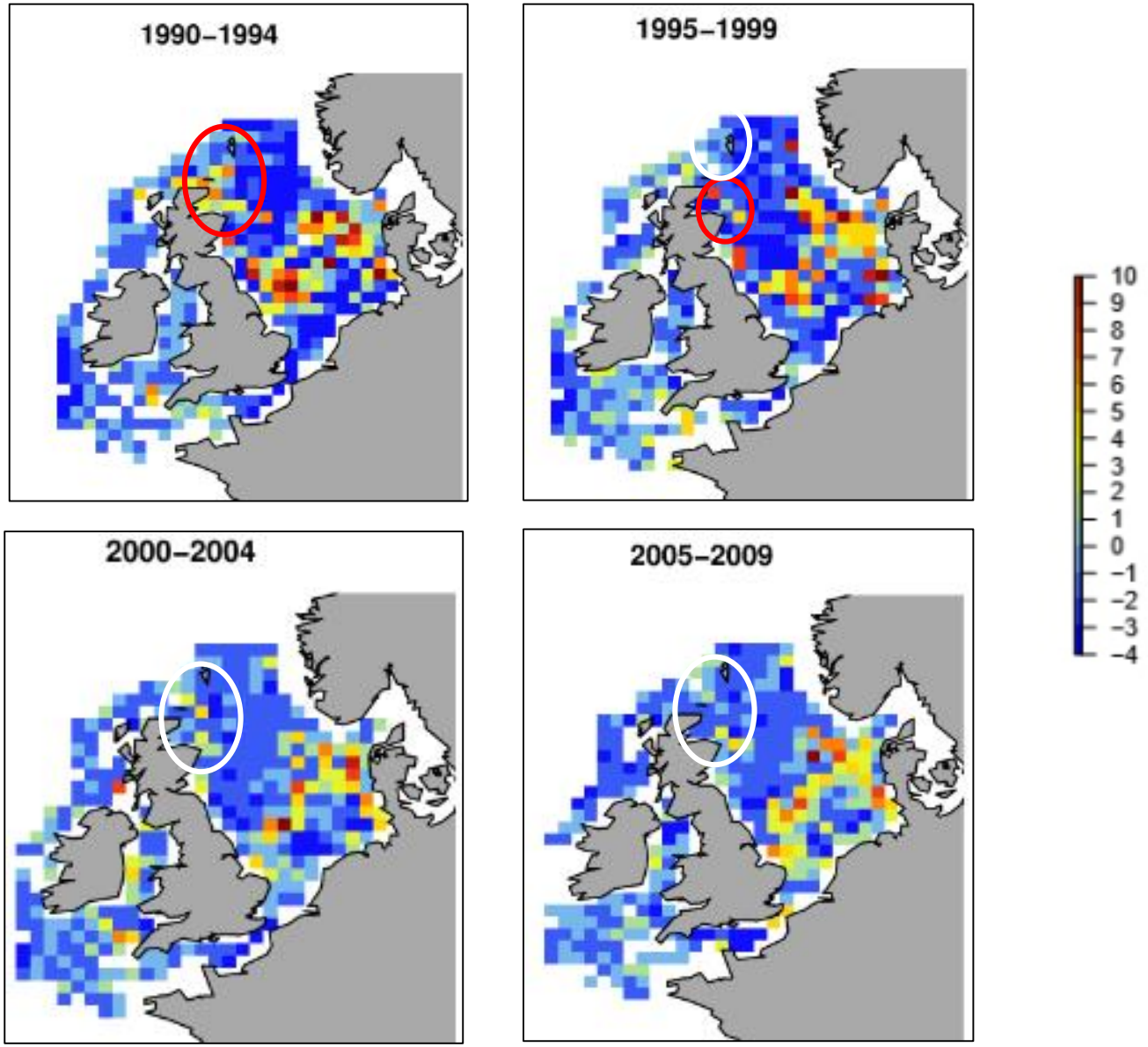
HARBOUR PORPOISE SUMMER DENSITIES IN UK WATERS FROM 1994 TO 2009



- need to demonstrate persistence in high usage over time

Source: Heinanen & Skov (2015)

SANDEEL CATCH RATES FROM 1990 TO 2009

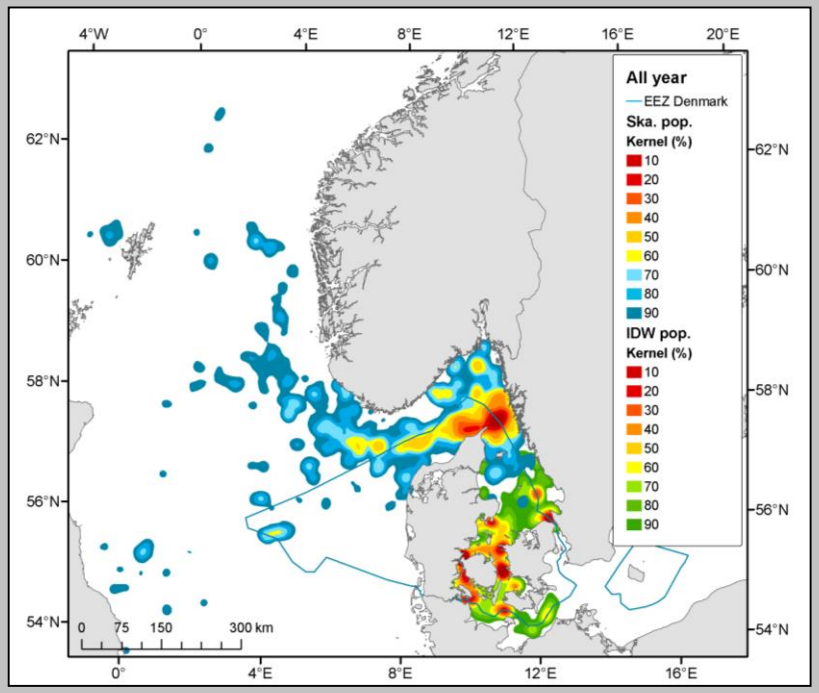


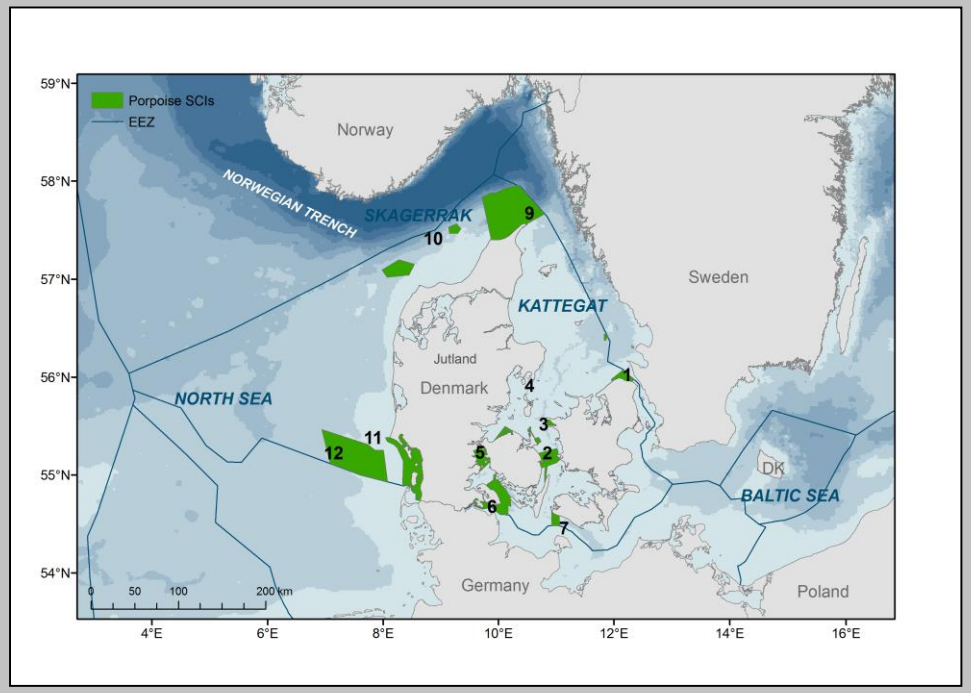
Source: ICES & CEFAS

Why populations may shift areas of concentration:

- climate change (oceanographic changes affecting cetacean prey)
- human-induced habitat change
- over-fishing of prey stocks
- increased mortality from bycatch
- increased disturbance – noise, risk of ship strike, and disruption of feeding/nursing

PORPOISE AREA USAGE AS REVEALED BY SATELLITE TELEMETRY





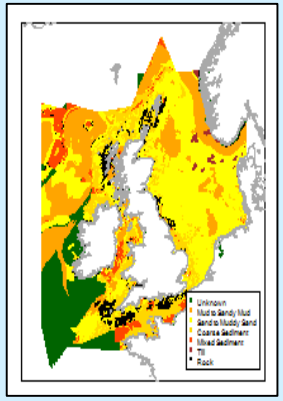
No. tagged = 62 harbour porpoises; Period of tagging: 1992-2007

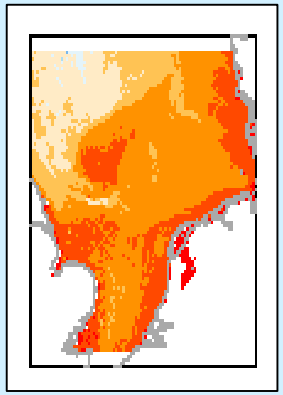
Source: Sveegaard & Teilmann, 2007; Teilmann *et al*., 2008; Sveegaard *et al*., 2011

Understanding Cetacean Distributions

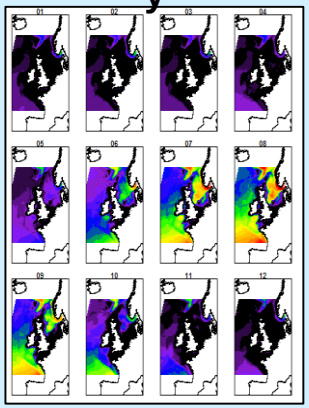
Identify environmental drivers of spatial and temporal variations In cetacean distributions, and predict their persistence

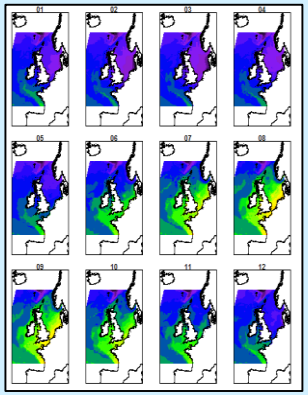
Seabed Properties



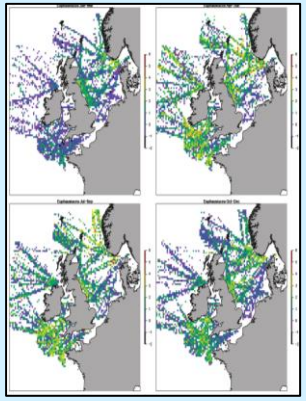


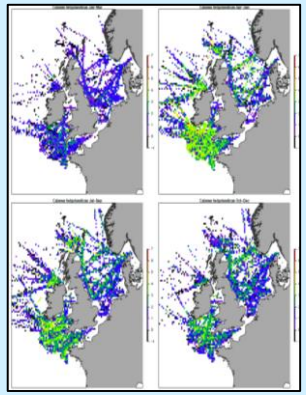
Oceanography



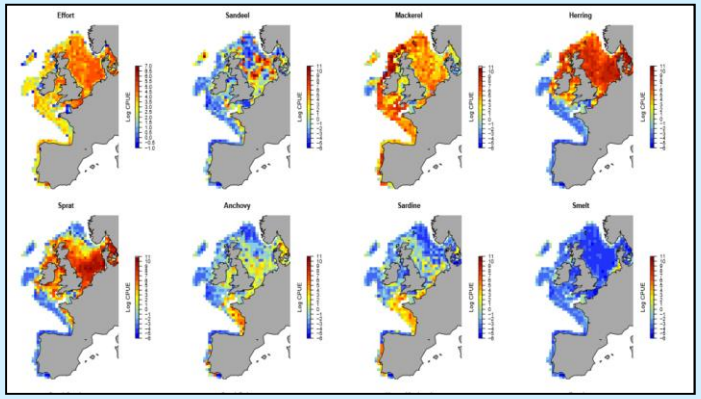


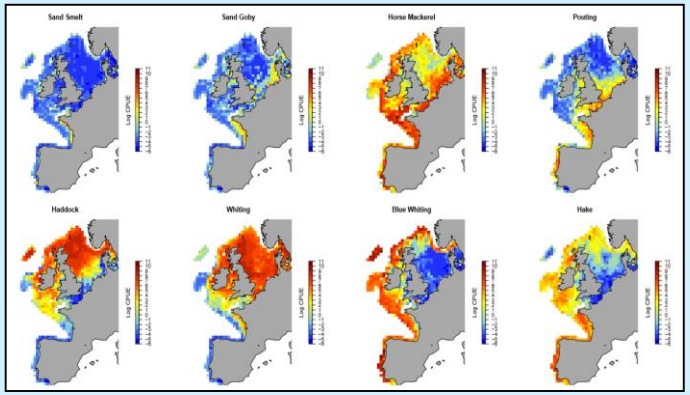
Zooplankton





Fish & Cephalopods



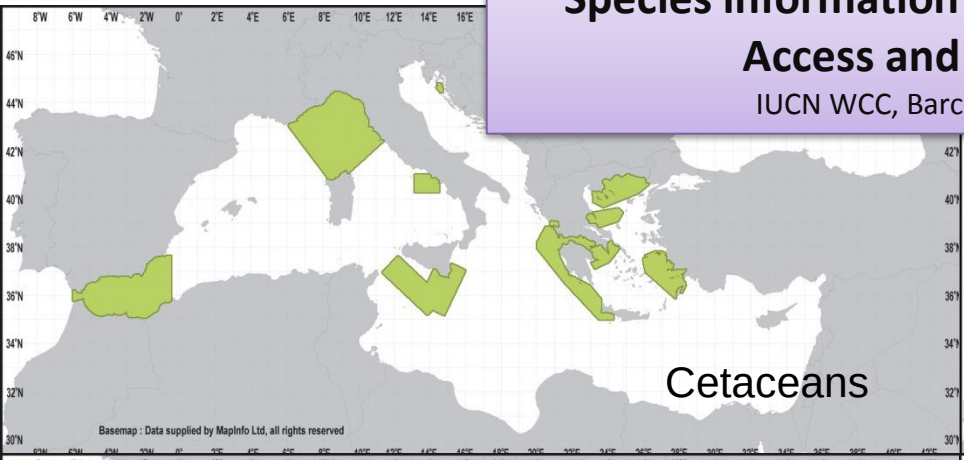


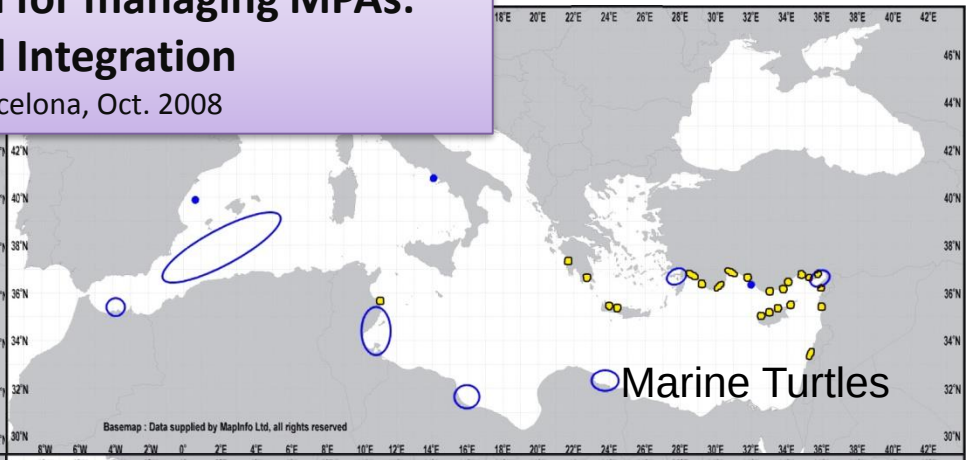
Source: James Waggitt & Peter Evans

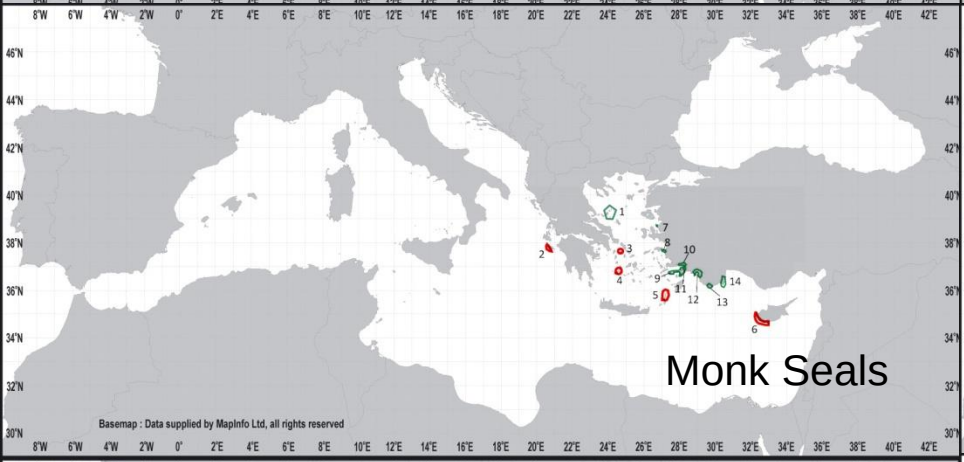
Notarbartolo di Sciara and Hoyt (2008):

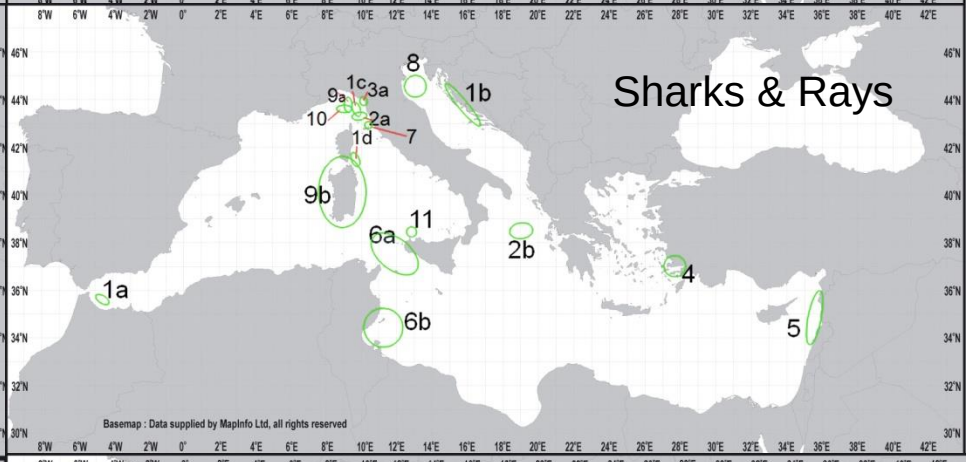
Species information for managing MPAs: Access and Integration

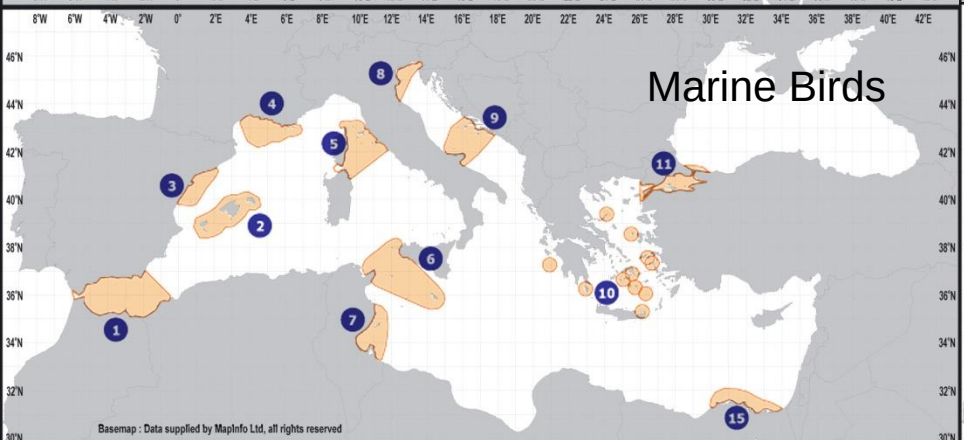
IUCN WCC, Barcelona, Oct. 2008







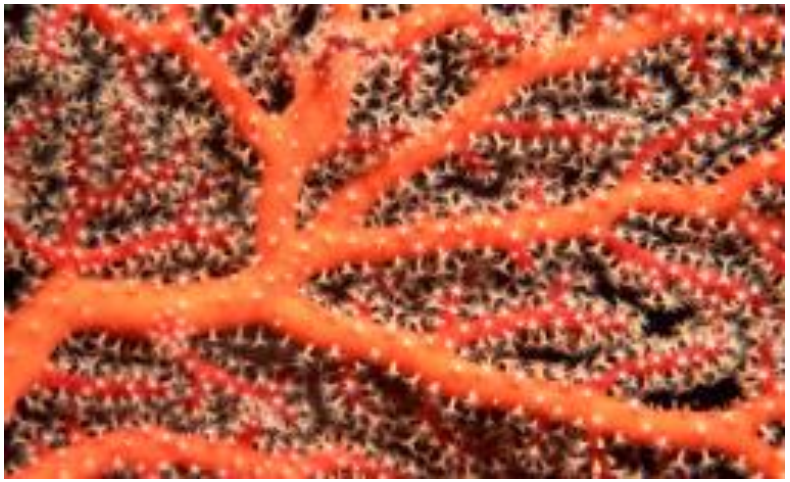




Convention on Biological Diversity

The EBSAs are special marine areas that serve important purposes, to support the healthy functioning of oceans and the many services that they provide.

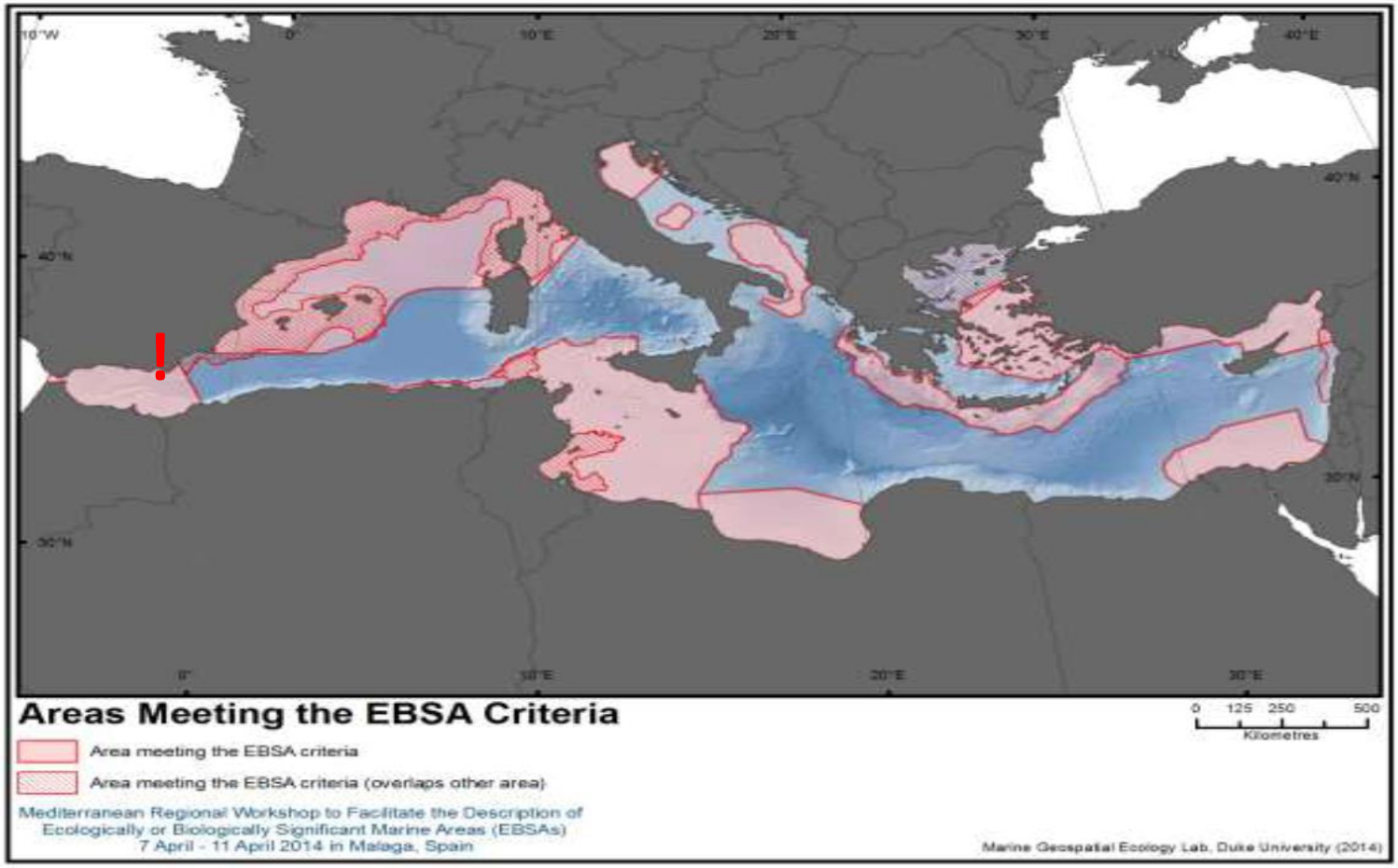
In 2008 CBD adopted 7 scientific criteria for identifying EBSAs in need of protection in open-ocean waters and deep-sea habitats.



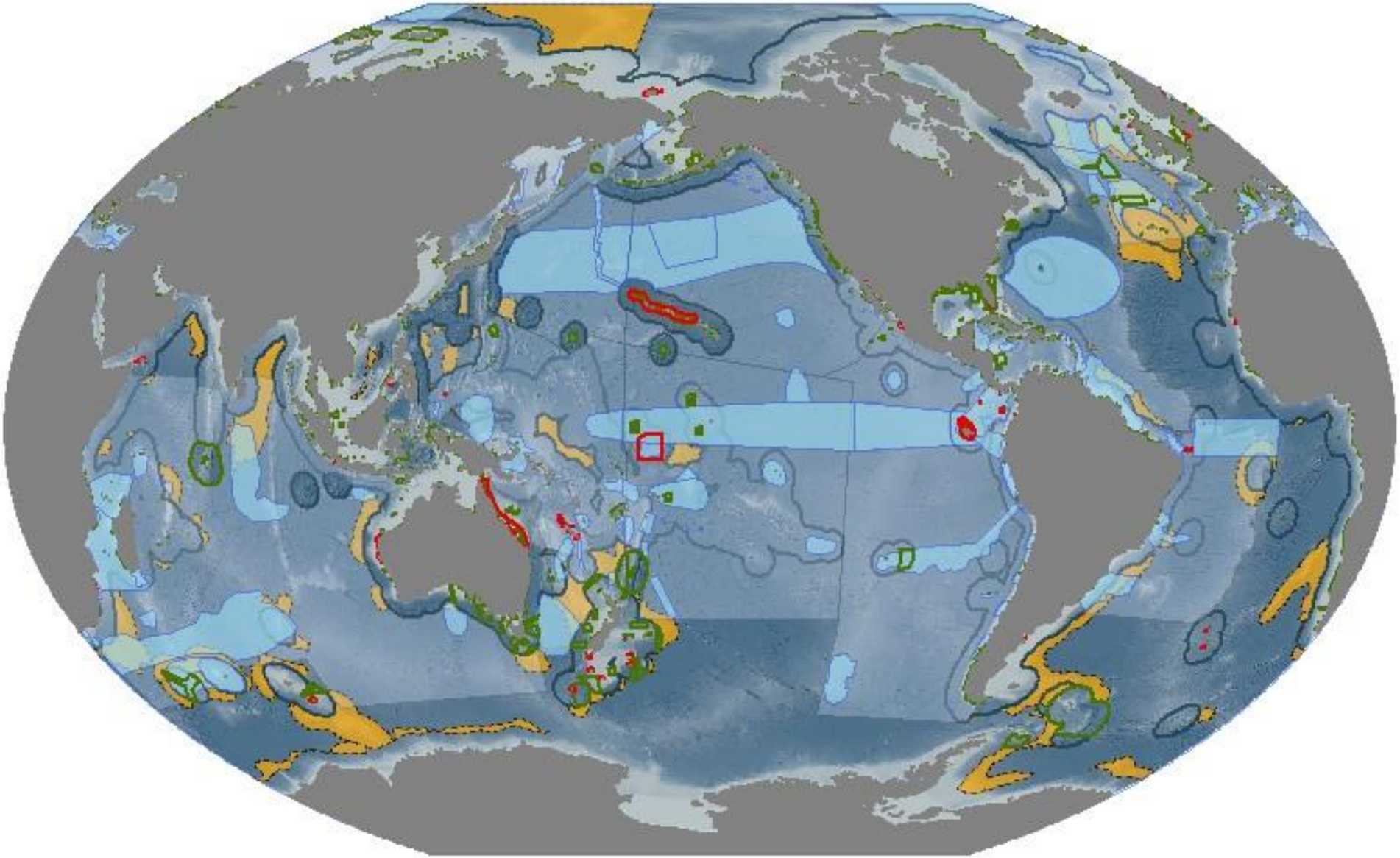
1. Uniqueness or rarity;
2. Special importance for life history of species;
3. Importance for threatened, endangered or declining species and/or habitats;
4. Vulnerability, fragility, sensitivity, slow recovery
5. Biological productivity;
6. Biological diversity;
7. Naturalness.

ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT AREAS (EBSAs)

As part of this effort, the Parties to the CBD identified 15 Mediterranean *Ecologically or Biologically Significant Areas* (EBSAs) in 2014, on the basis of the 7 criteria and a wealth of ecological considerations, where the presence of marine mammal habitat featured significantly



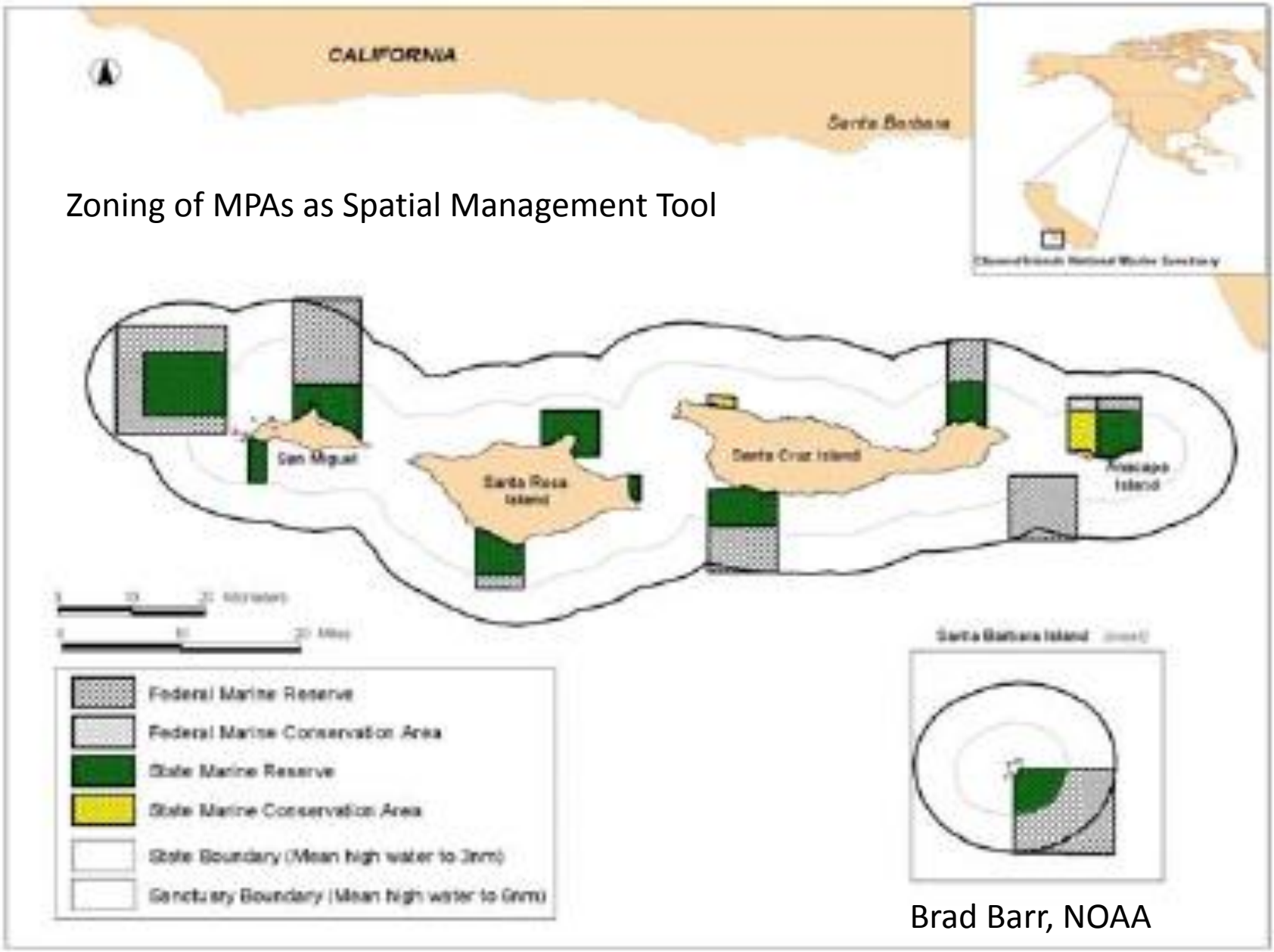
EBSAs – Ecologically or Biologically Significant Areas



Marine Geospatial Ecology Lab, Duke University (2013)

Pat Halpin, MGEL, Duke U

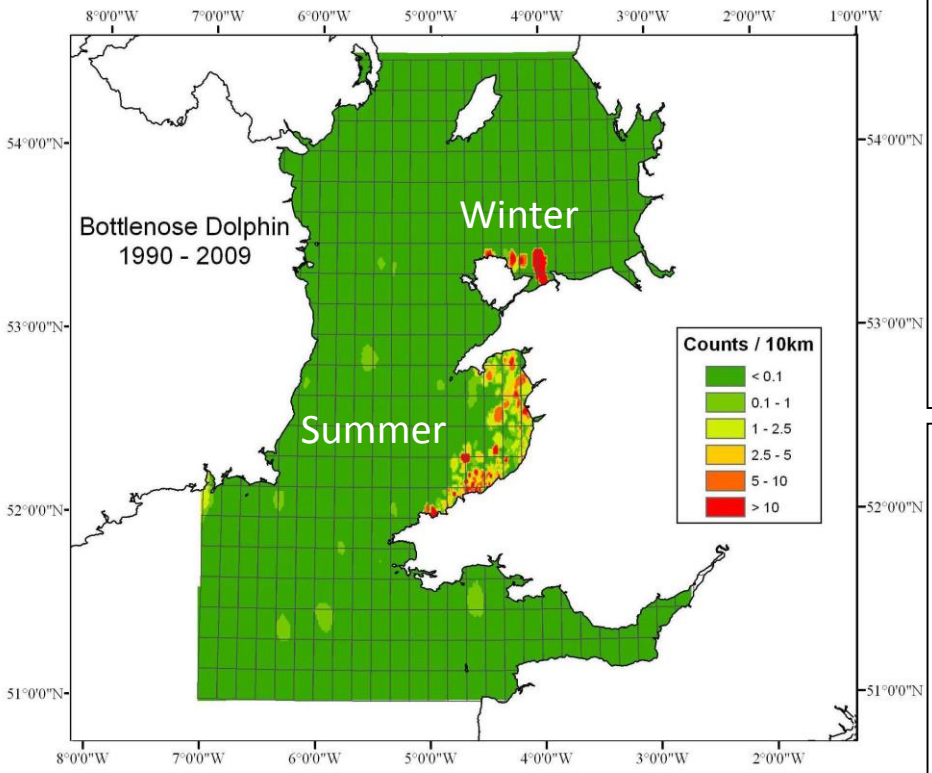
Zoning of MPAs as Spatial Management Tool

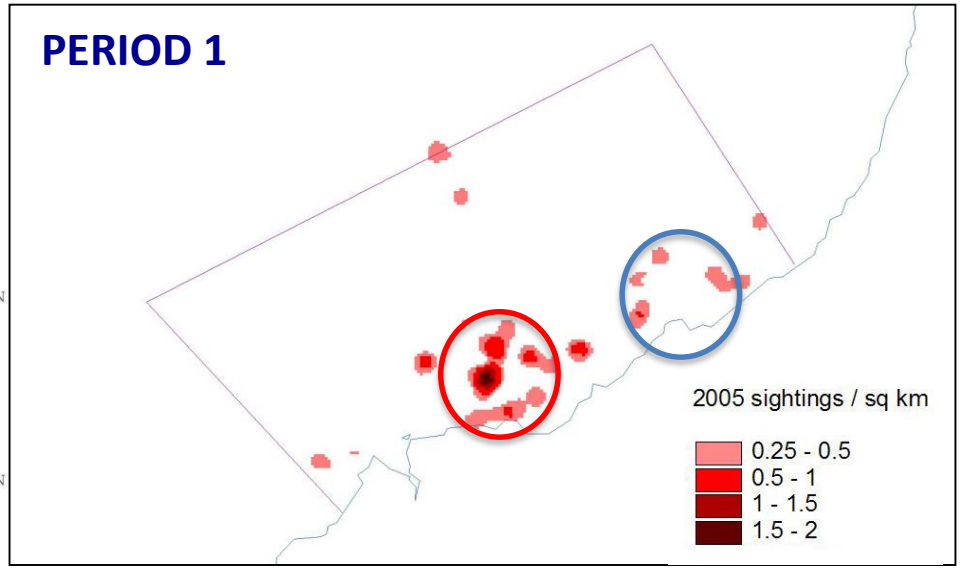


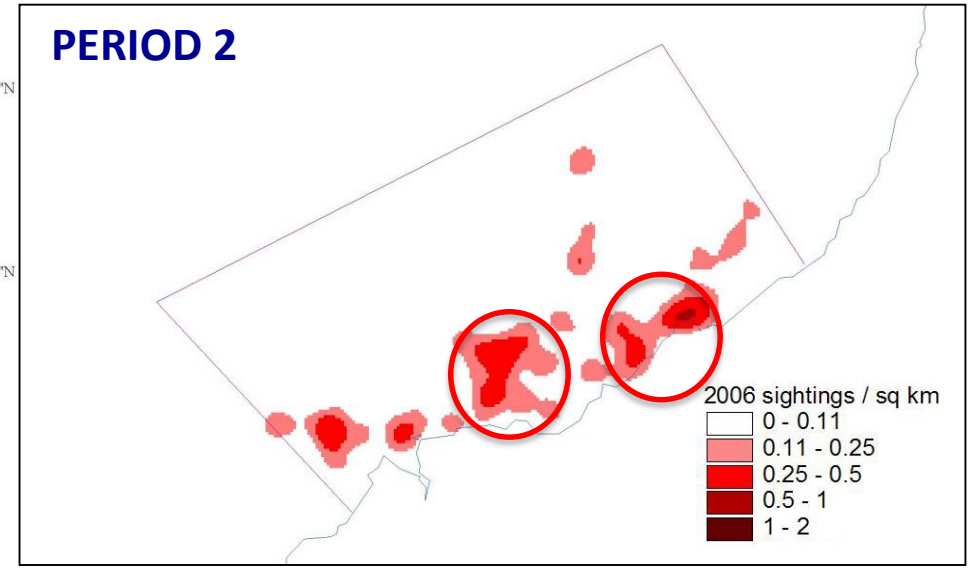
Brad Barr, NOAA

ZONING APPROACH TO AREA PROTECTION

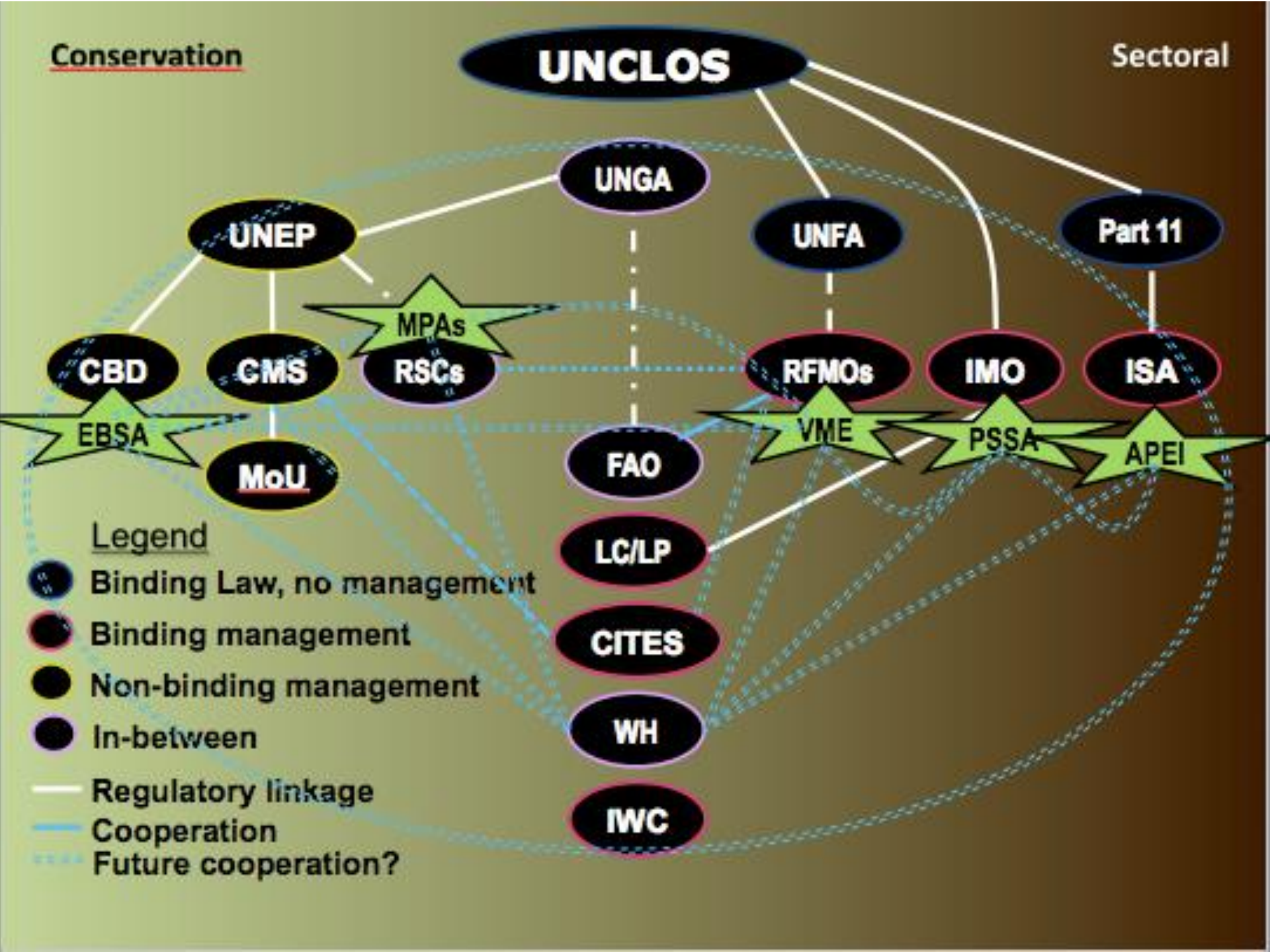
The bottlenose dolphin in Wales







Source: Pesante *et al*., 2008; Baines & Evans, 2012; Feingold & Evans, 2014


Conservation
UNCLOS
Sectoral
UNGA
UNEP
UNFA
Part 11
MPAs
RSCs
CBD
CMS
RFMOs
IMO
ISA
EBSA
VME
PSSA
APEI
MoU
FAO
LC/LP
CITES
WH
IWC
Legend
Binding Law, no management
Binding management
Non-binding management
In-between
Regulatory linkage
Cooperation
Future cooperation?

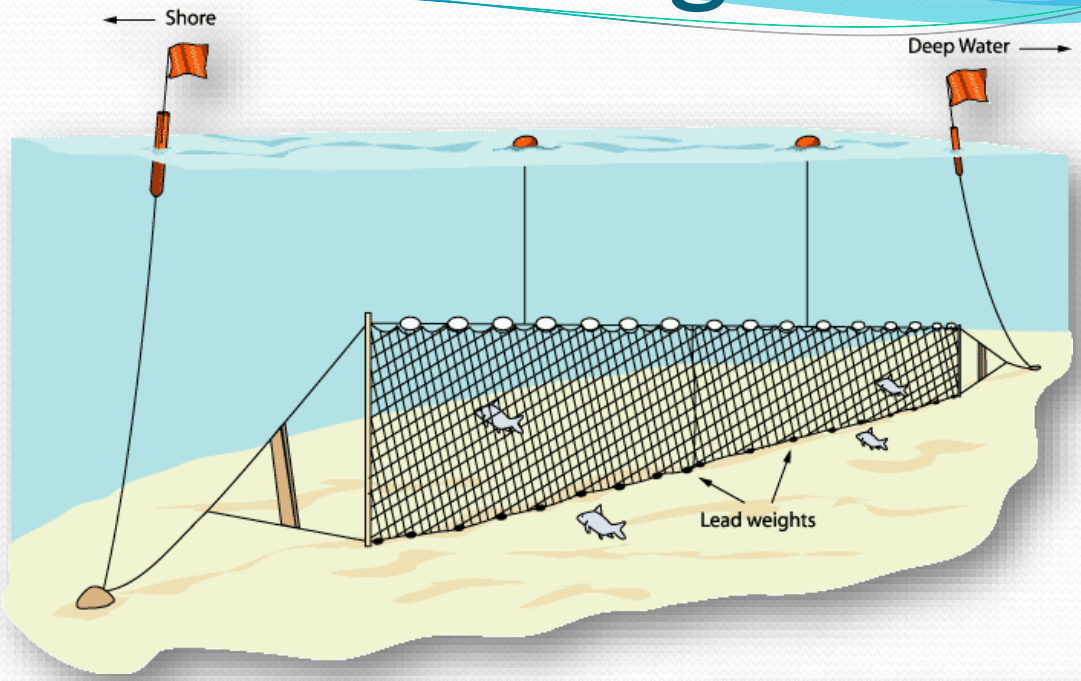
FISHERIES MANAGEMENT: PREVENTION OR REDUCTION OF IMPACTS

1. Close fisheries or areas
2. Design “whale safe” fishing gear
3. Develop rescue networks (for large whales)

Marine Mammal Protected Areas can:

- Institute seasonal closures
- Apply measures to reduce bycatch, e.g. pingers
- Provide a site and support for experimental fisheries
- Act as a catalyst or hub for rescue networks

Switch gear



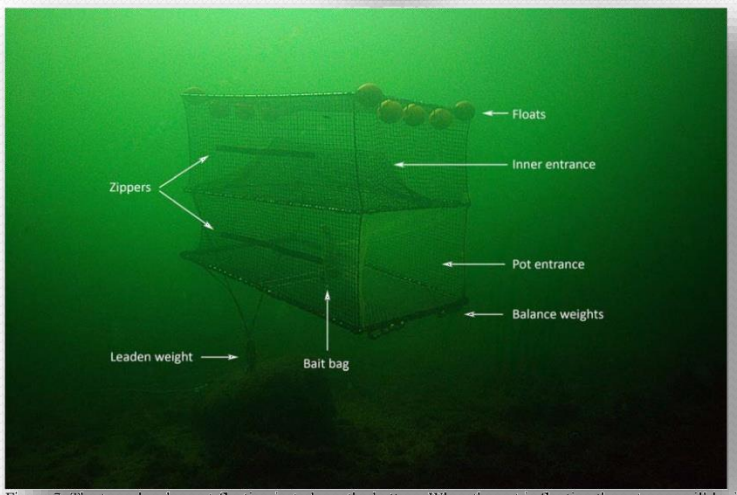
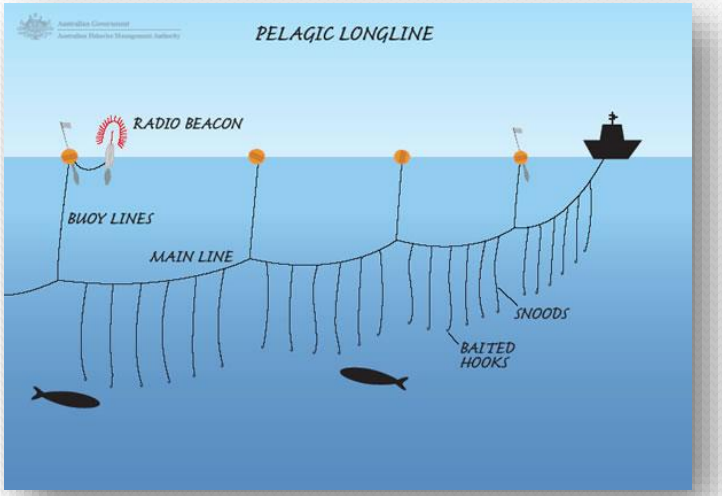


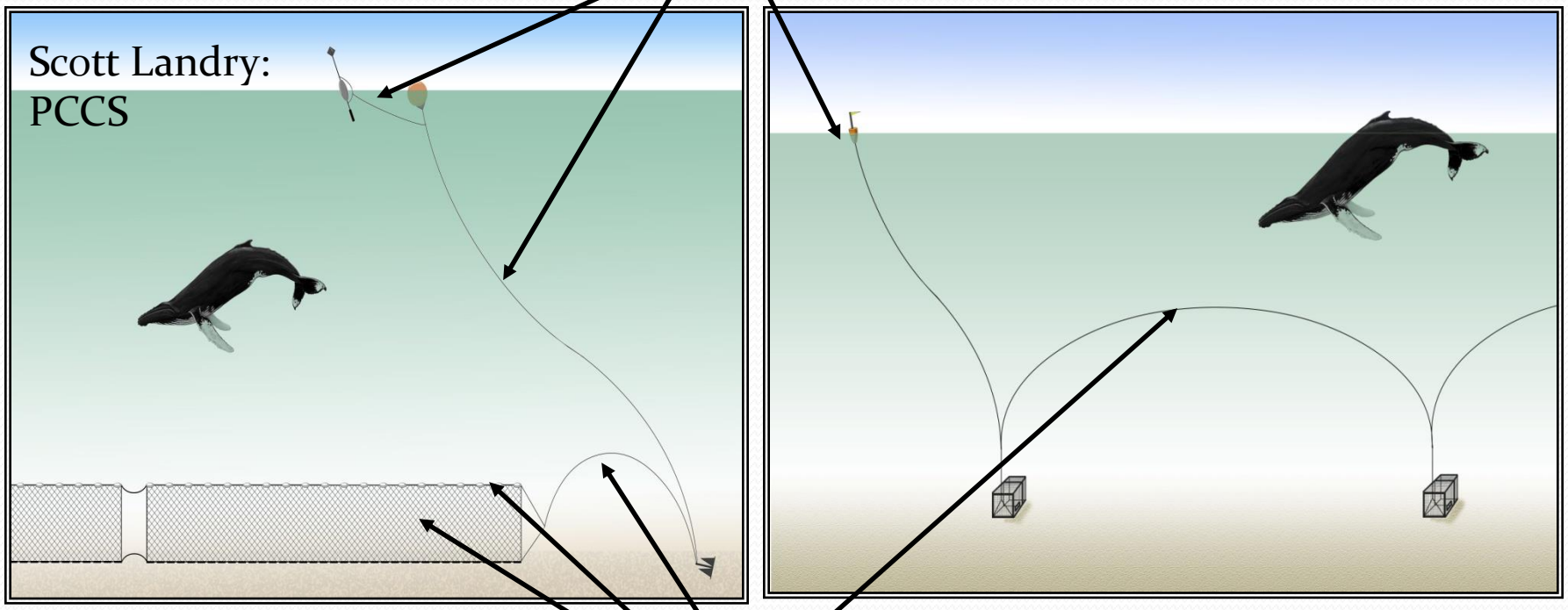
Figure 7. The two-chamber pot floating just above the bottom. When the pot is floating the entrance will be in the direction of the current. This enables for the cod to follow the scent from the bait bag into the pot. Usually eight pots are set in a link with a distance of 60 meters between them.



David Mattila, NOAA

Develop "whale safe" gear

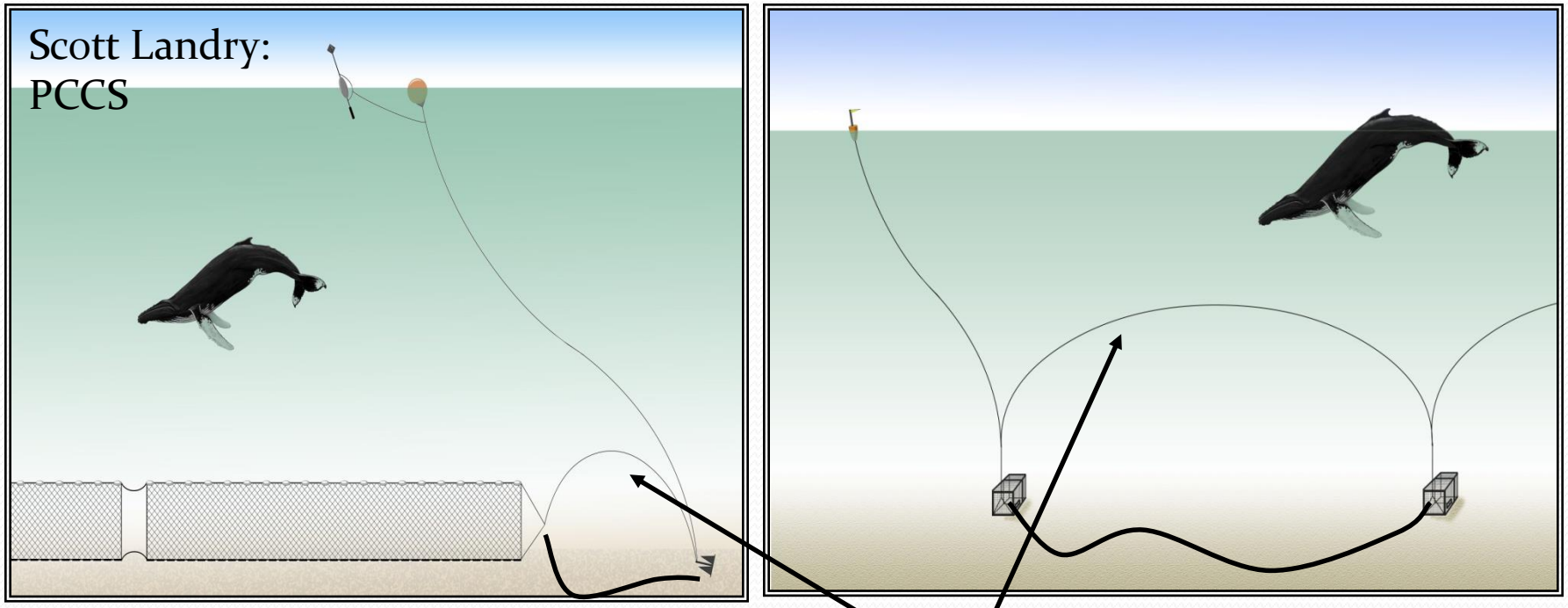
Potential points of entanglement



Potential points of entanglement

David Mattila, NOAA

Develop “whale safe” gear



Sinking ground lines first instituted in “critical habitat” (Cape Cod Bay)

May have reduced risk by up to 70%

David Mattila, NOAA

In theory	In practice
• MPAs should be selected on the basis of long-term high population usage, linked to stable features	• Until relatively recently, MPAs have been selected without adequate survey effort over an appropriately wide area and long time frame
• MPAs should be of an appropriate size; preferably large enough to be stable to perturbations	• MPAs are usually too small, either because they were not selected for that species or because of fear of conflict with other stakeholders
• Adaptive management is necessary to be responsive to changes; this requires monitoring in & out of MPAs	• Legislation to establish MPAs and subsequent management generally takes too long to respond at the appropriate spatial and time scales
• Once established, human activities that pose risk need some form of management with appropriate mitigation	• Often, adequate resources are not provided to fully understand risk from different human activities and then to take remedial action

ACKNOWLEDGEMENTS

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Mick Baines
Brad Barr
Heidi Frisch
David Mattila
Micheal O'Briain
Signe Sveegaard
James Waggitt