

Bottlenose Dolphins in the ASCOBANS Agreement Area



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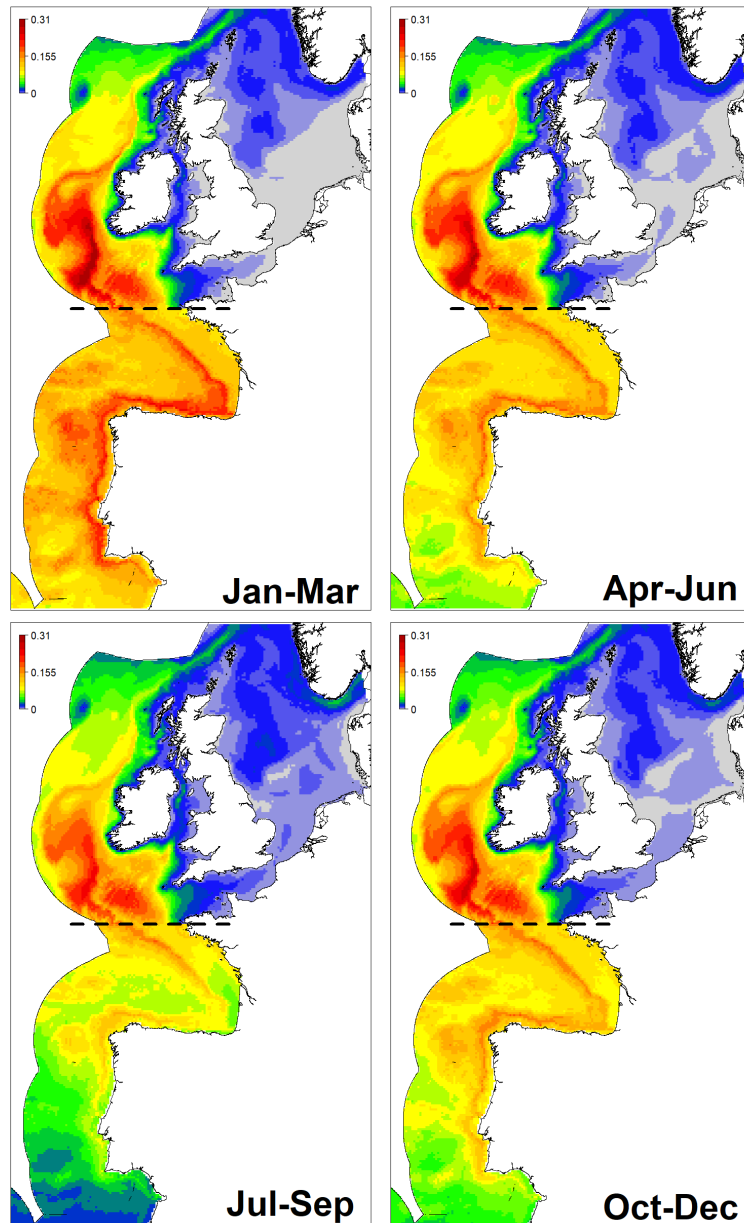
Bottlenose Dolphin distribution in North Atlantic



Main range where species regularly occurs

- Common bottlenose dolphin *Tursiops truncatus* has a worldwide distribution estimated to number c. 600,000 indivs
- Occupies temperate & tropical regions, mainly in SSTs of 10-32° C
- Coastal ecotype usually in depths of 50 m or less and within 20 km of land
- Offshore ecotype favours the shelf edge and offshore shelf seas between 50-500 m depth

OFFSHORE BOTTLENOSE DOLPHIN DENSITY DISTRIBUTIONS



- Coastal populations not easily surveyed by line transect methods
- Offshore populations show greatest densities along the shelf edge particularly from west of Ireland southwards
- In the Bay of Biscay and around the Iberian coast, the shelf edge comes close to the coast and so do bottlenose dolphins. In those areas, offshore and coastal ecotypes may overlap spatially
- Some evidence for inshore movements in summer months, and northward movements along shelf edge in winter

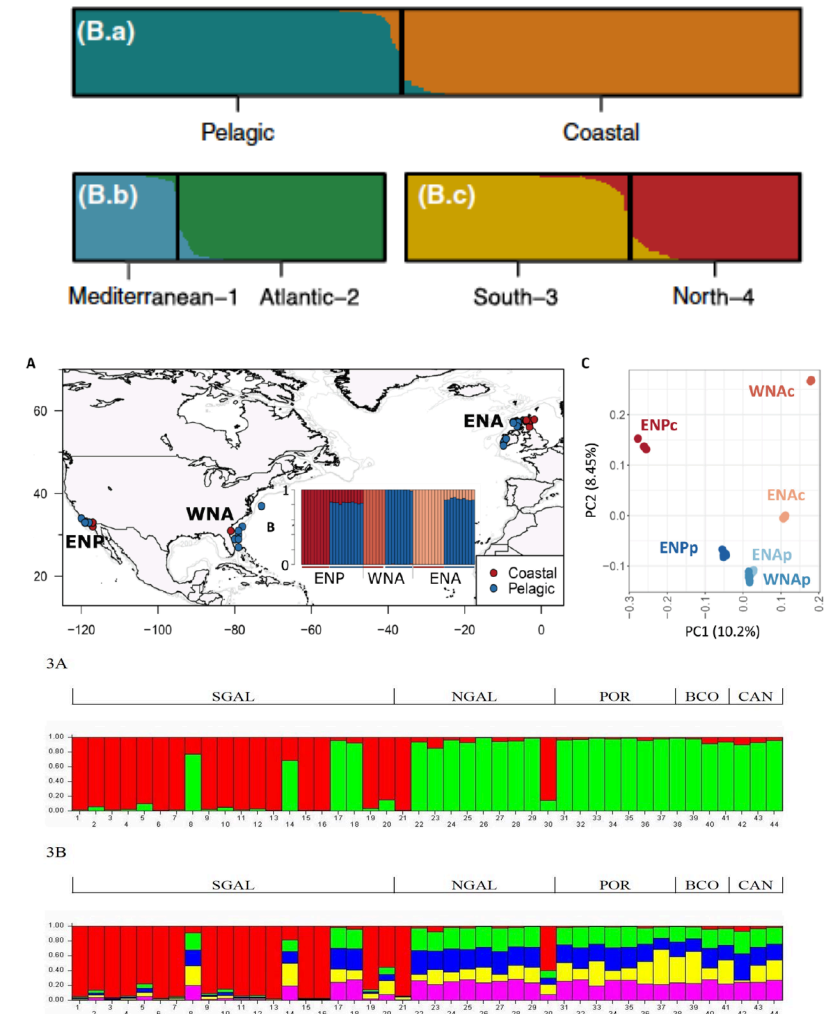
Source: Waggitt et al. (2020), Evans et al. (2021)



Population Structure & Management Units

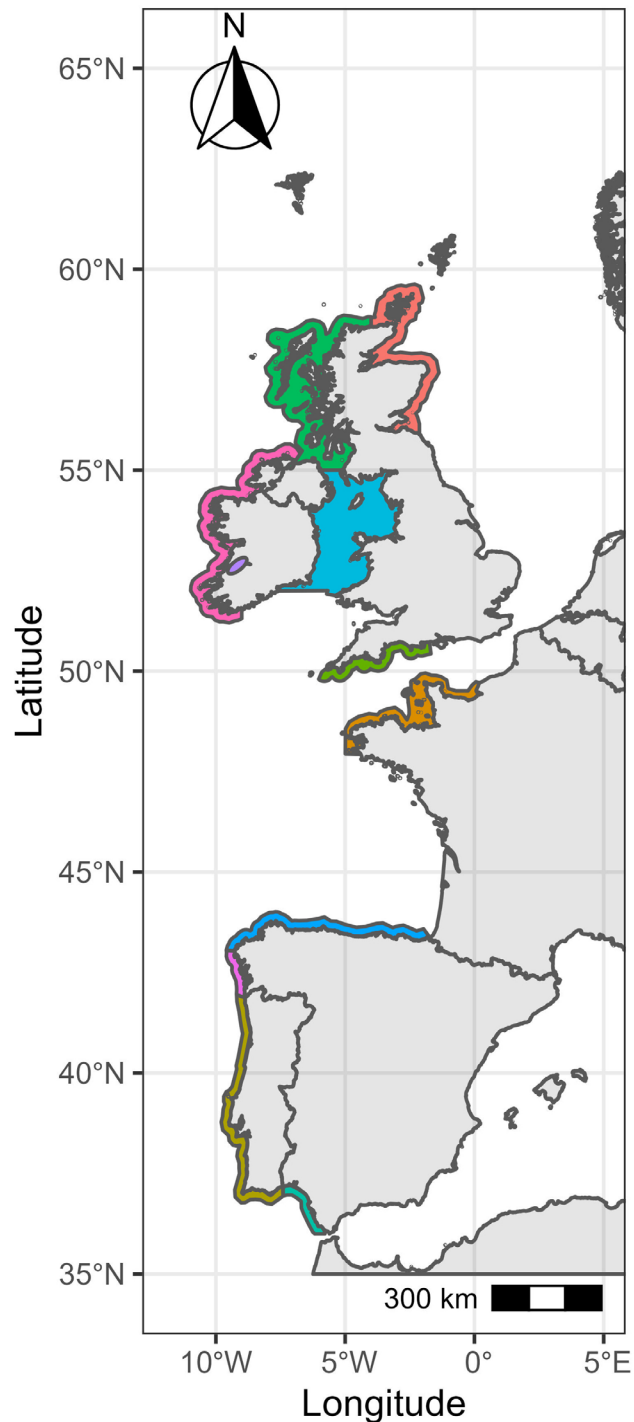
POPULATION STRUCTURE IN NORTH ATLANTIC BOTTLENOSE DOLPHINS

- Genetic studies (using microsatellites & mtDNA) indicate coastal and pelagic populations to be highly differentiated in NE Atlantic with finer-scale population structure within the two ecotypes
- Three distinct populations identified around Ireland: Shannon Estuary (low diversity), Connemara-Mayo region (low diversity), and strandings of unknown origin (high diversity)
- Distinct differences observed between animals from northern Galicia, southern Galicia, and Portugal
- Animals from offshore Atlantic show much higher genetic diversity and greater gene flow



Sources: Parsons et al. (2002), Quérrouil et al. (2009), Fernández et al. (2011), Mirimin et al. (2011), Oudejans et al. (2018), Nykanen et al. (2018, 2019), Louis et al. (2014, 2021)

ASSESSMENT UNITS PROPOSED FOR COASTAL BOTTLENOSE DOLPHINS IN ATLANTIC EUROPE



Name

<div></div>	Coastal East Scotland
<div></div>	Coastal Normandy & Brittany
<div></div>	Coastal Portugal
<div></div>	Coastal West Channel
<div></div>	Coastal West Scotland and Hebrides
<div></div>	Gulf of Cadiz
<div></div>	Irish Sea and Coastal Wales
<div></div>	Northern Spain
<div></div>	Shannon Estuary
<div></div>	Southern Galician Rias
<div></div>	West Coast of Ireland

Source: IAMMWG (2020)

Definition of a Management Unit:

“A group of individuals for which there are different lines of complementary evidence suggesting reduced exchange (migration / dispersal) rates over an extended period (low tens of years)”

Lines of Evidence:

- Distributions
- Photo-ID matches
- DNA analyses
- Stable isotope signatures
- Contaminant levels
- Morphometrics

BOTTLENOSE DOLPHIN SIGHTINGS: 2020-21

Jan



Feb



Mar



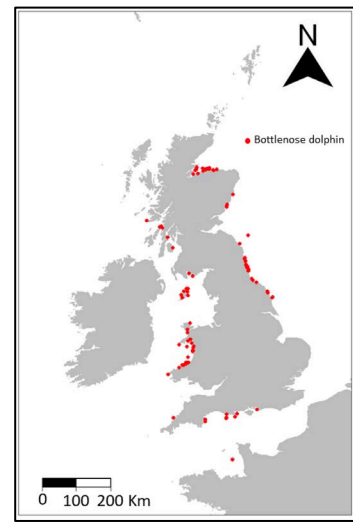
Apr



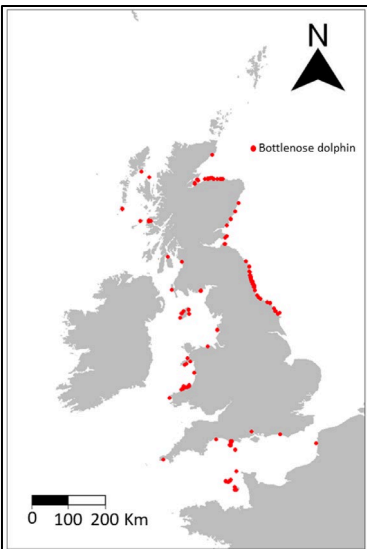
May



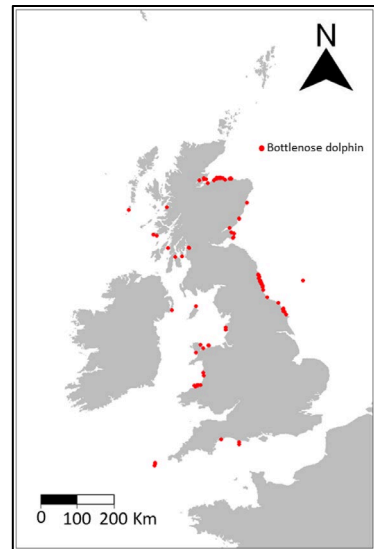
Jun



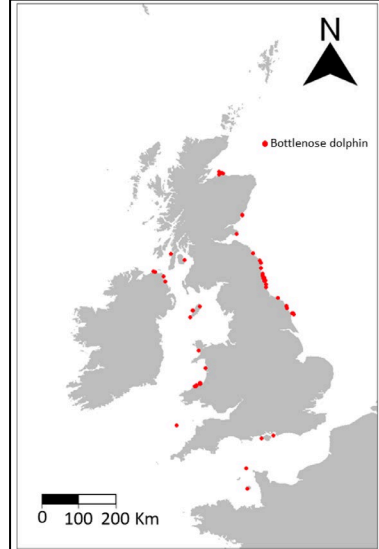
Jul



Aug



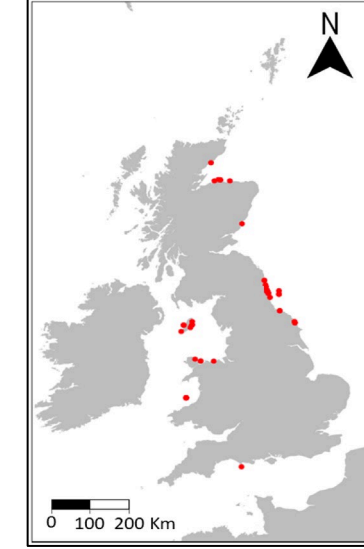
Sep



Oct



Nov

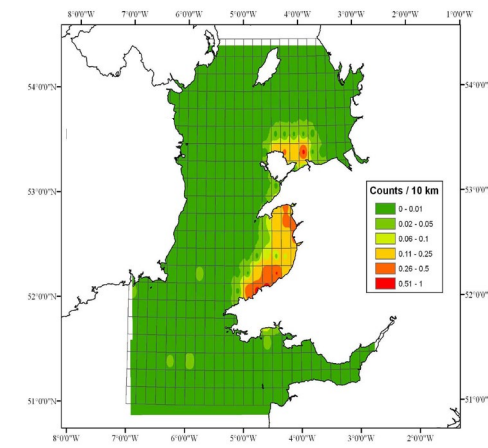
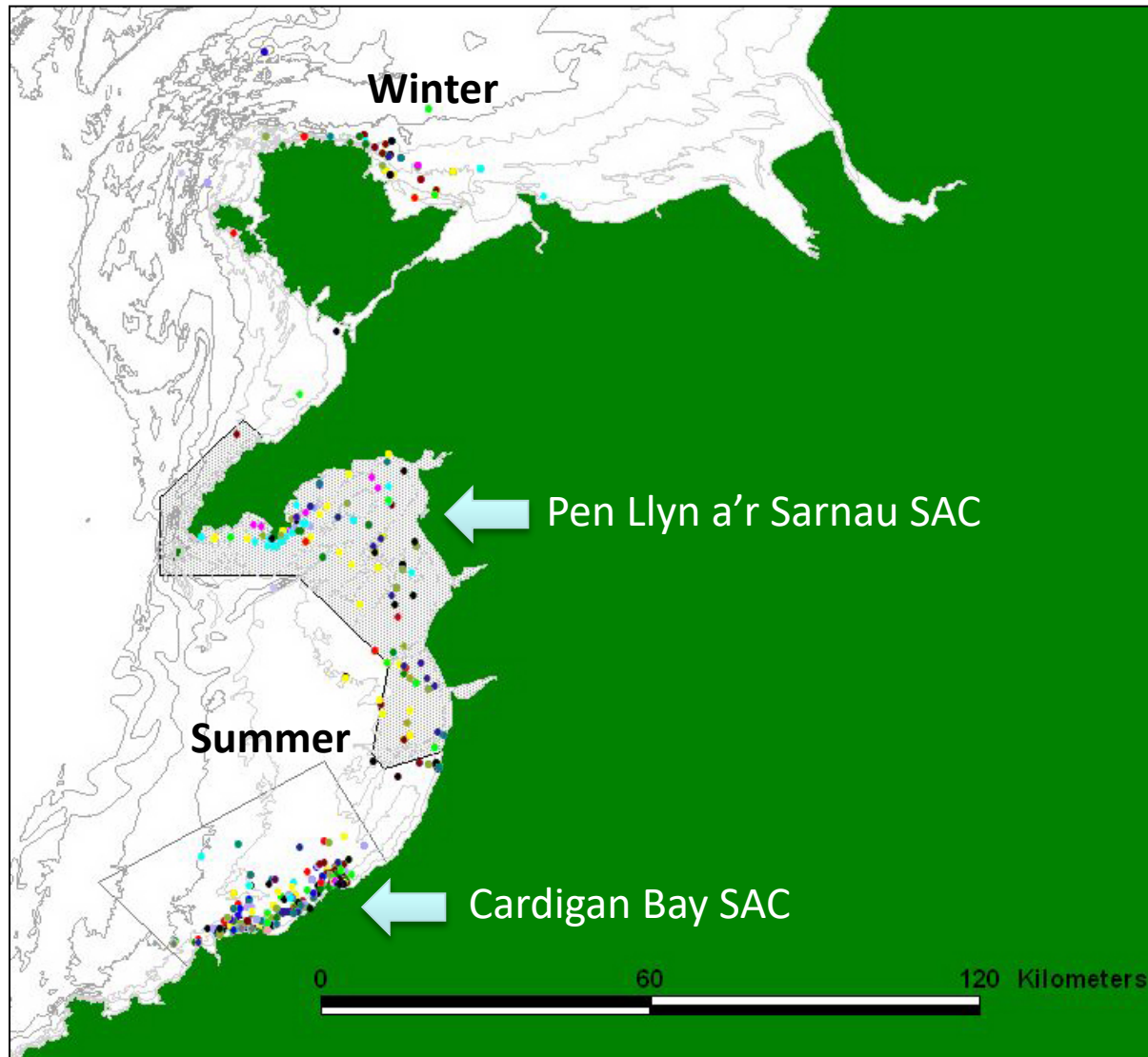


Dec



Source: Sea Watch Foundation Sightings Database

HOME RANGES OF BOTTLENOSE DOLPHINS



- 64% (141/221) of individuals recorded in both Cardigan Bay SAC and North Wales
- 78% (172/221) of individuals recorded in one or both SACs also occurred in North Wales
- 15% (33/221) of individuals recorded only in Cardigan Bay SAC

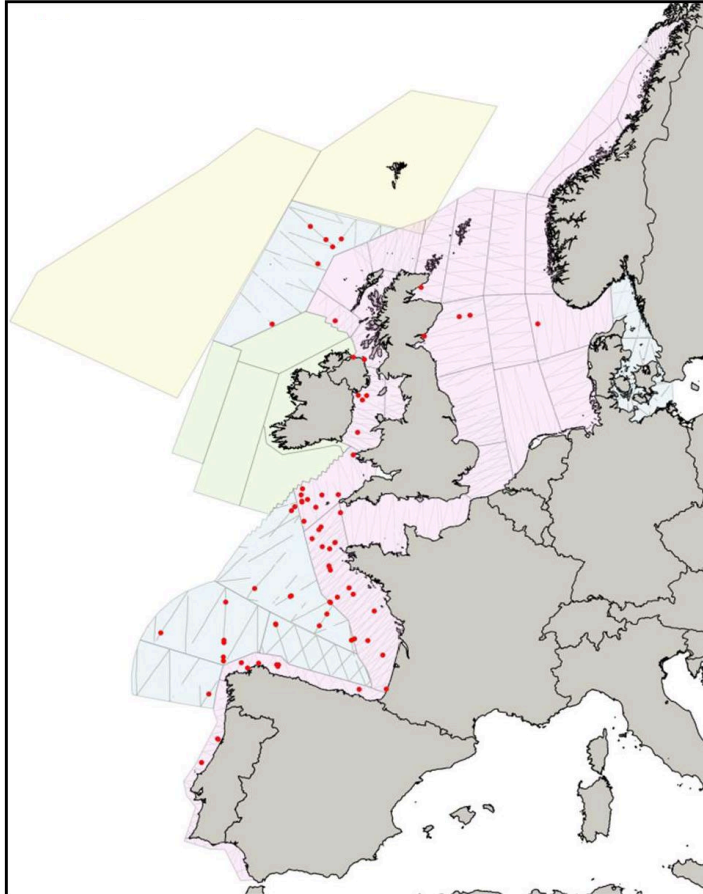
Source: Baines & Evans (2012), Veneruso & Evans (2012), Lohrengel et al. (2017)



Population Abundance & Trends

ABUNDANCE ESTIMATES FOR BOTTLENOSE DOLPHIN IN NW EUROPE

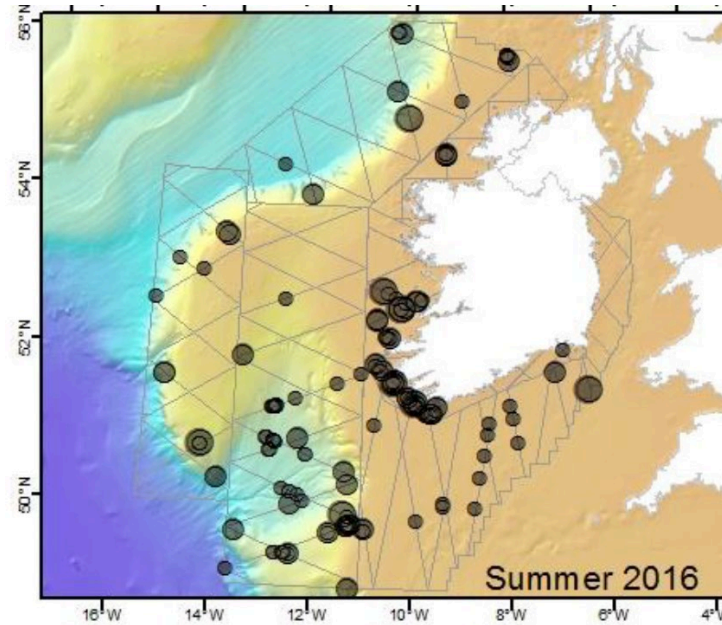
SCANS-III
(July 2016)



- 33,123 individuals
(95% CI: 20,305-54,033)

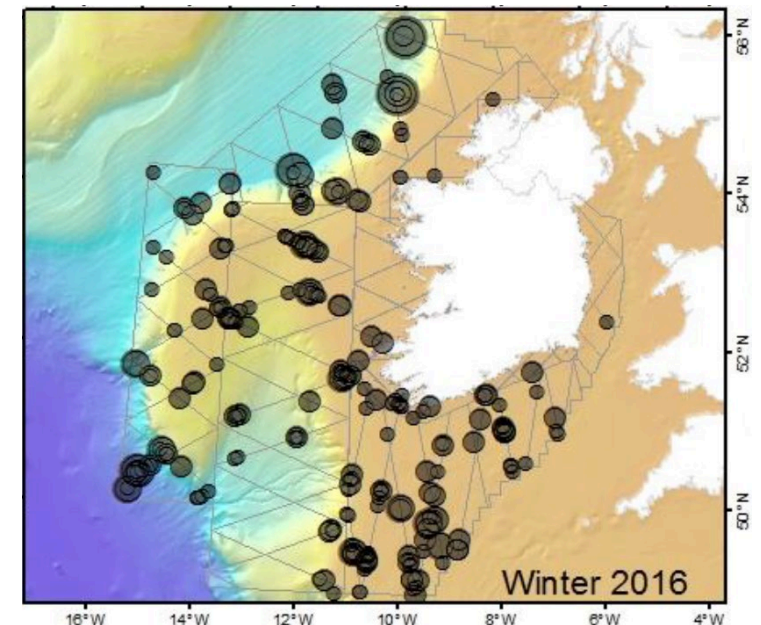
Source: Hammond et al. (2021)

Irish ObSERVE Survey
(Summer 2016)



- 87,330 individuals
(95% CI: 58,029-131,426)

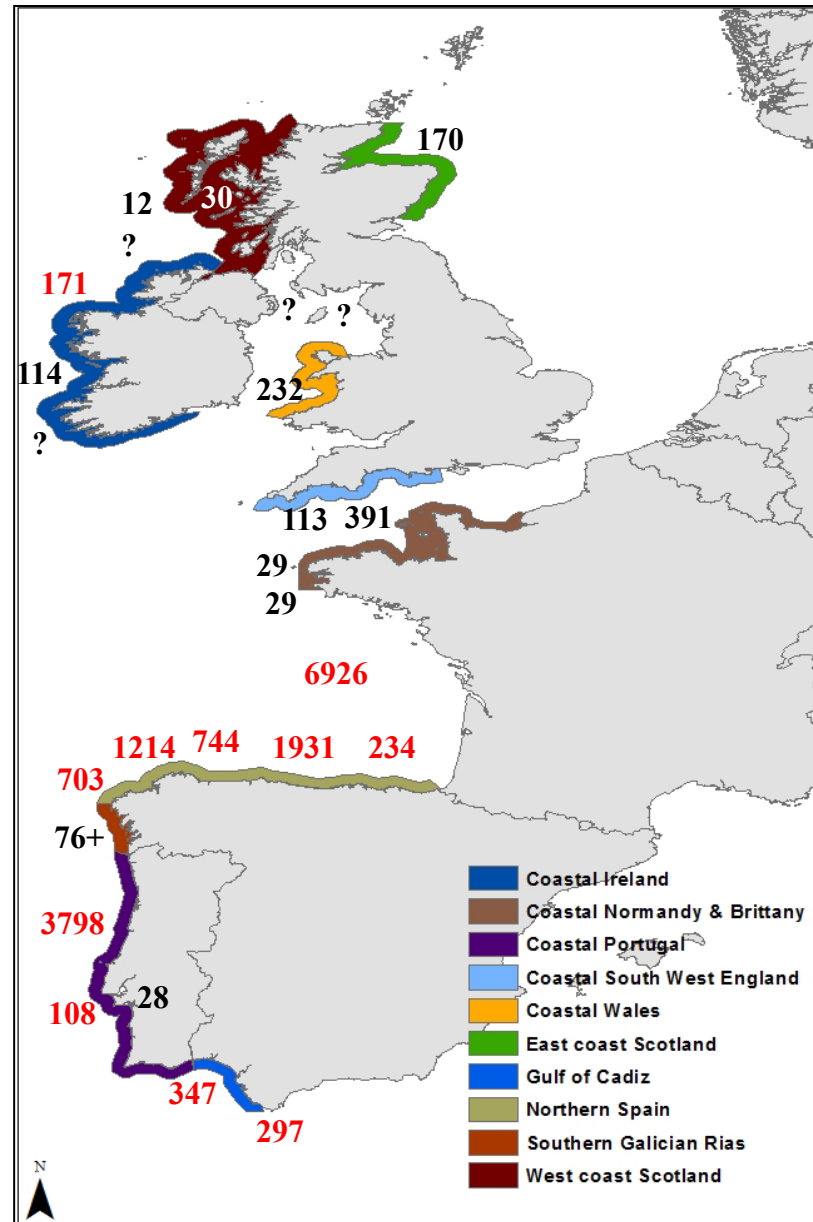
(Winter 2016)



- 212,646 individuals
(95% CI: 157,026-287,967)

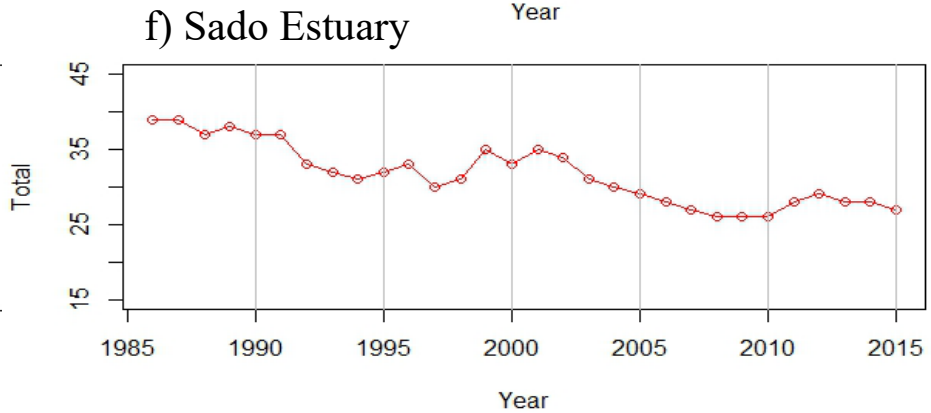
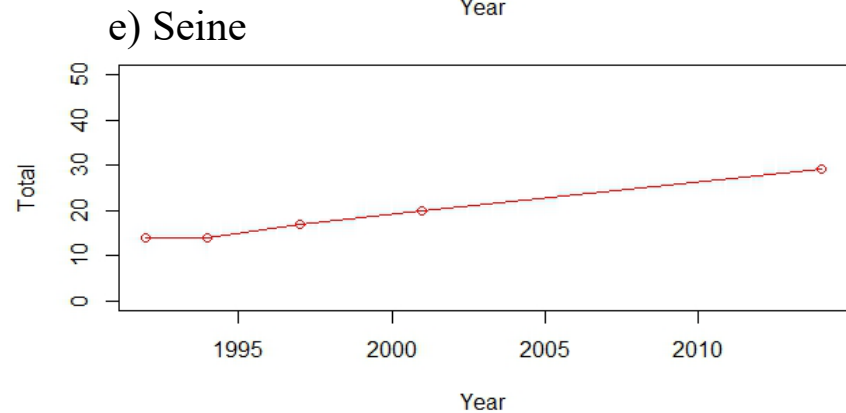
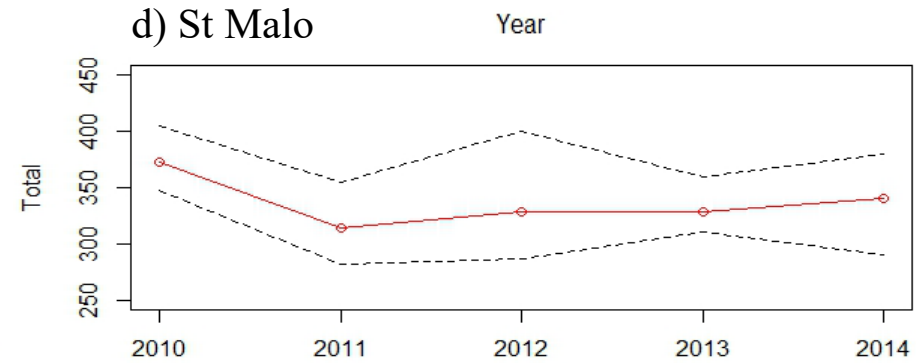
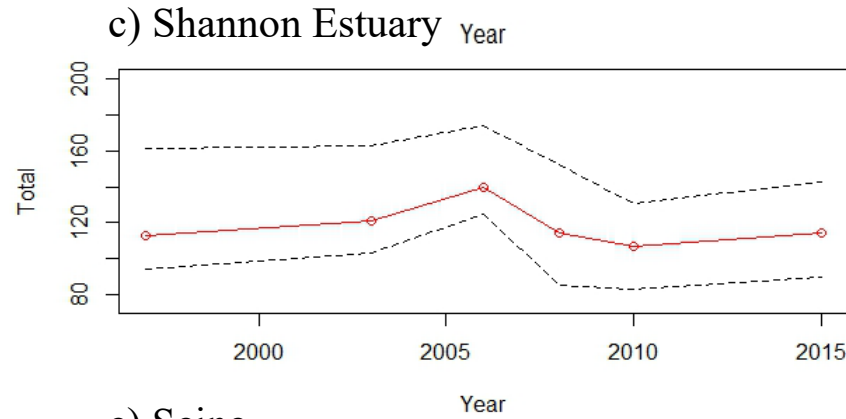
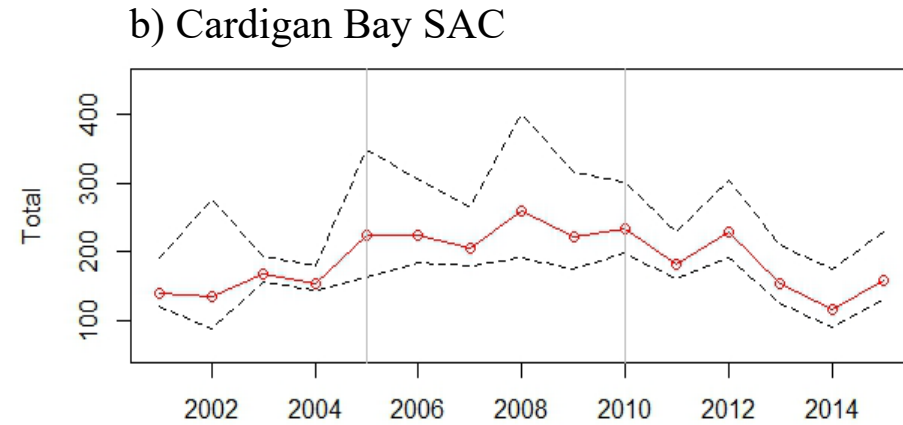
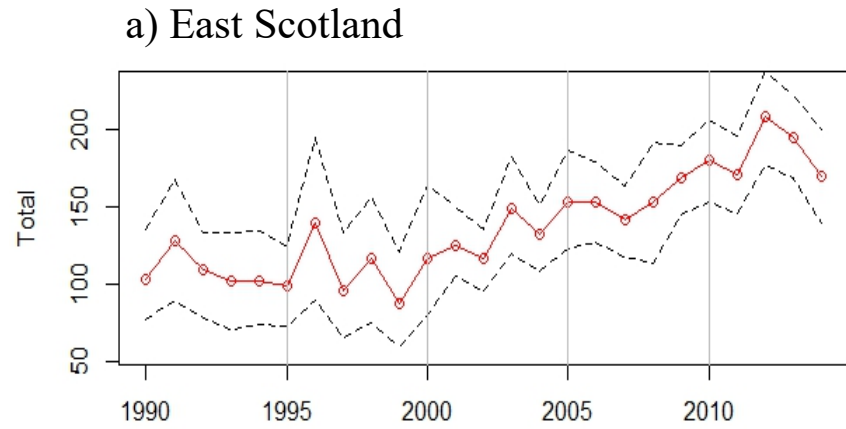
Source: Rogan et al. (2017)

BOTTLENOSE DOLPHIN NUMBERS IN ATLANTIC EUROPE



- Coastal populations all small, between c. 10 and 400 individuals
- Off-shelf population appears to be an open one, and is much larger, numbering in the thousands or tens of thousands
- Where the shelf edge comes close to the coast, as around the Iberian Peninsula, it becomes difficult to differentiate offshore from coastal populations except in estuarine habitats such as Sado Estuary and South Galician Rias

COASTAL BOTTLENOSE DOLPHIN POPULATION TRENDS

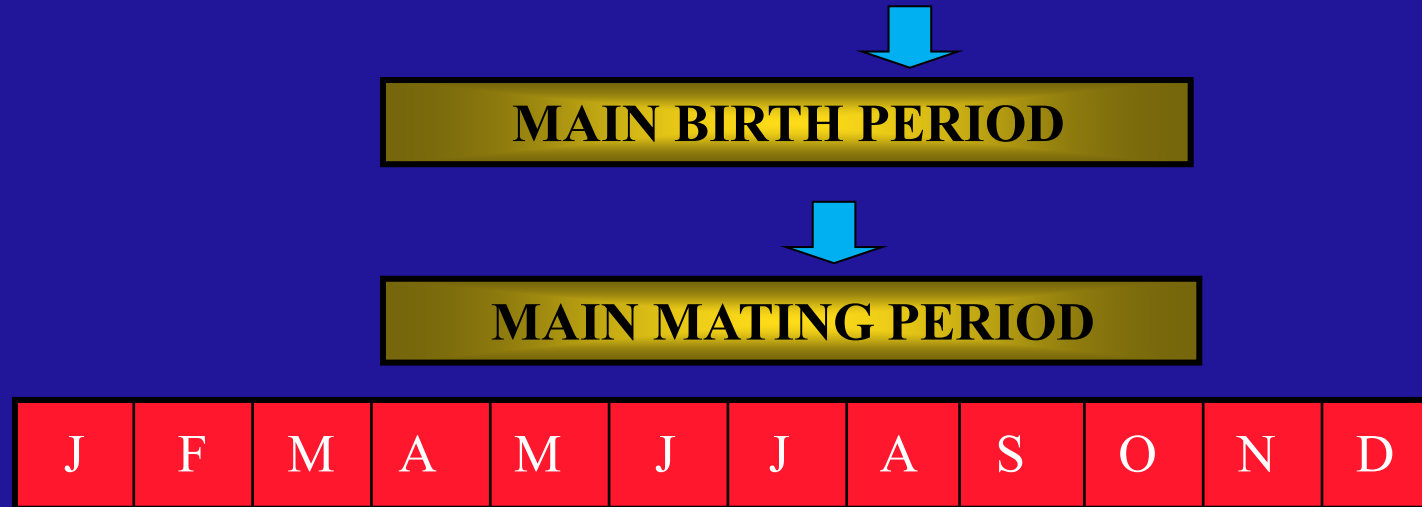


Source: ICES (2016)

Life History Parameters



ANNUAL CYCLE OF THE BOTTLENOSE DOLPHIN



Gestation Period: 12-13 months
Lactation Period: 18-24 months
Calving Interval: 2-10 years (av. 4)

Bottlenose Dolphin Life History Parameters



Sources: Gaspar (2003), Wilson (2008), Silva et al. (2009), Lohrengel et al. (2017), Robinson et al. (2017), Arso Civil et al. (2017, 2019), Cheney et al. (2019)

Growth & Reproduction

- Length at birth is 120-130 cm and up to 30 kg weight
- Adult lengths 3.0-3.8 m, weighing up to 650 kg
- Males become sexually mature at 9-15 years; females at 5-13 years of age
- Level of sexual dimorphism unknown, but adult males in western North Atlantic 10% longer than females

Life Span

- Males 40-45 (52) years
- Females c. 50 (>67) years
- calf survival (0-1 yr): 0.83-0.90;
juvenile survival (1-9 yr): 0.94;
adult survival (>9 yr): 0.95-0.99

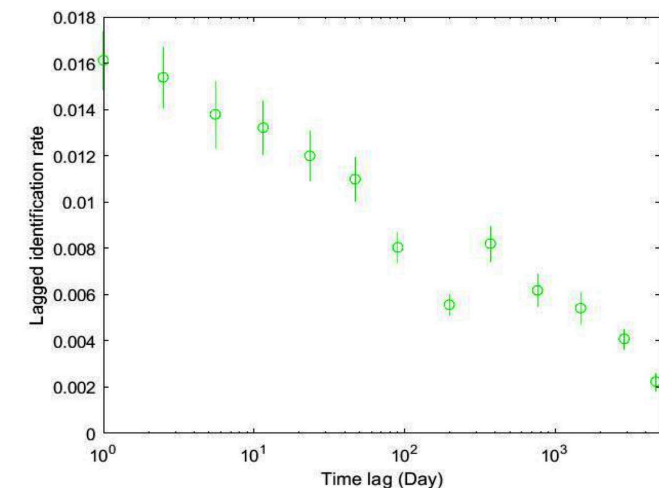
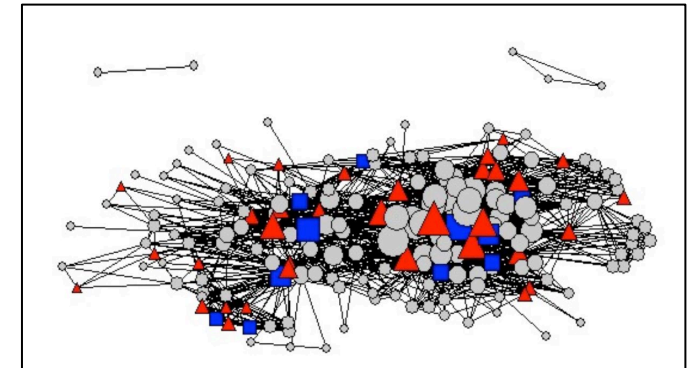
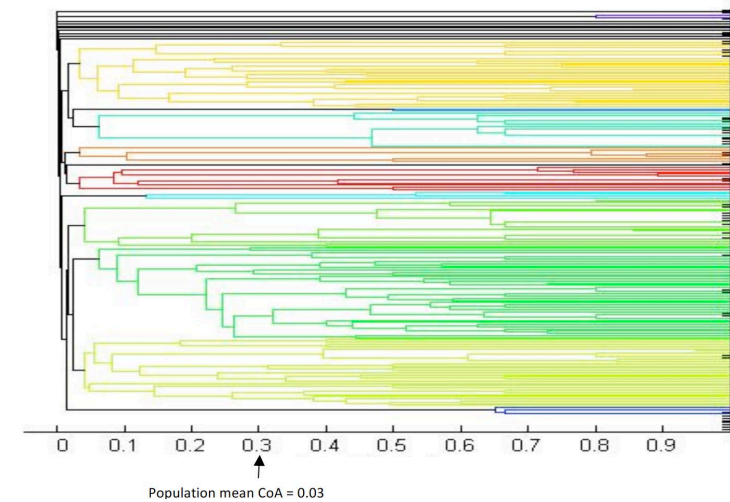
Bottlenose Dolphin Social Behaviour



BOTTLENOSE DOLPHIN BEHAVIOUR AND SOCIAL STRUCTURE

- Typical group size of coastal ecotype: 2-20 (100) individuals, and of offshore ecotype: 10-100 (500) individuals
- Studies of social structure undertaken on bottlenose dolphin populations in the Moray Firth (Scotland), Cardigan Bay (Wales), Shannon Estuary (Ireland), Normandy/Brittany (France), Galicia (NW Spain), and Sado Estuary (Portugal)
- Diverse, non random social bonds; temporal associations best fit a model of preferred companions and casual acquaintances against standardised lagged association rates
- Most associations are between pairs of individuals which may be long-lasting but forming a society governed by fission-fusion dynamics

Sources: Wilson (1995), Augusto (2011), Richardson (2012), Sim (2015), Louis et al. (2015, 2018), Baker et al.,(2017), Manusset et al. (2019), Thomson (2021)





Feeding Ecology

BOTTLENOSE DOLPHIN FEEDING

Atlantic salmon



Garfish



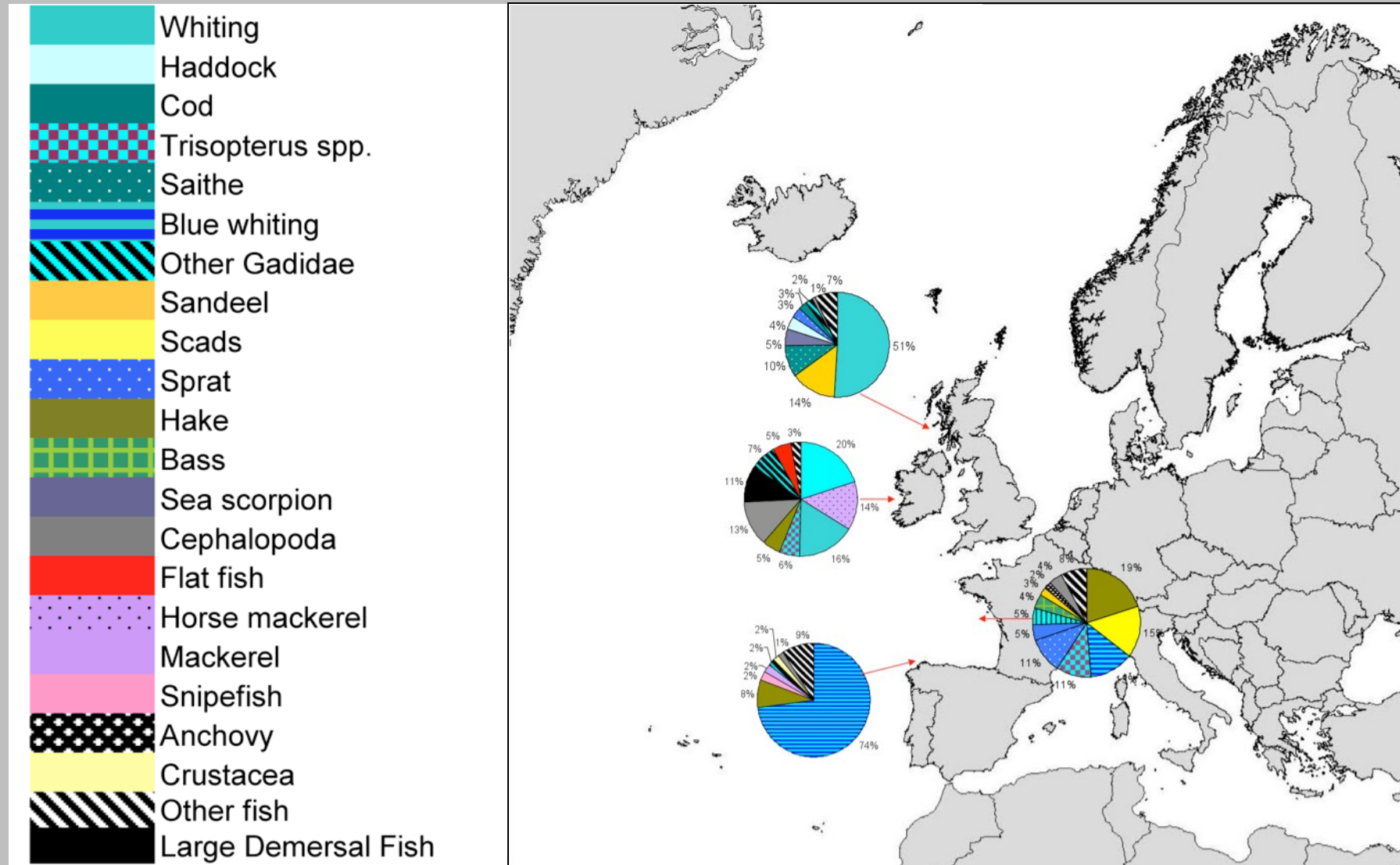
Sea bass



Sand eel

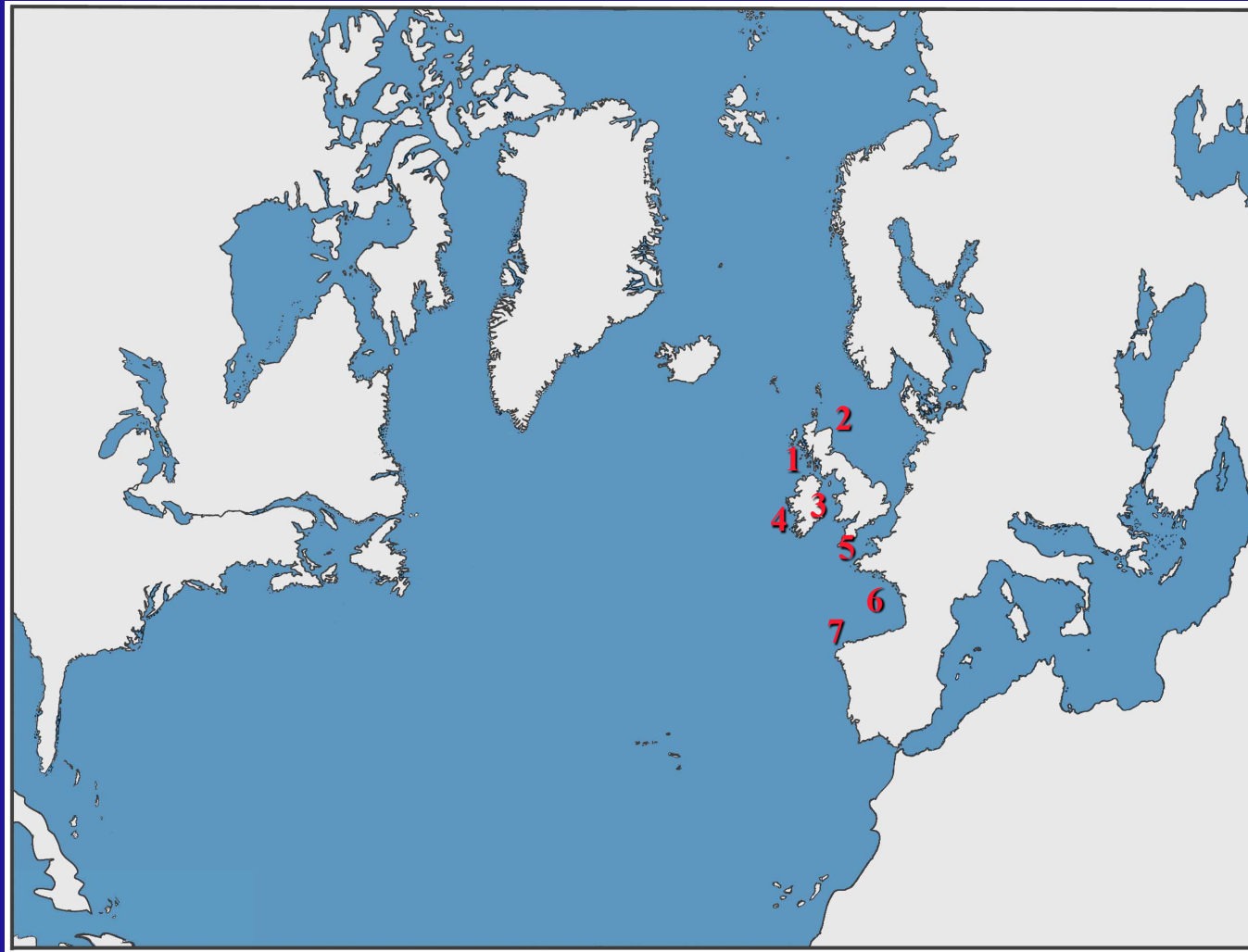


BOTTLENOSE DOLPHIN DIET IN NW EUROPE (BY NUMBER)



Source: Santos et al. (2001, 2007), Spitz et al. (2006), Hernandez-Milian et al. (2015)

Geographic Variation in Bottlenose Dolphin Diet



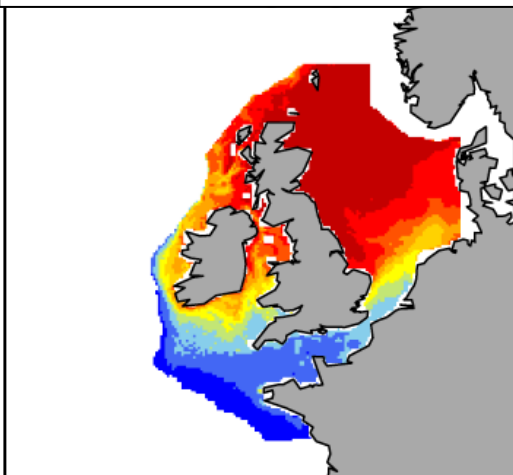
Principal Species

- 1 Whiting, saithe, cod, sand eels, sprat, haddock
- 2 Salmonids, eels, whiting
- 3 Salmonids, eels, whiting, sea bass, sand eels, sole, dab, brill
- 4 Whiting, hake, horse mackerel, blue whiting, pollack, conger eel, ling
- 5 *Trisopterus* spp., mackerel, gobies
- 6 Hake, blue whiting, horse mackerel, sprat, mullets
- 7 Hake, blue whiting

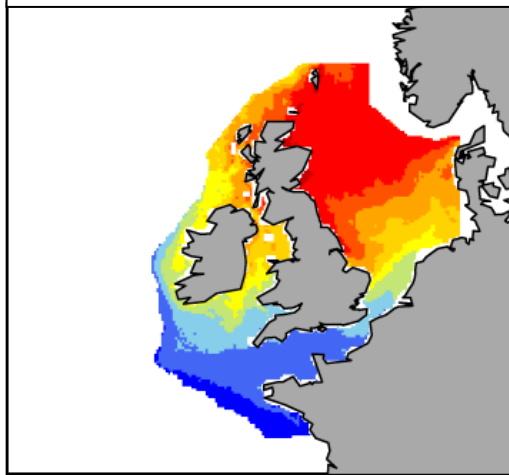
Sources: Santos et al. (2001, 2007), De Pierrepont et al. (2005), Spitz et al. (2006), Hernandez-Milian et al. (2015), Lohregel et al. (2017)

Modelled Prey Distributions

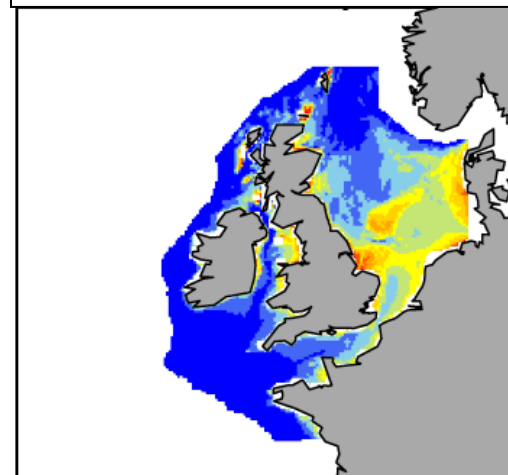
Whiting



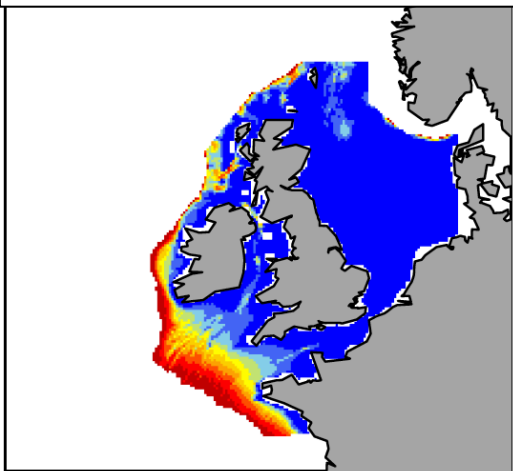
Cod



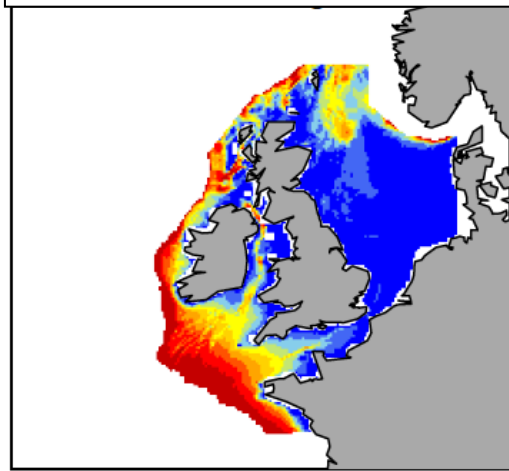
Sandeel



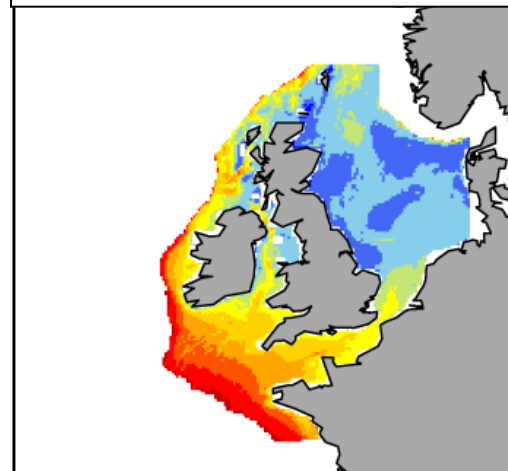
Blue Whiting



European Hake



Horse Mackerel



POSSIBLE SCHEMATIC TO DESCRIBE BOTTLENOSE DOLPHIN POPULATIONS

Trait	Offshore	Coastal	Estuarine
Home Range	Large	Medium - Large	Small
Prey resources	Mobile pelagic/semi-pelagic fish, e.g. blue whiting, hake, horse mackerel, mackerel, saithe	Benthic/demersal fish, e.g. sole, dab, haddock, whiting + Pelagic fish, e.g. herring, sea bass	Benthic/demersal fish, e.g. sole, dab, + Riverine species, e.g. eel, salmon, trout
Movements	Migratory	Semi-Resident	Resident
Typical group size	Large	Variable	Small
Carrying capacity	Large, in thousands	Medium, in hundreds	Small, in tens



Human Pressures



Whaling



Over fishing



Entanglement in
fishing gear



Ship strikes



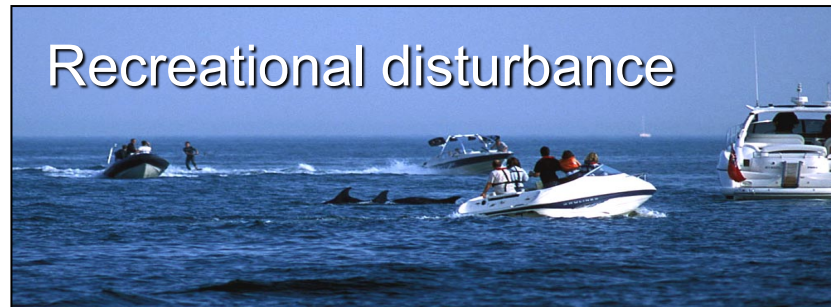
Pollution



Active sonar



Shipping



Recreational disturbance



Climate
Change



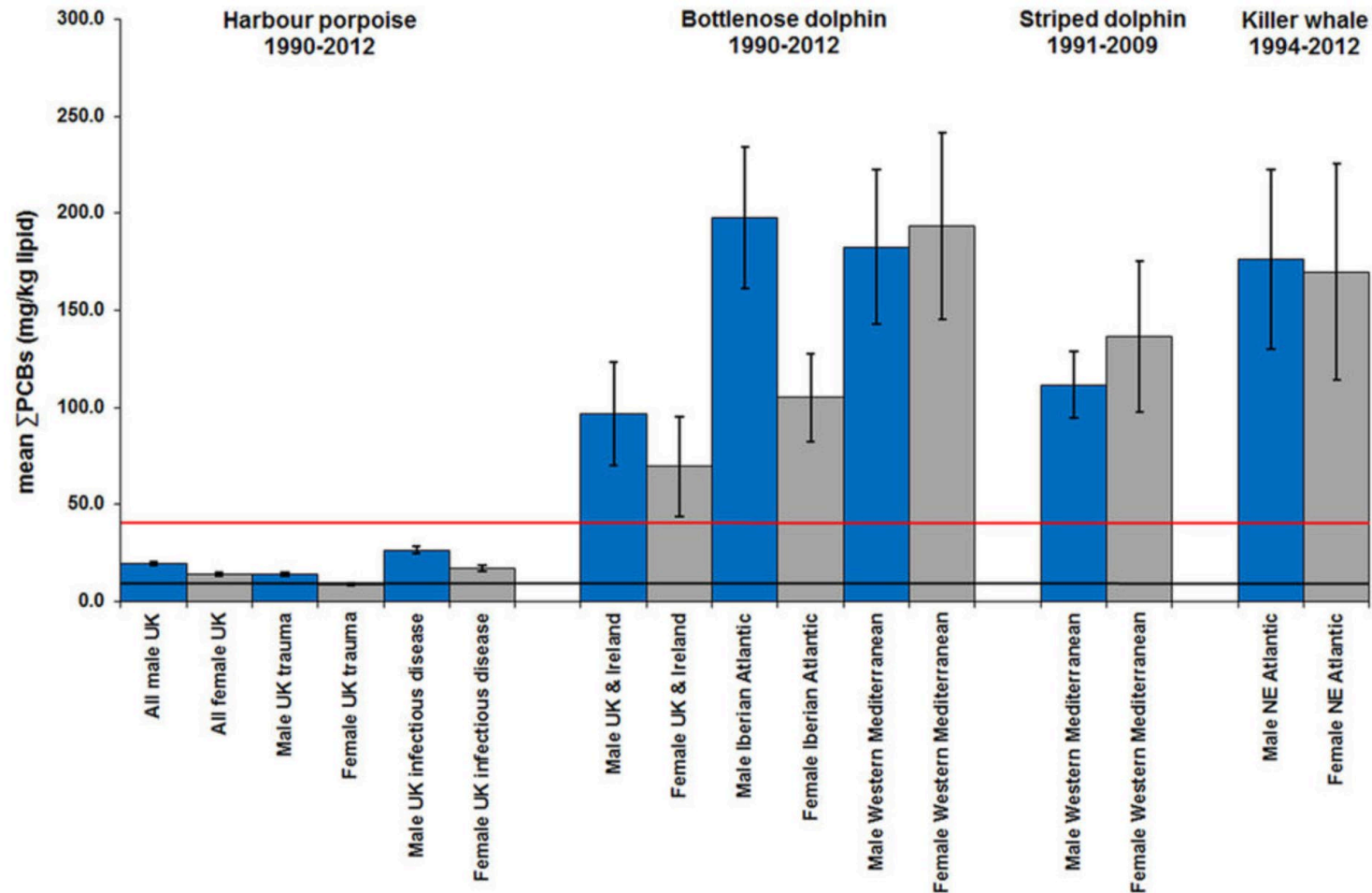
Wind farm construction

Bottlenose Dolphin Threats Matrix

		Coastal			Offshore		
		Greater North Sea	Celtic Seas	Bay of Biscay	Greater North Sea	Celtic Seas	Bay of Biscay
POLLUTION & OTHER CHEMICAL CHANGES	Contaminants	H	H	H	M	M	M
	Nutrient enrichment	L	L	L	L	L	L
PHYSICAL LOSS	Habitat loss	L	L	L	L	L	L
PHYSICAL DAMAGE	Habitat degradation	L	L	L	L	L	L
OTHER PHYSICAL PRESSURES	Litter (inc. <u>microplastics</u> and discarded fishing gear)		L	L	L	L	L
	Underwater noise changes	Military Sonar	L	L	L	L	L
		Seismic surveys	L	M	L	M	L
		Pile-driving	M	M	L	L	L
		Explosions	M	L	L	L	L
		Shipping	M	L	L	L	L
	Barrier to species movement (offshore windfarm, wave or tidal device arrays)		L	L	L	L	L
	Death or injury by collision		M	M	L	L	L
BIOLOGICAL PRESSURES	Introduction of microbial pathogens		L	L	L	L	L
	Removal of target and non-target species (prey depletion)		M	M	M	M	M
	Removal of non-target species (marine mammal bycatch)		L	L	M	L	M
	Disturbance (e.g. wildlife watching)		M	M	M	L	L
	Deliberate killing + hunting		L	L	L	L	L

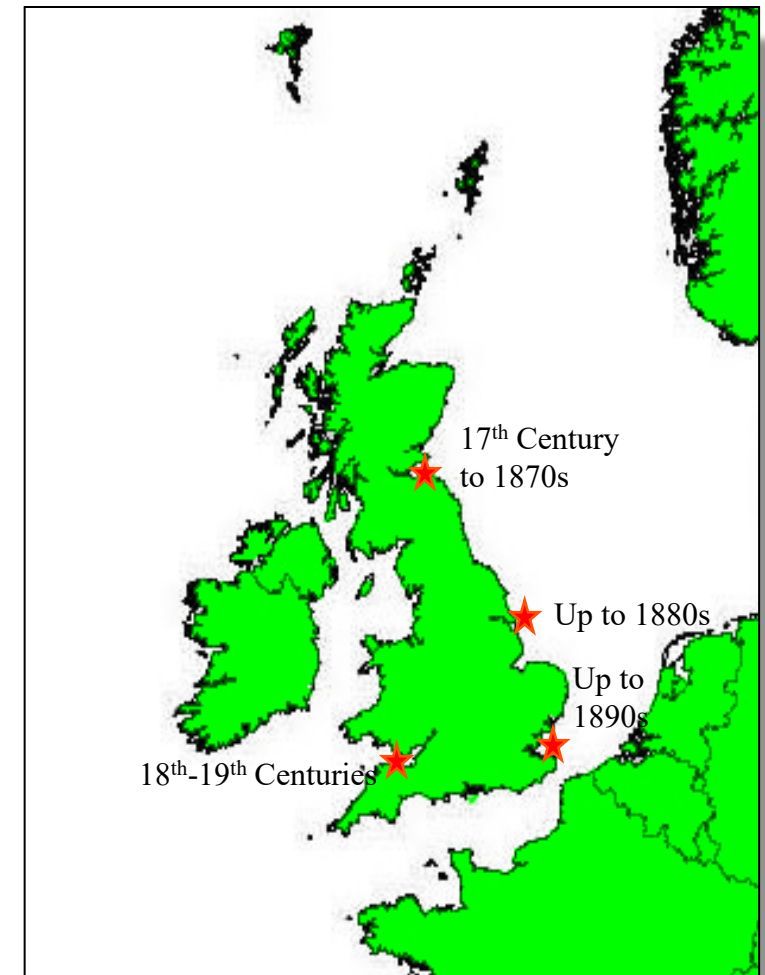
Source: ICES WGMME (2019)

PCB CONTAMINANT BURDENS



Source: Jepson *et al.* (2016)

HISTORICAL BOTTLENOSE DOLPHIN DISTRIBUTIONS IN THE UK

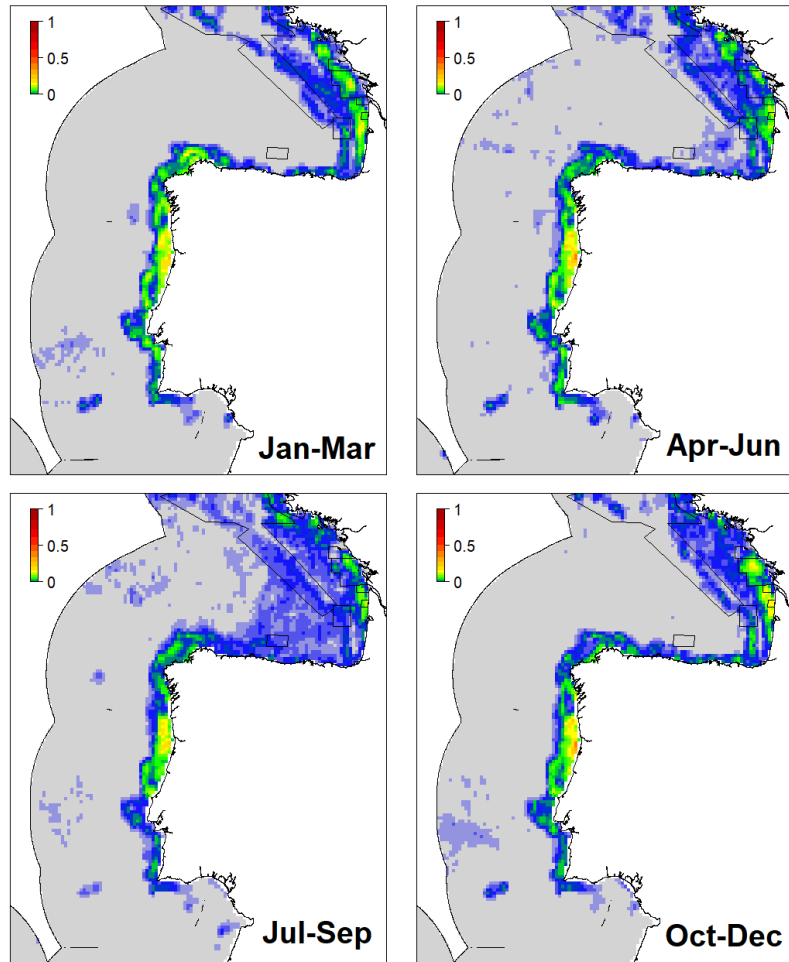


Derived from: Evans & Scanlan (1990)

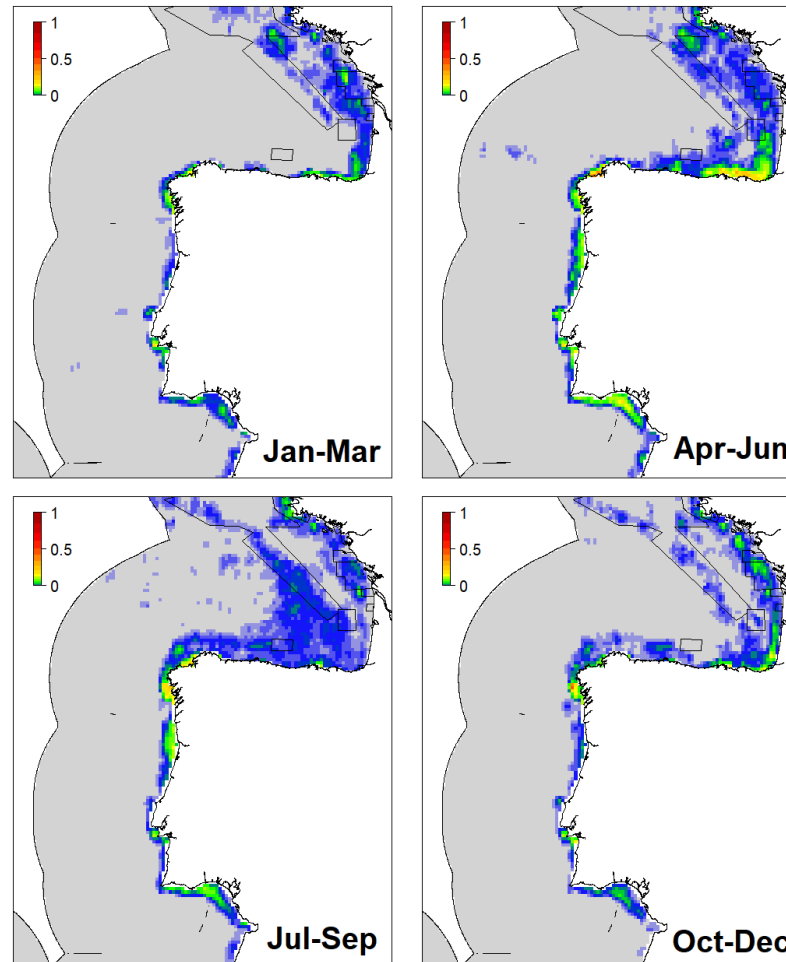
★ = Localities where bottlenose dolphins formerly occurred regularly

BOTTLENOSE DOLPHIN BYCATCH SEASONAL RISK MAPS

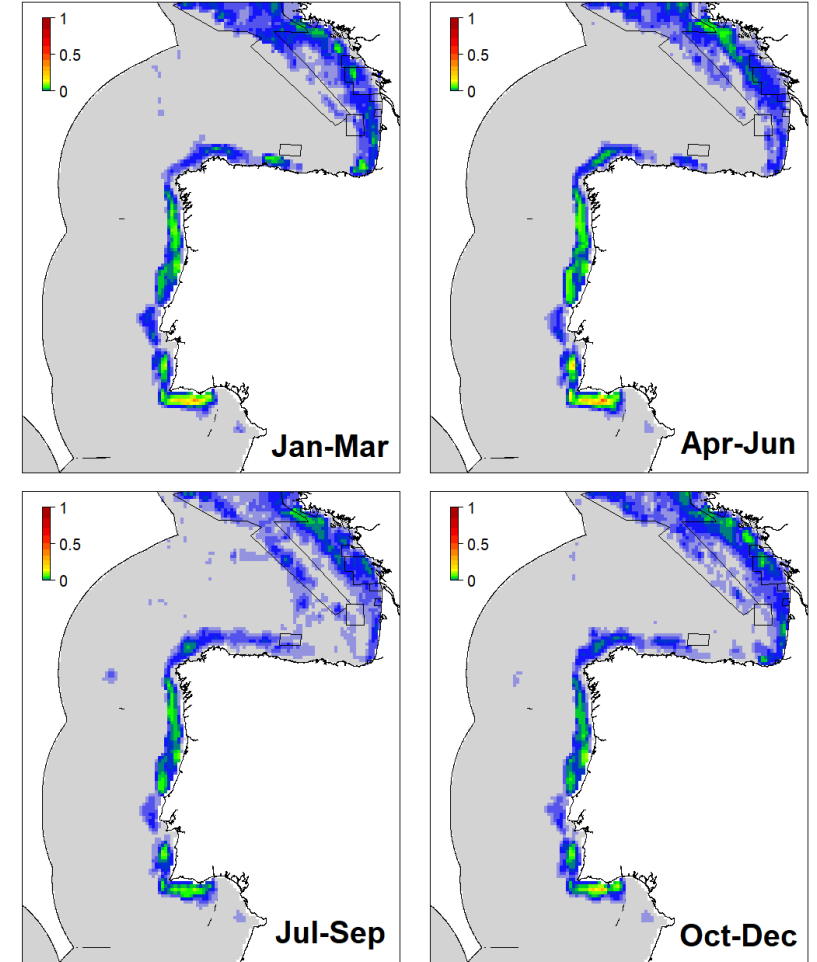
Gillnets



Pelagic Trawls



Demersal Trawls



Source: Evans et al. (2021)

Effects of Recreational Activities on Bottlenose Dolphins

Short-term

- avoidance
- increased dive times
- increased swim speeds
- frequency shifts in vocalisations
- changes in social cohesion
- disruption of social groups



Long-term

- movement out of the affected area
- decline in relative abundance
- disruption of association patterns



Sources: Bejder and Samuels (2003), Hastie et al. (2003), Mattson et al. (2005), Bejder et al. (2006a, b), Lusseau (2006), Lusseau et al. (2006, 2009), New et al. (2013), Hudson (2014), Pirodda et al. (2014, 2015), Koroza (2018), Vergara-Peña (2019)

Natura 2000 sites hosting Bottlenose Dolphin *Tursiops truncatus*

321 sites in twelve
Member States:-

A: 10 (4 Atlantic)

B: 43 (8)

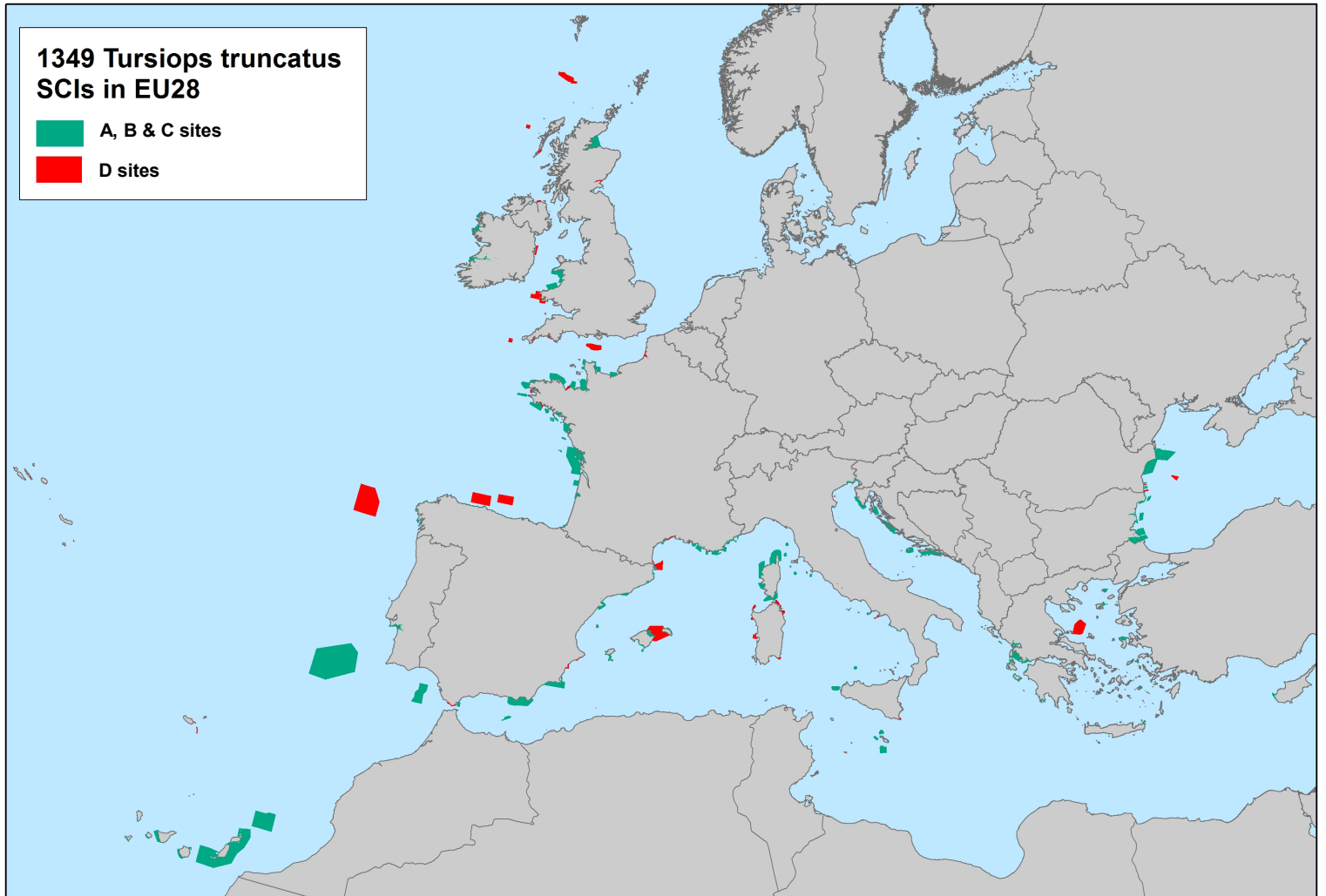
C: 162 (37)

D: 89 (23)

Unspecified: 17 (1)

Source:

*European
Commission (2020)*



SAC Conservation Objectives

To maintain (or restore) the habitat and species features, as a whole, at (or to) Favourable Conservation Status within the site

For species such as bottlenose dolphin:

- **Ensure a Viable Population**

- Population Size

- Reproductive Success

- Population Structure

- Physiological Health

- **Ensure Range is not reduced**

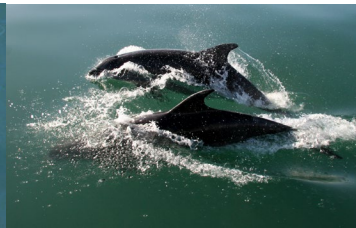
- **Ensure Habitat is sufficient to maintain or increase Population**

- Distribution and Extent

- Structure, Function and Quality

- Prey Availability

- **Management of Activities and Operations to achieve above**



River Lamprey

RECOMMENDATIONS

Research & Monitoring

- Support long-term photo-ID studies of coastal bottlenose dolphins at key sites in the ASCOBANS Agreement Area to determine abundance trends, survival rates, home ranges, and habitat preferences
- Further investigate population structure of both coastal and offshore ecotypes
- Coordinate material from strandings for analysis to better address studies on growth rates and life history parameters, diet, and health status including further investigations of contaminant levels and their impact
- Better monitor coastal fishing effort and bycatch rates in high risk areas such as around the Iberian Peninsula

Conservation Action

- Work towards cleaning up major watersheds reducing/removing harmful chemical inputs
- Identify contexts in which bottlenose dolphin bycatch occurs and introduce appropriate mitigation measures
- Ensure management is fully effective within Marine Protected Areas
- Consider restoration of natural habitats in coastal area, for example by planting seagrass beds in appropriate habitats

Thank You for Listening

