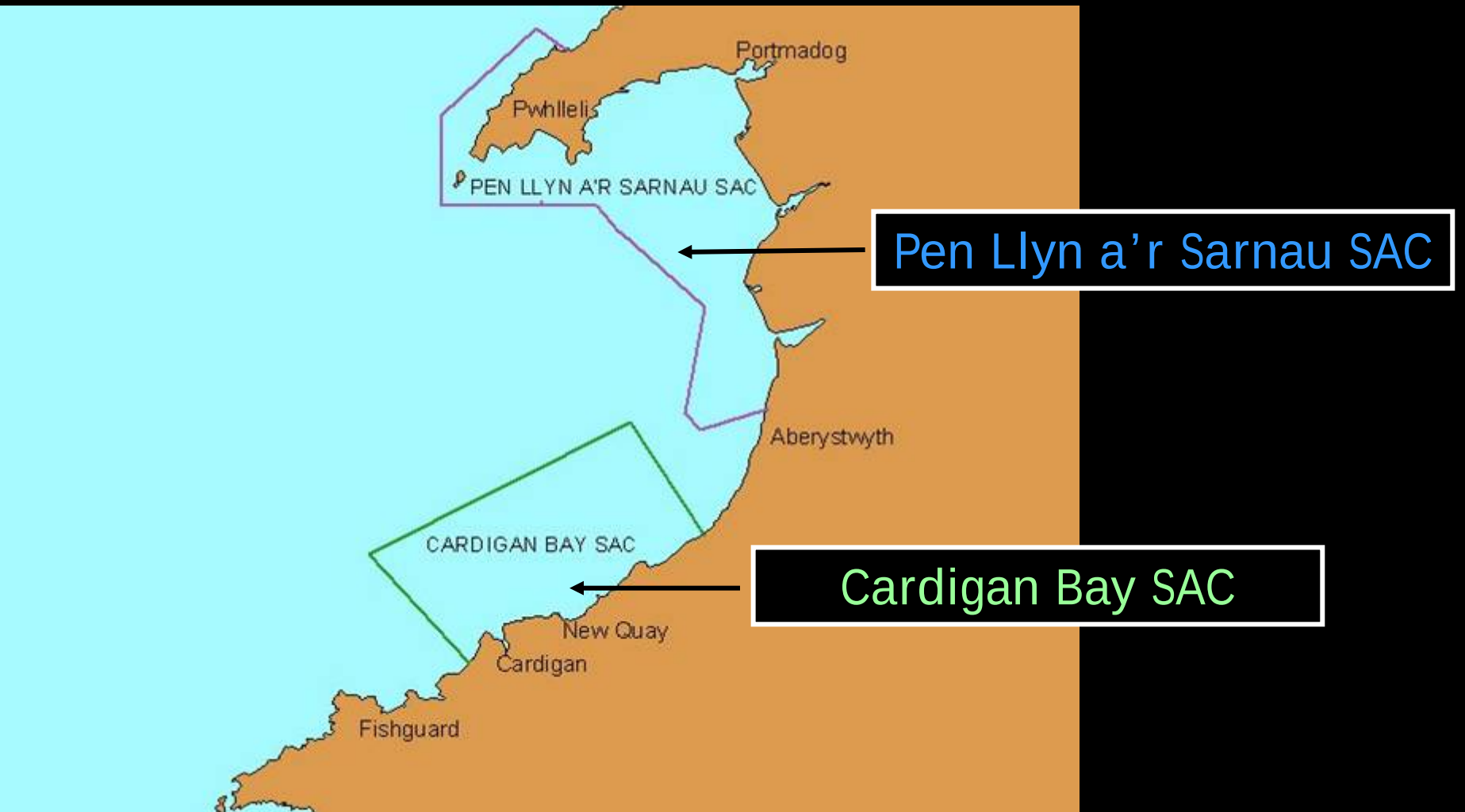
Are we meeting Conservation Objectives for the bottlenose dolphin within two Natura 2000 sites?

Peter G.H. Evans

Sea Watch Foundation & University of Wales Bangor

CARDIGAN BAY, WEST WALES

Two Special Areas of Conservation (SACs) designated in 2004, following the 1992 EU Habitats and Species Directive, in order to protect the bottlenose dolphin population



SAC Conservation Objectives

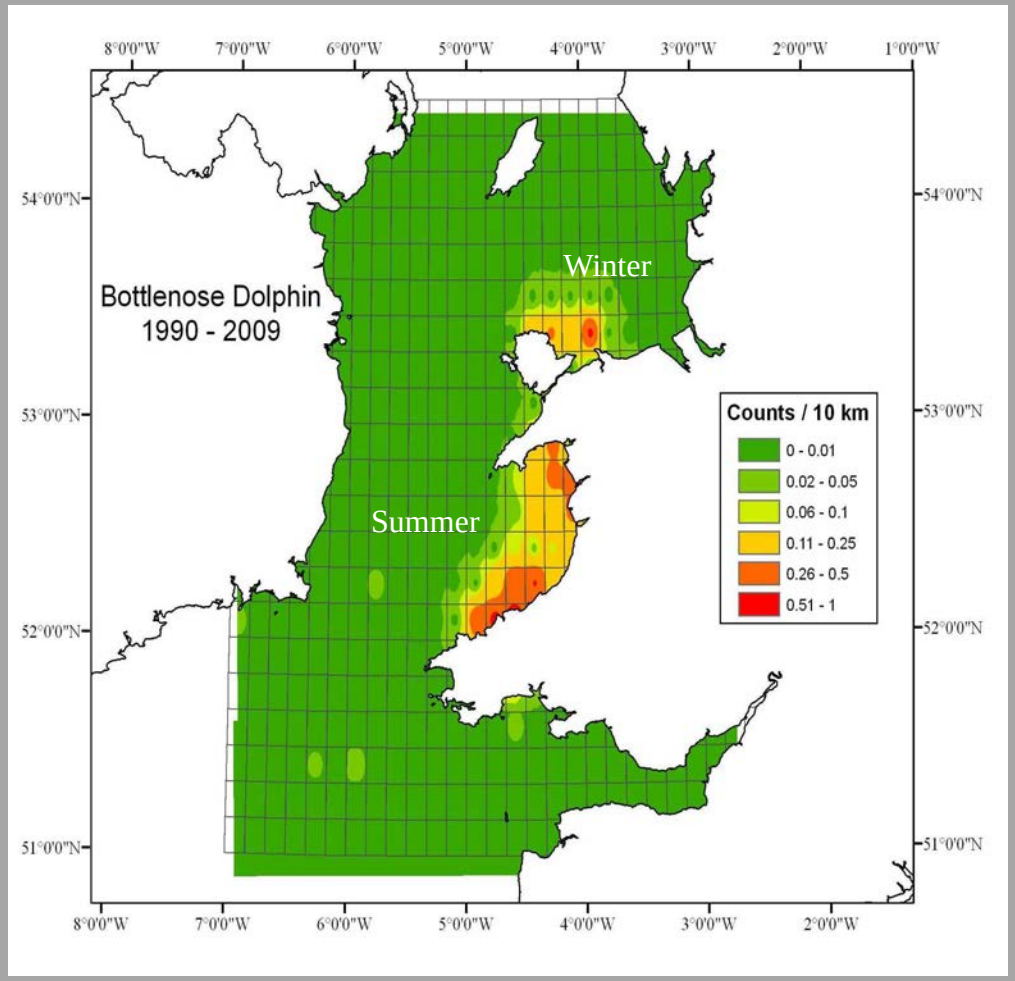
To maintain (or restore) the habitat and species features, as a whole, at (or to) Favourable Conservation Status within the site

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**



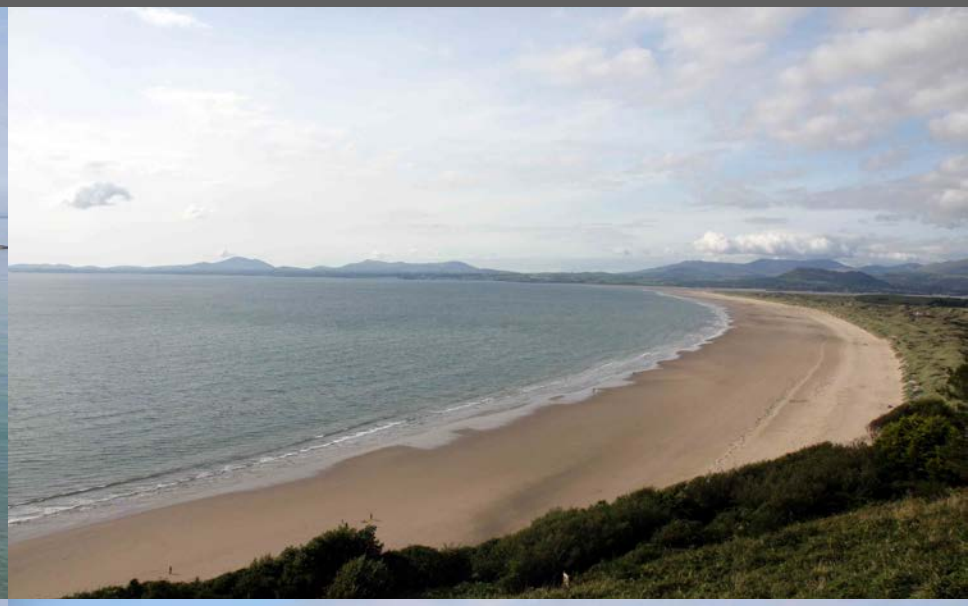

BOTTLENOSE DOLPHIN DISTRIBUTION IN THE IRISH SEA



- locally distributed, mainly coastal, particularly in summer
- main summer concentrations are in Cardigan Bay & in winter, N Wales

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

CARDIGAN BAY COASTAL HABITATS

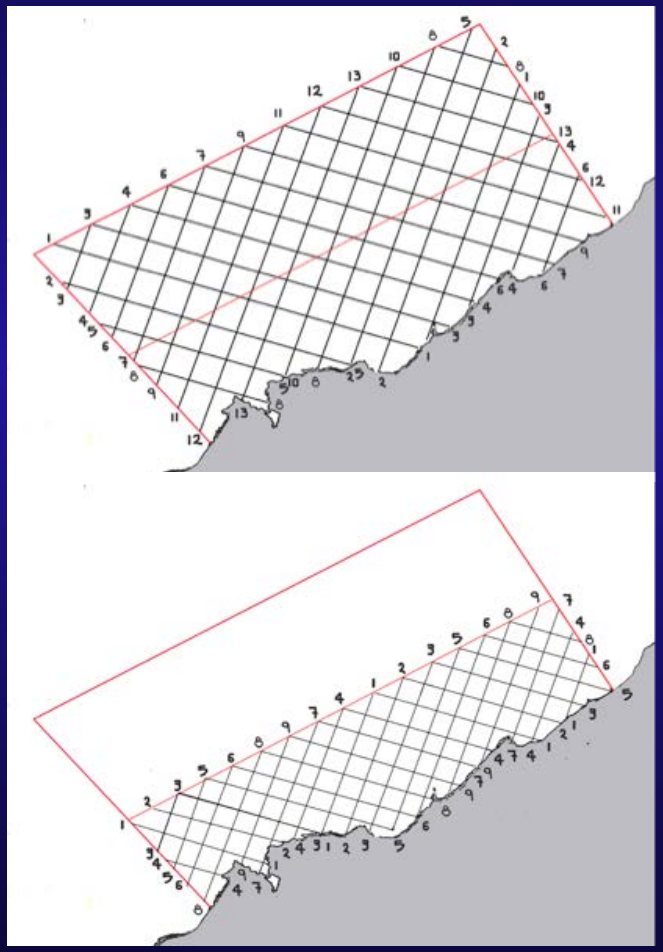


DYFI & TEIFI ESTUARIES

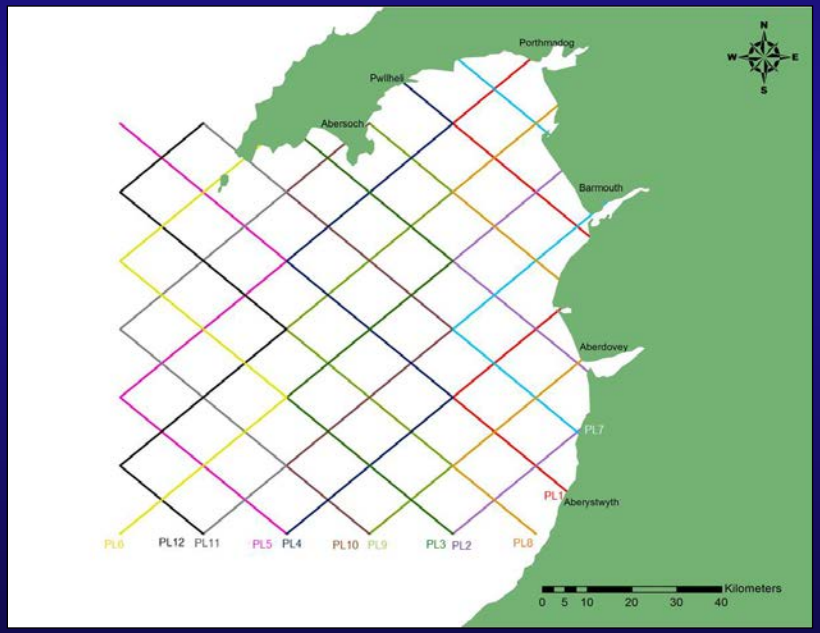
Monitoring methods: Line-transect design

sea watch FOUNDATION

a) Cardigan Bay SAC: 2001-present



b) Northern Cardigan Bay: 2005-present



- Select transects at random
- Survey effort has varied over time

Hosted by Llywodraeth Cymru
Sponsored by Welsh Government

Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

SEA WATCH FOUNDATION WELSH BOTTLENOSE DOLPHIN PHOTO-IDENTIFICATION CATALOGUE 2011

D. Feingold and P.G.H. Evans

CCW Marine Monitoring Report No. 97

Recommended citation for this volume:
Feingold, D. and Evans, P.G.H. (2012) Sea Watch Foundation Welsh Bottlenose Dolphin Photo-Identification Catalogue 2011. CCW Marine Monitoring Report No: 97

Bottlenose Dolphin Photo-ID Catalogue

sea watch FOUNDATION

PHOTO-IDENTIFICATION – the catalogue

248 marked
(103 well and 145 slightly)

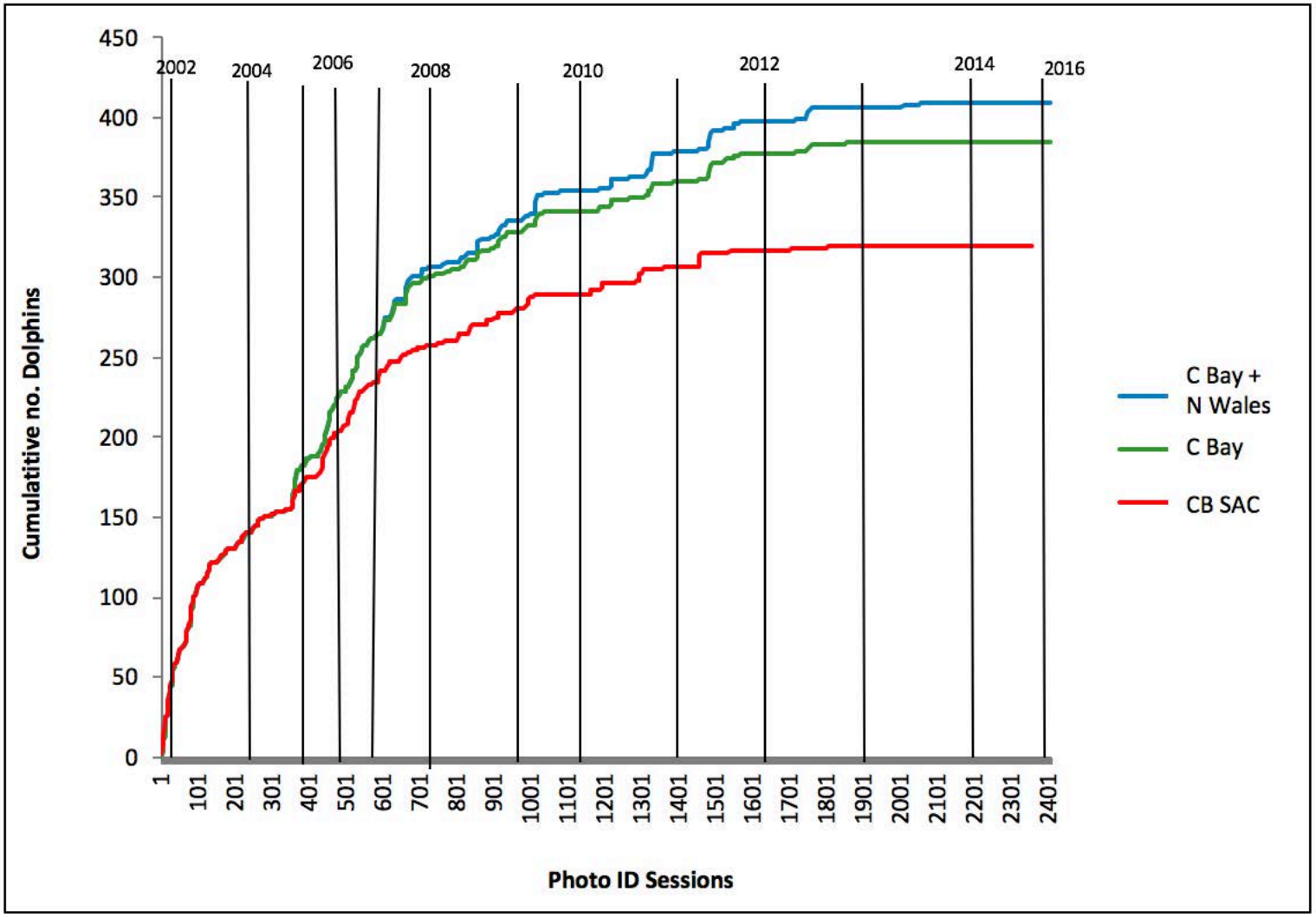
131 right
(no nicks)

120 left
(no nicks)

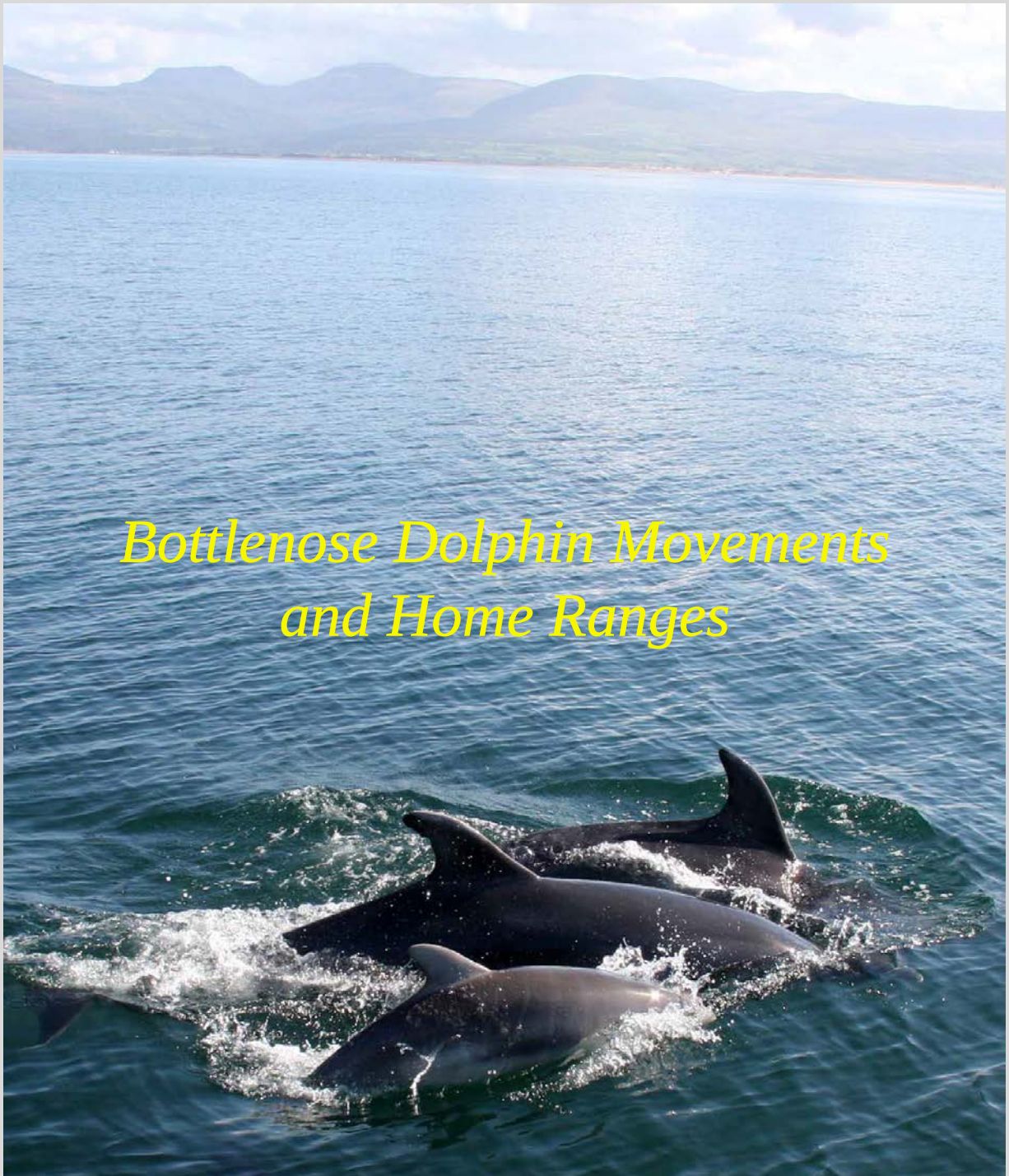
Around 400 dolphins in the catalogue

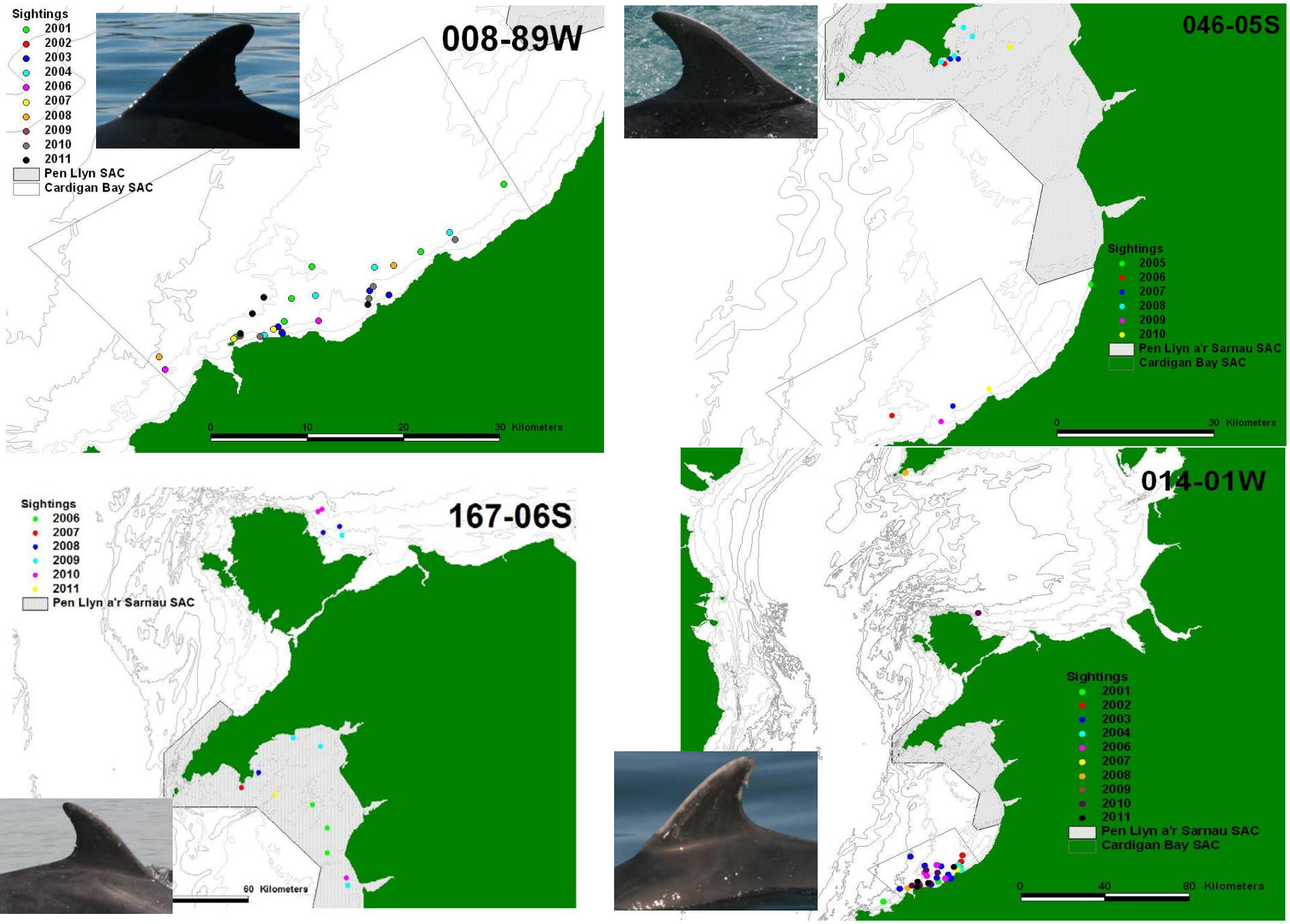
Welsh Bottlenose Dolphin Discovery Curves

sea watch FOUNDATION



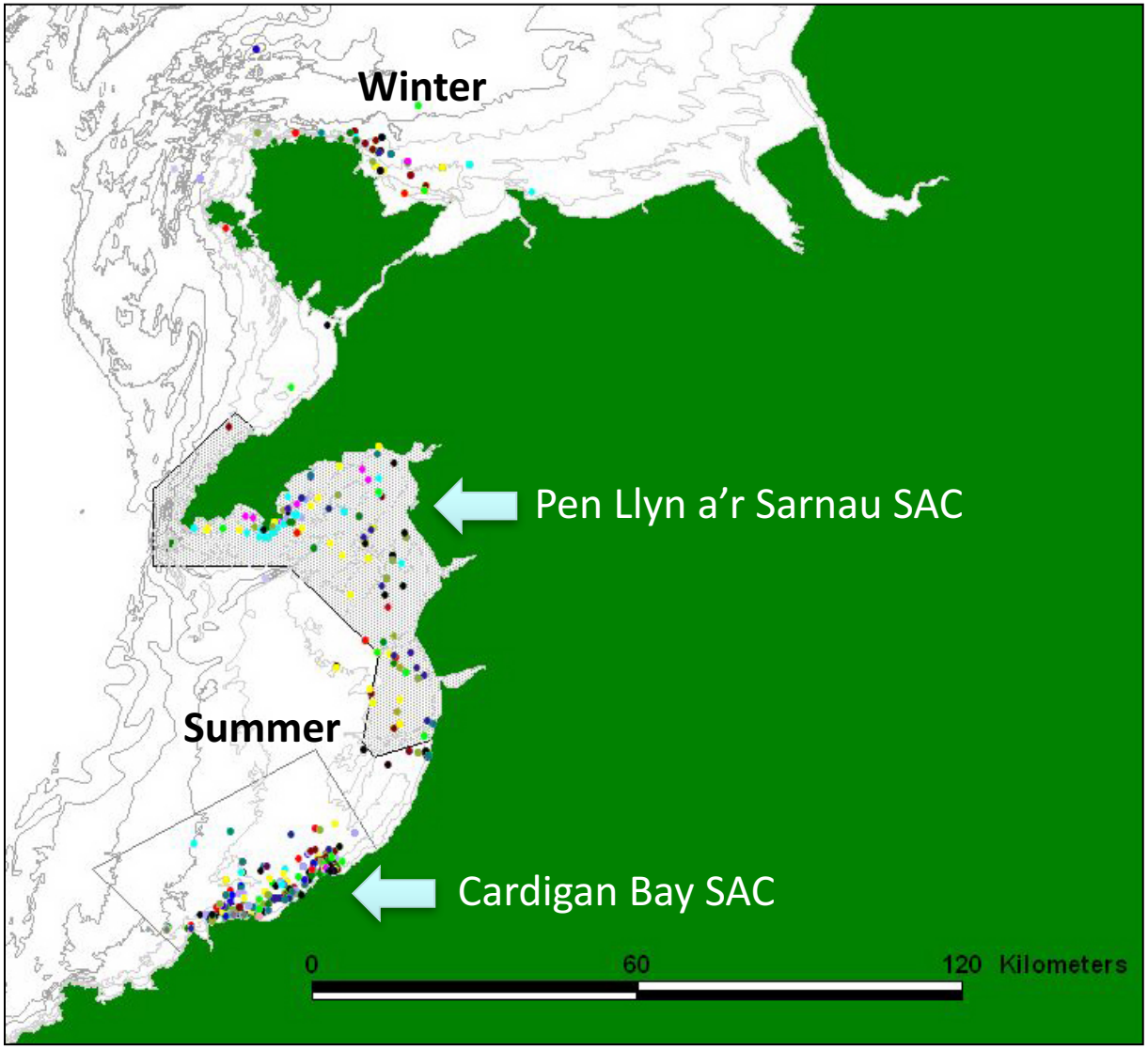
- catalogue size flattening off only since 2008


Bottlenose Dolphin Movements
and Home Ranges



Source: Feingold & Evans, 2014

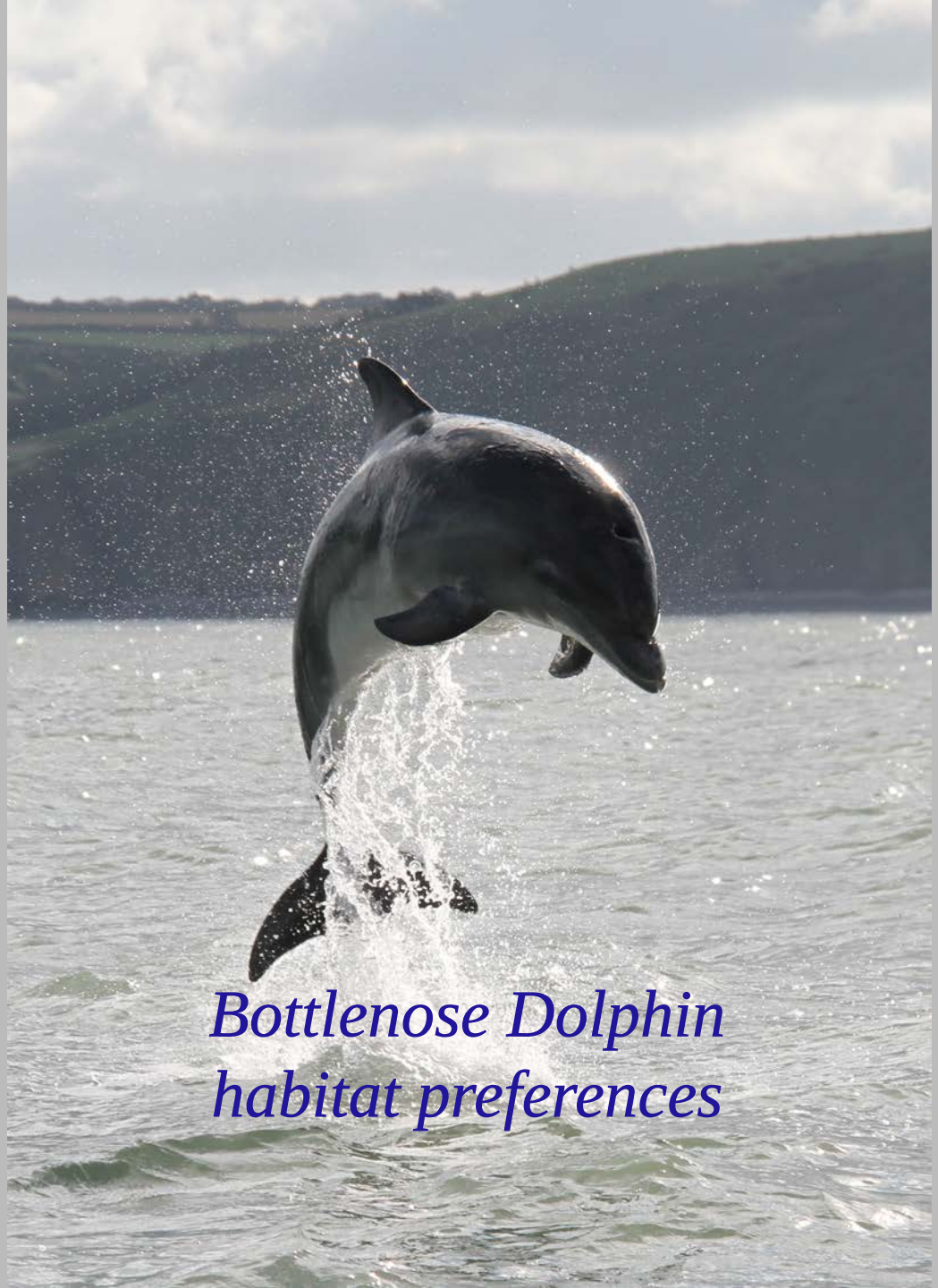
HOME RANGES OF BOTTLENOSE DOLPHINS



Bottlenose Dolphin Photo-ID in Wales

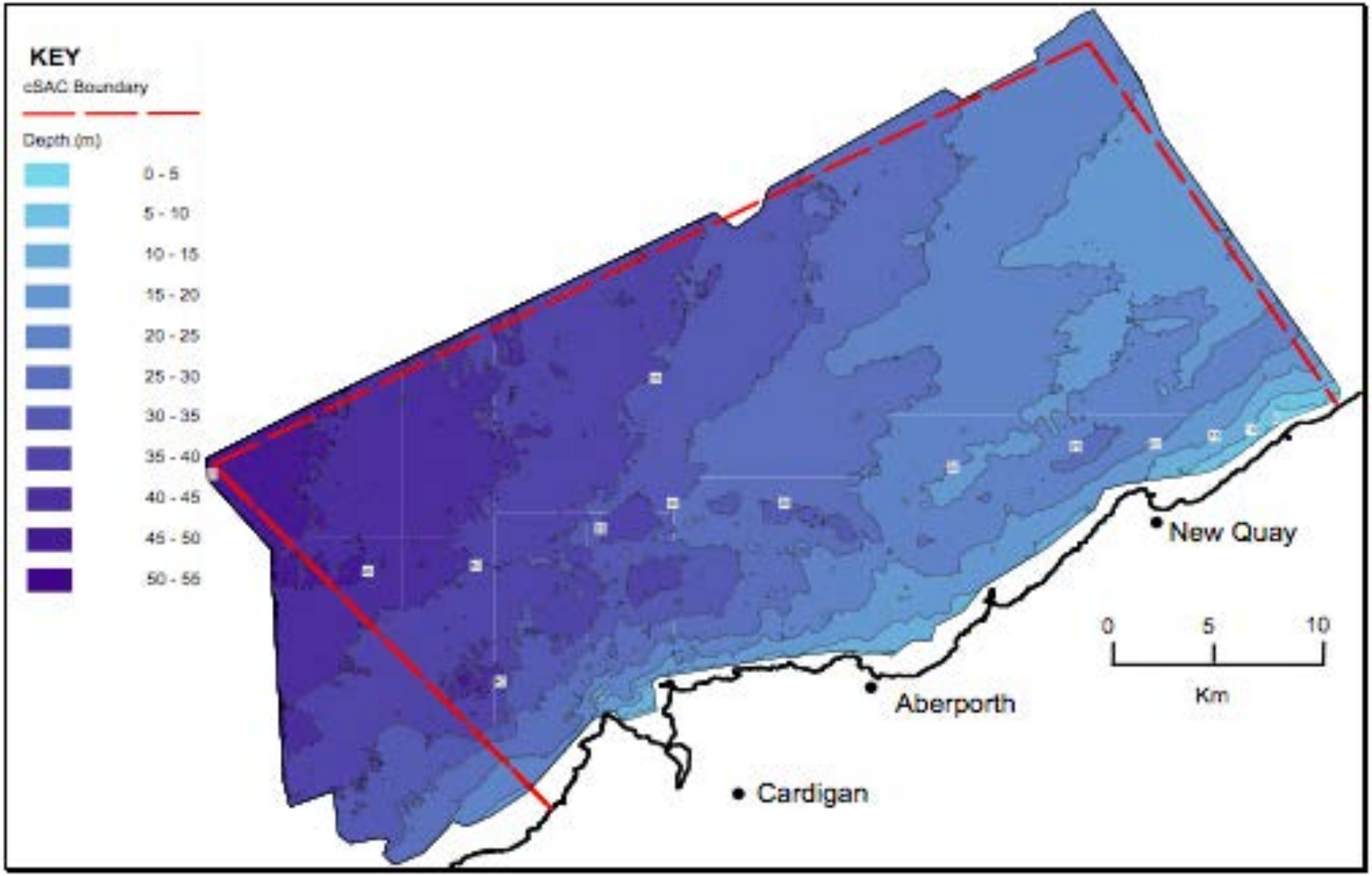
- 77% (167/216) of individuals recorded in Cardigan Bay have also occurred in North Wales
- 19% (42/216) of individuals recorded in Cardigan Bay have also occurred in Isle of Man
- 7% (15/216) of individuals have been recorded only within Cardigan Bay SAC

Source: Lohrengel & Evans, 2016



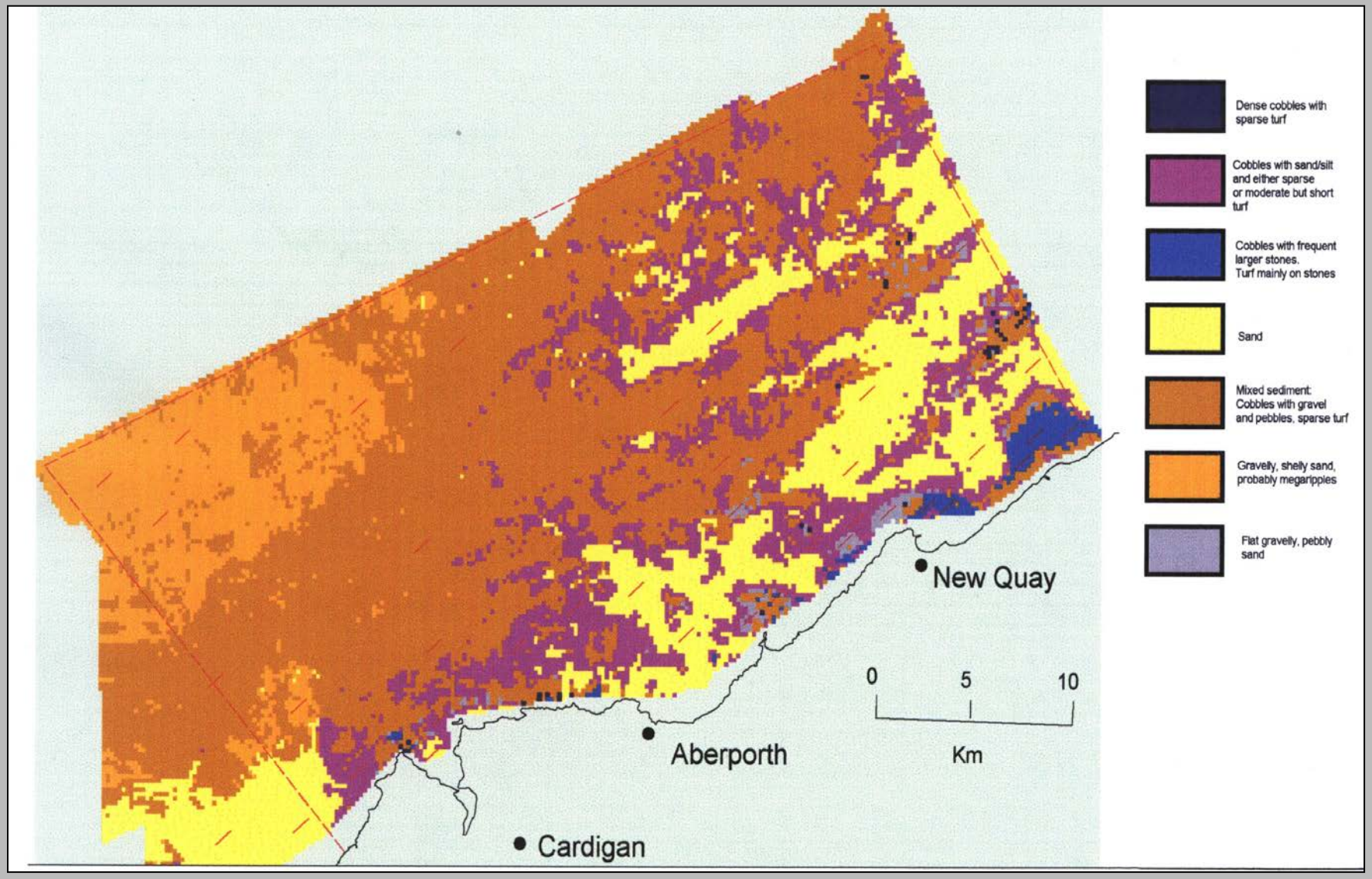
Bottlenose Dolphin habitat preferences

BATHYMETRY IN CARDIGAN BAY SAC



Source: Cardigan Bay SAC Management Scheme (2008)

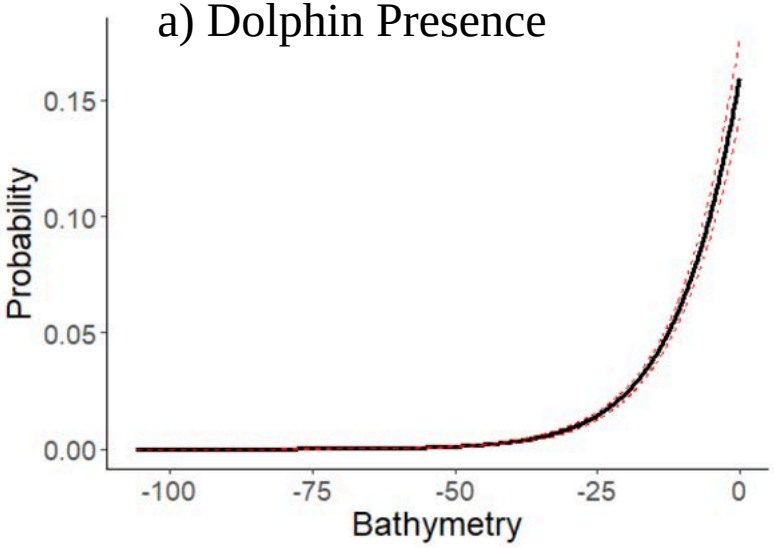
SEDIMENT TYPES IN CARDIGAN BAY SAC

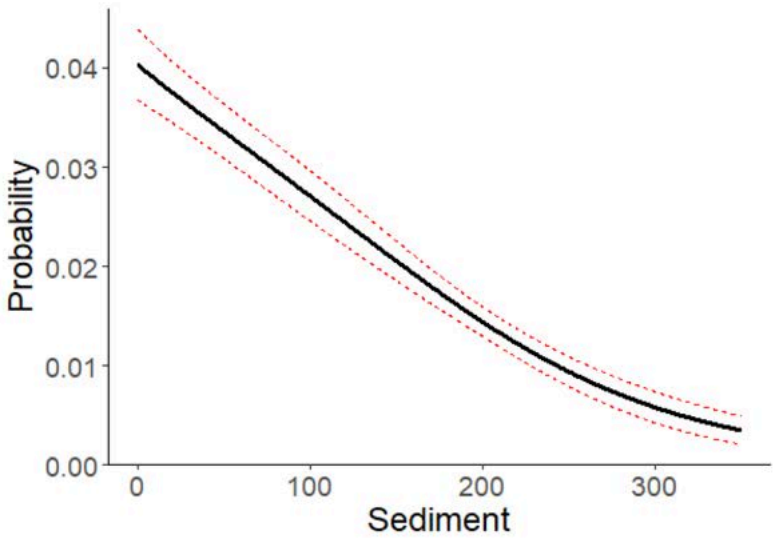


Source: Cardigan Bay SAC Management Scheme (2008)

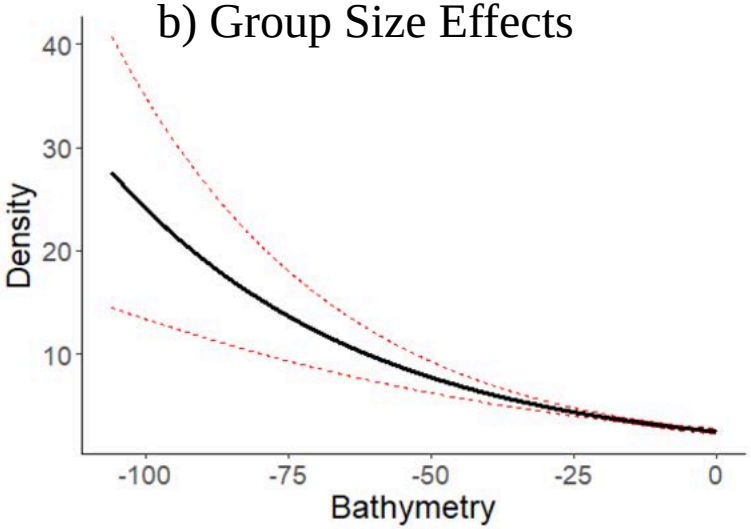
HABITAT PREFERENCES OF BOTTLENOSE DOLPHINS IN CARDIGAN BAY

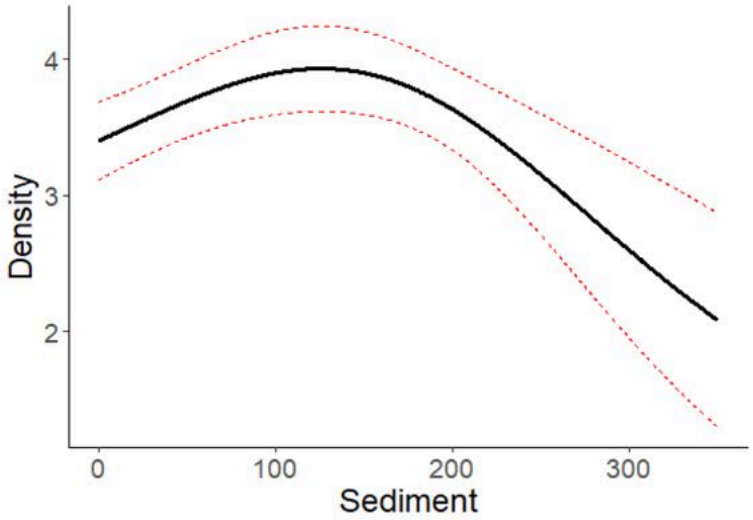
a) Dolphin Presence





b) Group Size Effects

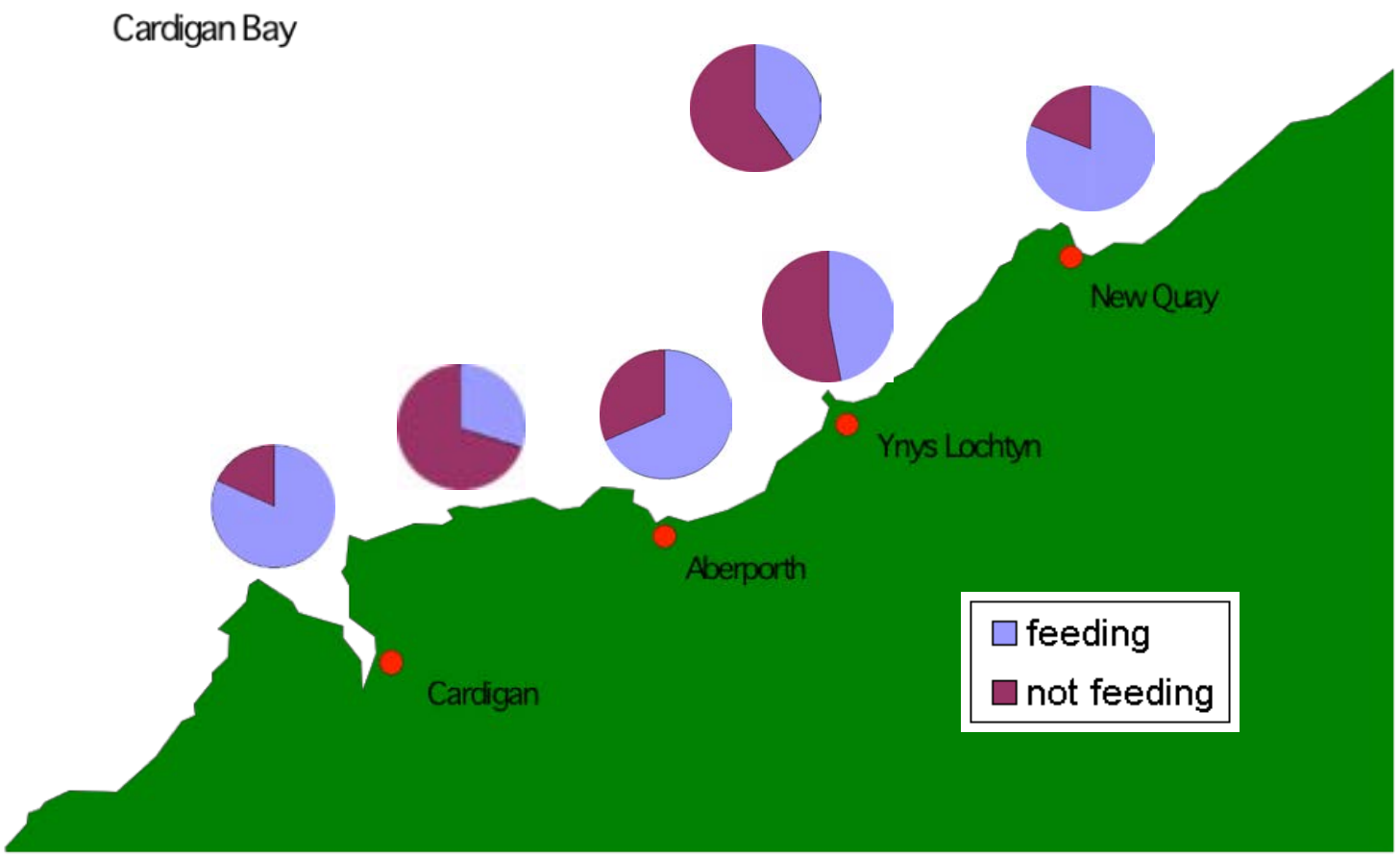




Source: Lopes (2017)

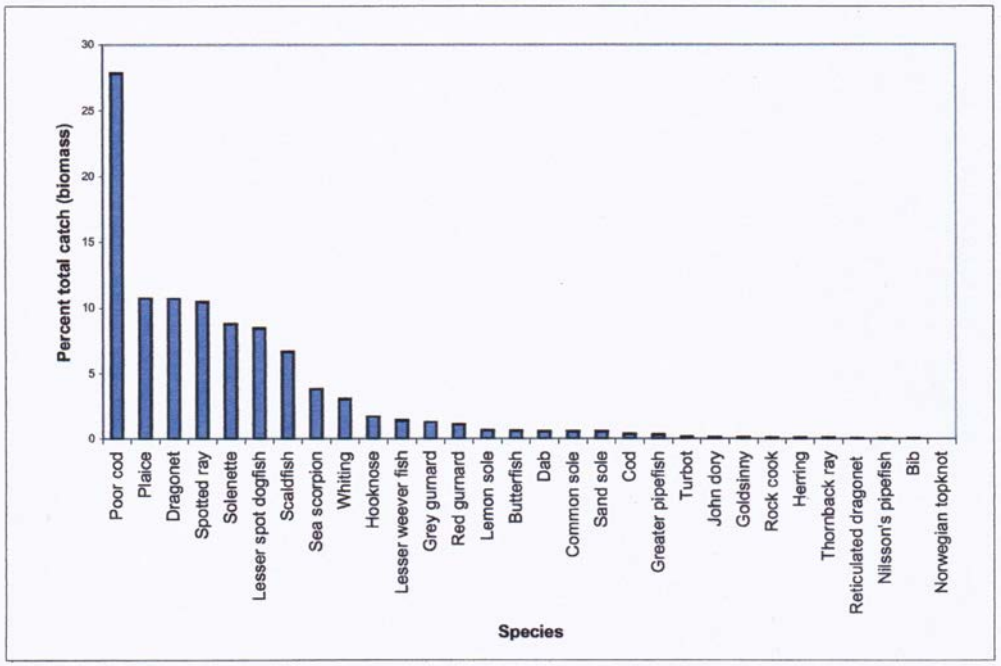

Cardigan Bay as a feeding area

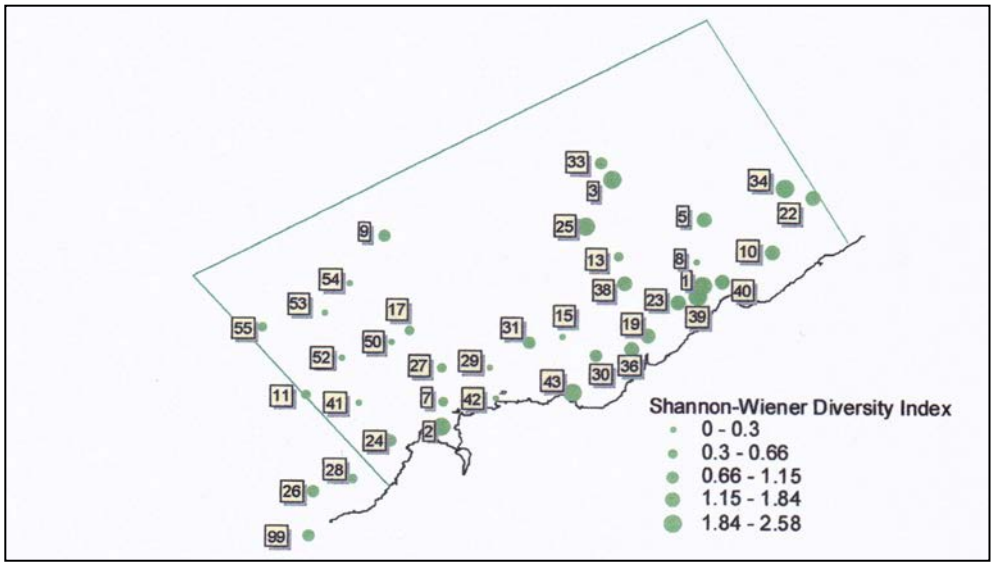
OBSERVATIONS OF BOTTLENOSE DOLPHINS INDICATING FORAGING/FEEDING



Source: Sea Watch Foundation (unpublished data)

TRAWLING RESULTS IN CARDIGAN BAY SAC





- 46 beam trawls conducted in Cardigan Bay SAC between Feb and Sept (mainly June)
- Six most important fish species in terms of biomass were: poor cod, plaice, dragonet, spotted ray, solenette, and lesser spotted dogfish
- Total of 37 fish species and 63 invertebrate species identified
- Highest species diversity near the coast and in shallower waters

Source: Evans *et al.* (2000)

BOTTLENOSE DOLPHINS CAPTURING FISH

BOTTLENOSE DOLPHIN DIET

Species recorded taken in Welsh coastal waters:

Riverine
- Atlantic salmon
- Trout
- Eel

Benthic
- Sole
- Brill
- Red gurnard

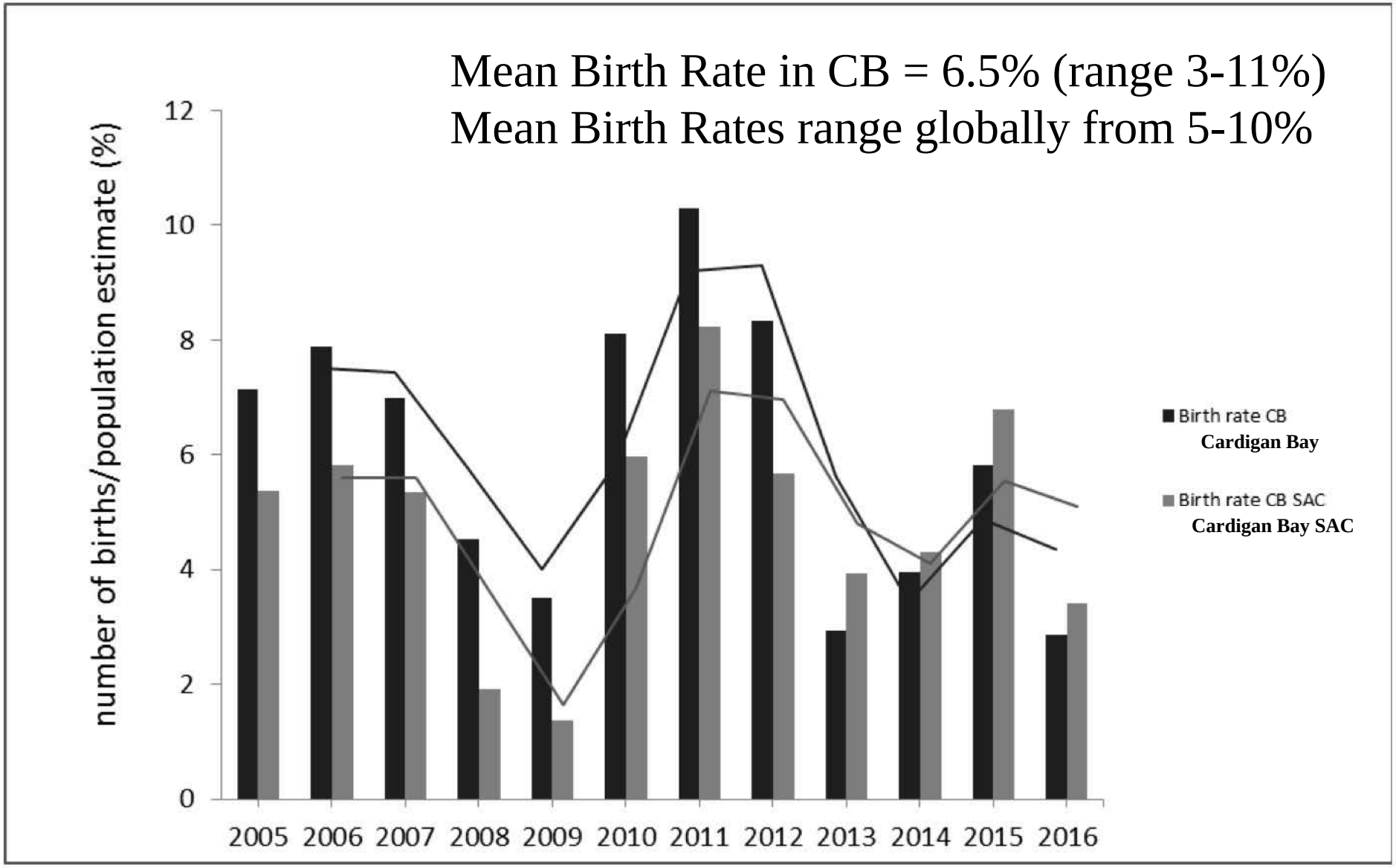
Bentho-pelagic
- Sandeel
- Tope

Demersal (Pelagic in 1st 2-3 mo)
- Whiting

Shallow pelagic
- Sea bass
- Garfish
- Smooth-hound

Cardigan Bay as a Nursery Area

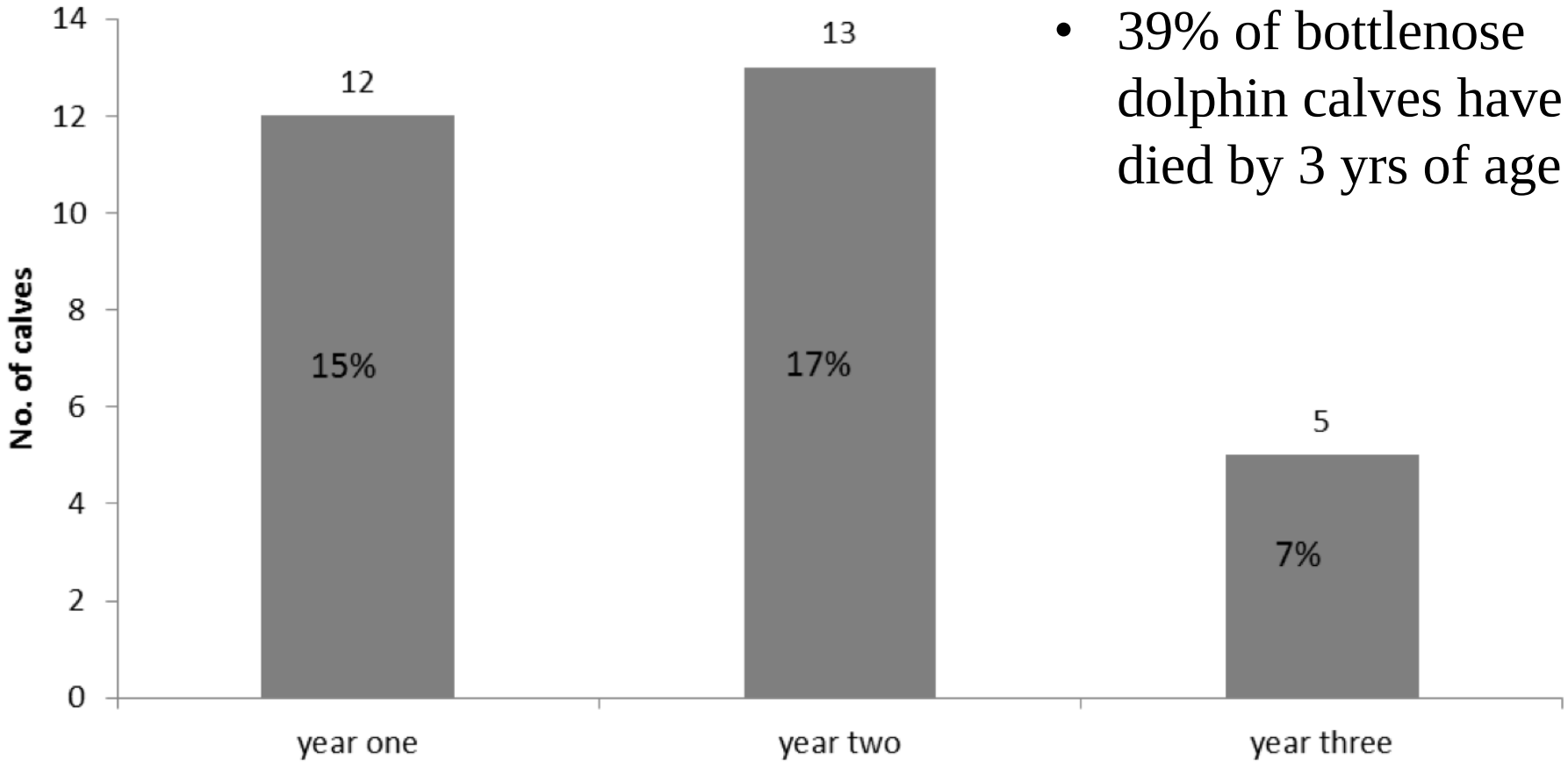
BIRTH RATES IN CARDIGAN BAY SAC AND THE WIDER CARDIGAN BAY, 2005-16



Source: Lohrengel & Evans (2017)


Bottlenose Dolphin
Population Structure

JUVENILE MORTALITY RATES OF BOTTLENOSE DOLPHINS

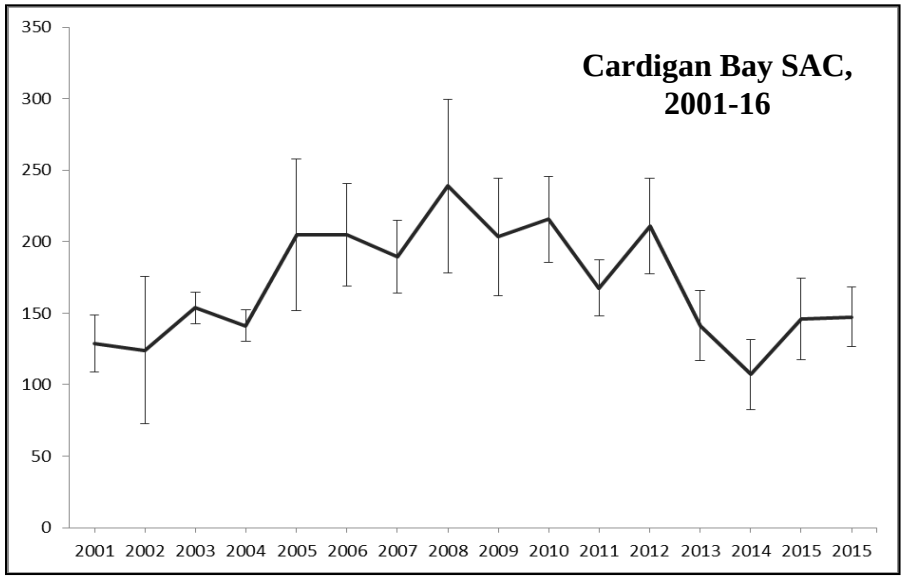


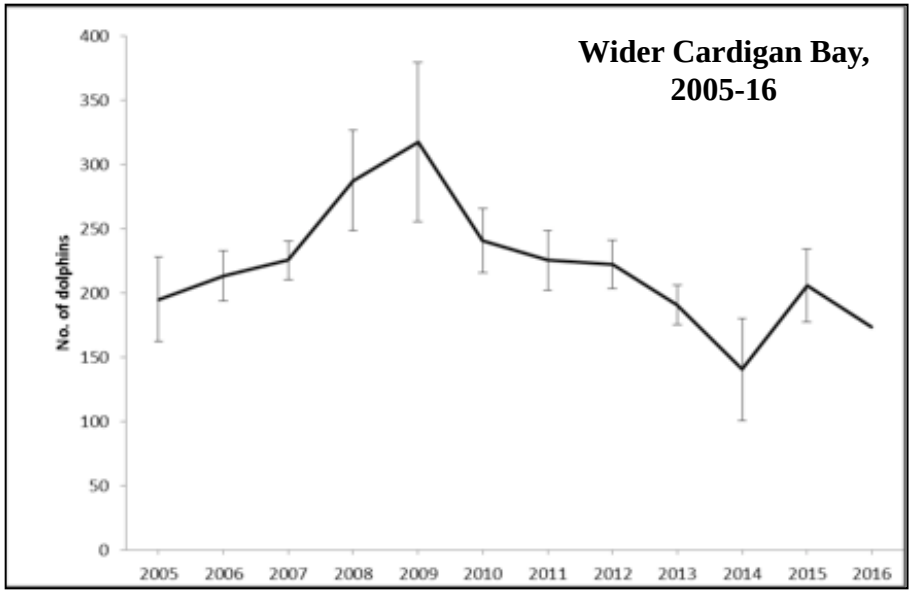
- 39% of bottlenose dolphin calves have died by 3 yrs of age

Source: Lohrengel & Evans (2017)


Monitoring Population Change

BOTTLENOSE DOLPHIN POPULATION TRENDS IN CARDIGAN BAY

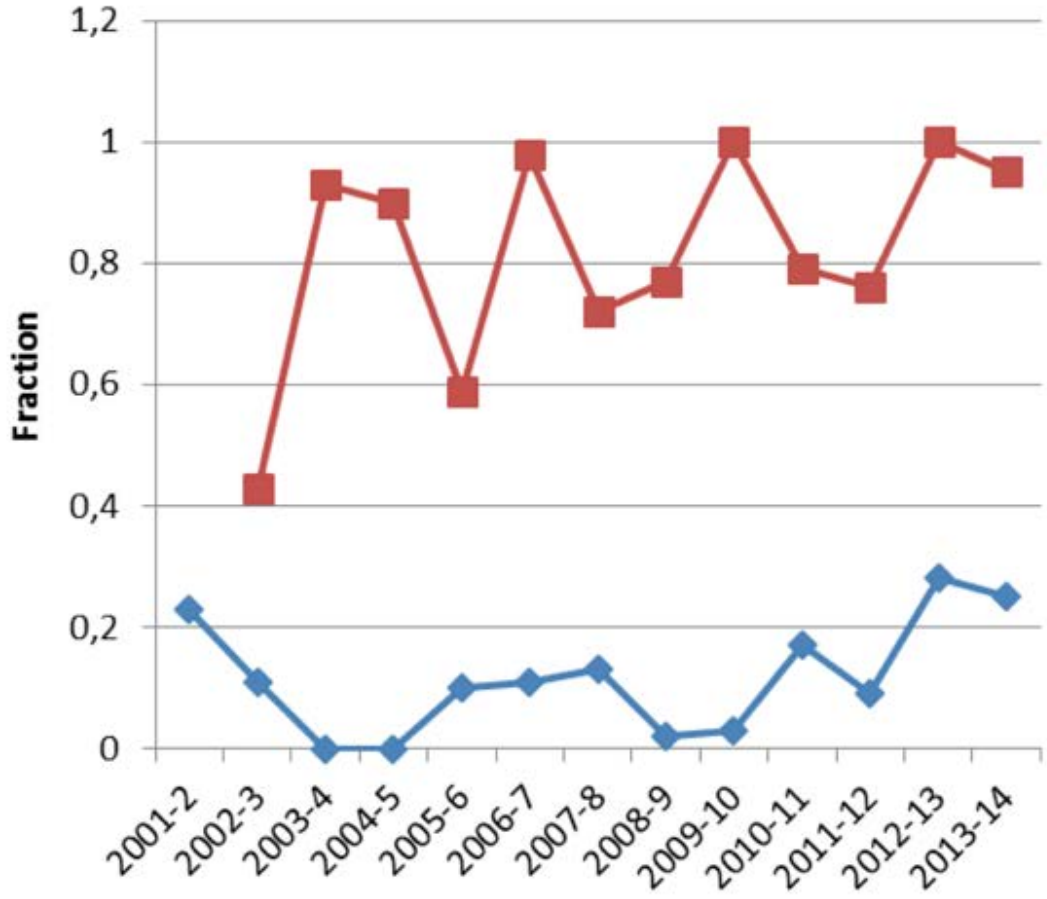




- Bottlenose dolphins are monitored by photo-ID and capture-mark-recapture
- Within Cardigan Bay SAC, steady increase from 2001-08, and thereafter a decline
- In the wider Cardigan Bay, an increase to 2009, and thereafter a decline

Source:
Lohrengel & Evans (2017)

BOTTLENOSE DOLPHIN RESIDENCY RATES IN CARDIGAN BAY SAC (from open population models)



Probability of an animal

Emigrating from CB SAC

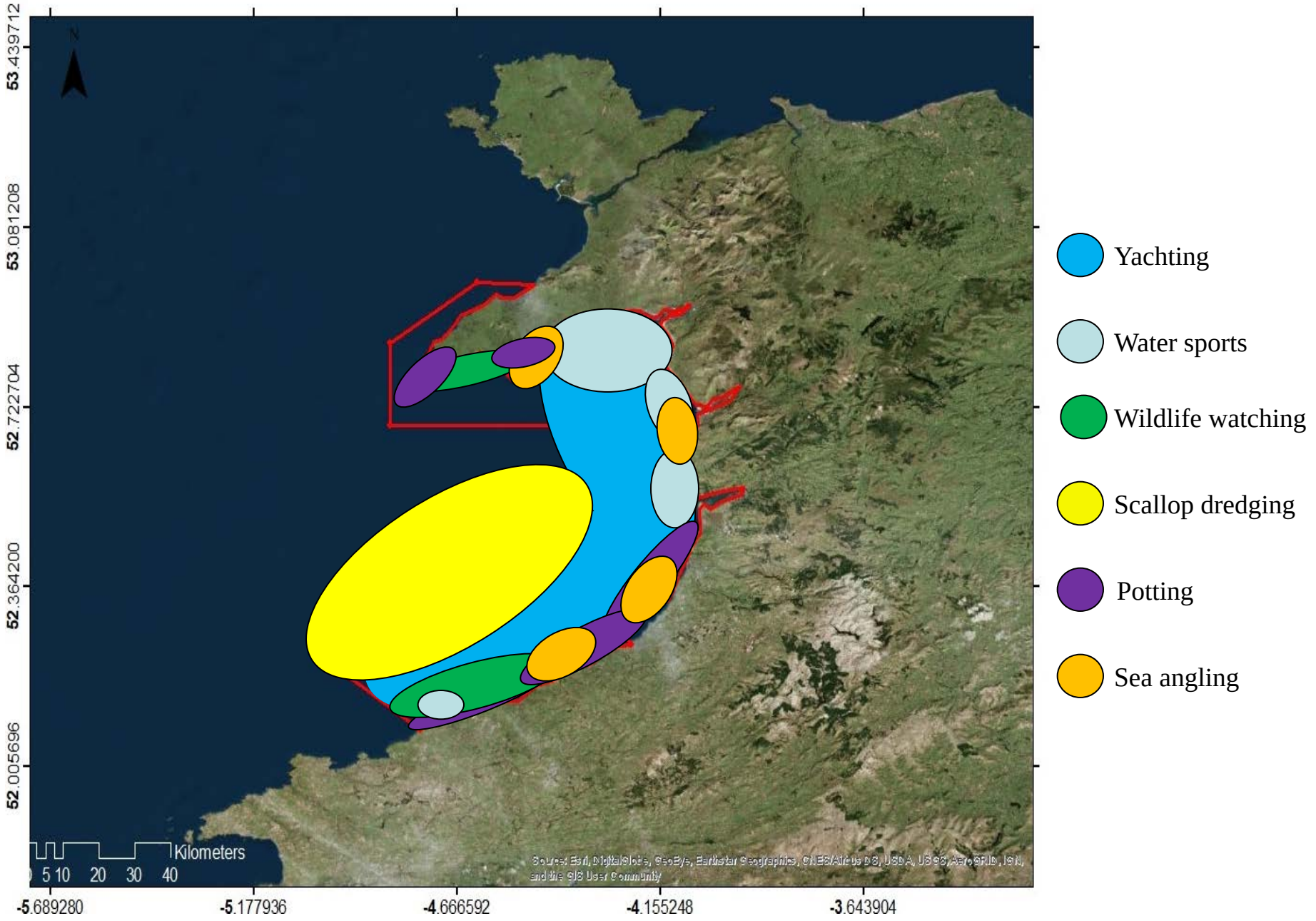
Staying out of CB SAC

Source:
Lohrengel & Evans (2017)

Human Activities in Cardigan Bay

• Potting • Scallop Dredging • Sailing • Water Sports • Dolphin Watching

DISTRIBUTION OF HUMAN ACTIVITIES IN CARDIGAN BAY



Human Activities in North Wales

Wind farm construction - disturbance from pile driving

Industrial activities in Liverpool Bay - high levels of PCBs, mercury and lead

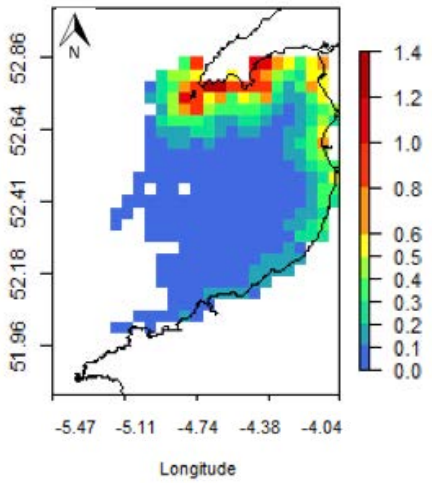
The socio-economic value of dolphin watching in Wales

- No. of dolphin watchers in Wales rose from 17,000 (1998) to 33,350 (2008) and 45,150 (2011)
- No. of dolphin trip operators in Wales rose from 3 (1998) to 17 (2008) and 26 (2011)
- Direct income to trip operators rose from £147,000 (1998) to £659,000 (2008) and £1.09 million (2011) + indirect income from £1.33m (1998), to £1.70m (2008) and £2.82m (2011)

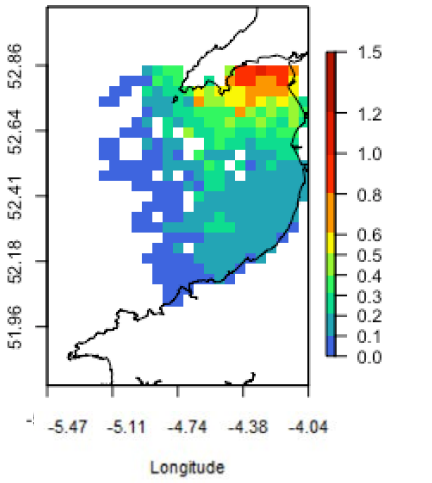
Sources: Hoyt, 2001; O'Connor *et al*., 2009; Lambert & Evans, 2012

Recreational Sea Use

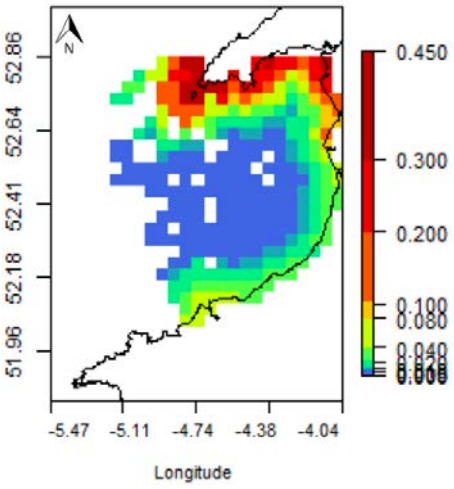
Kayaking



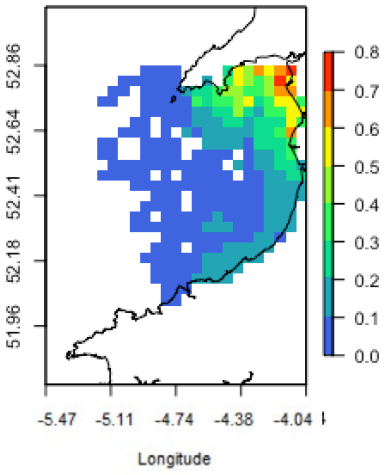
Sail boat



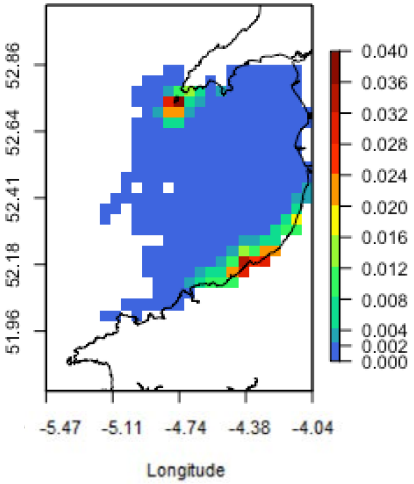
Speed craft



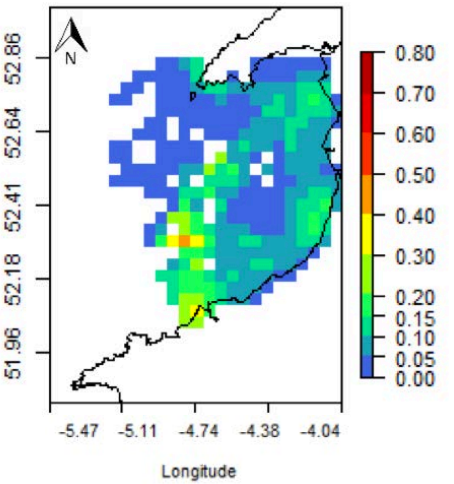
Motorised craft



Wildlife watching

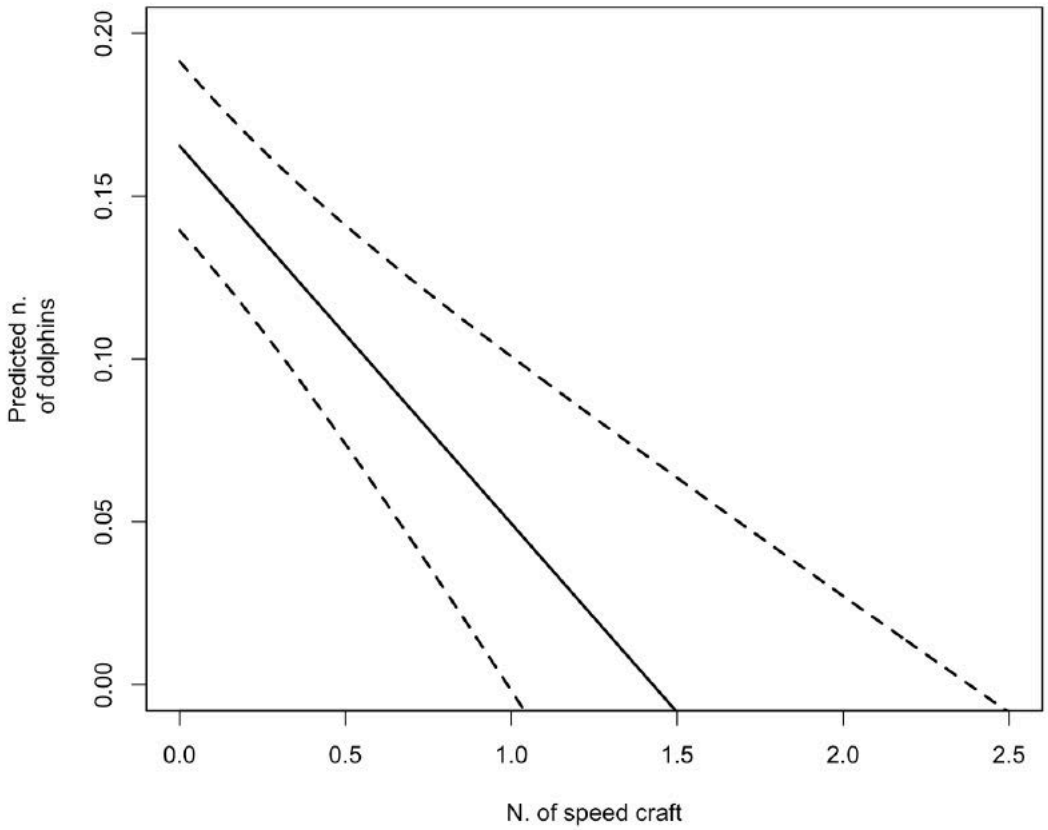


Sea angling



Source: SWF (2019); Vergara-Peña (2020)

BOTTLENOSE DOLPHIN ABUNDANCE IN RELATION TO SPEED CRAFT ABUNDANCE IN CARDIGAN BAY, 2005-16



Bottlenose dolphin abundance show an inverse relationship to speed craft abundance. Relationships quantified from GAMs with a Gaussian distribution. Dashed lines represent 95% confidence intervals.

Source: Vergara-Peña (2020)

Ceredigion Marine Code

In general keep a good look out and keep your distance. Do not approach marine mammals, let them come to you. Headlands and reefs such as Mwnt, Aberporth, Ynys Lochtyn, New Quay and Sarn Cynfelyn are very important feeding areas for dolphins and porpoises; take extra care to travel slowly and not to disturb animals in these areas. Please operate all boats with care and attention for the safety of occupants and respect for all other sea users. Do not discard litter or fishing tackle at sea.

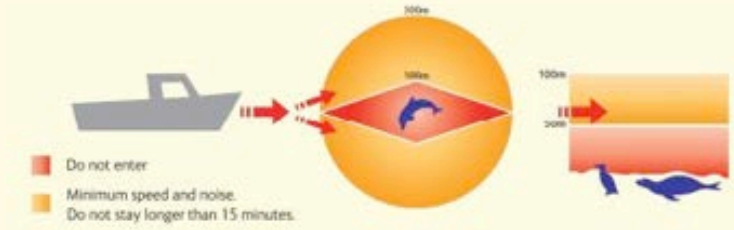
Dolphins, Porpoises & Seals

If these creatures are encountered at sea please:

- Slow down gradually to minimum speed. Do not make sudden changes in speed or course.
- Do not steer directly towards them or approach within 100m.
- Do not attempt to touch, feed or swim with them.
- Take extra care to avoid disturbing animals with young.
- Do not approach seals resting on the shore, and do not enter sea caves during the pupping season (1st August to 31st October).
- Avoid any unnecessary noise near the animals.

Birds

- Keep out from cliffs in the breeding season, 1st March – 31st July.
- Avoid any unnecessary noise close to cliffs.
- Keep clear of groups of birds resting or feeding on the sea.



This code applies to all recreational vessels including motor boats, yachts, dinghies, personal watercraft, kayaks and canoes. Always comply with requests from the local patrol boats and be aware of speed restrictions around bathing beaches and wildlife sites.

Note that Ceredigion Harbourmasters and Launch Control Officers are authorised to withdraw launching and/or mooring permits from vessels and individuals not observing local regulations, byelaws or the Ceredigion Marine Code. Deliberate or reckless disturbance of any protected species (such as dolphins) is a criminal offence.

Ceredigion County Council Department of Environmental Services and Housing

Gwynedd Marine Code

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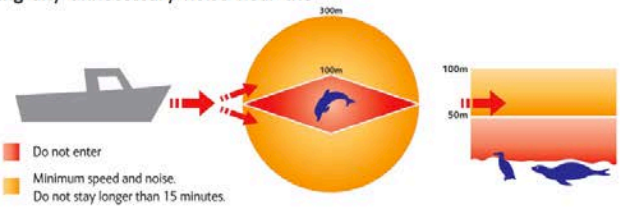

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£12m (10,500 tonnes) of shellfish (scallops, whelks, lobsters, crabs) landed by UK vessels in Wales

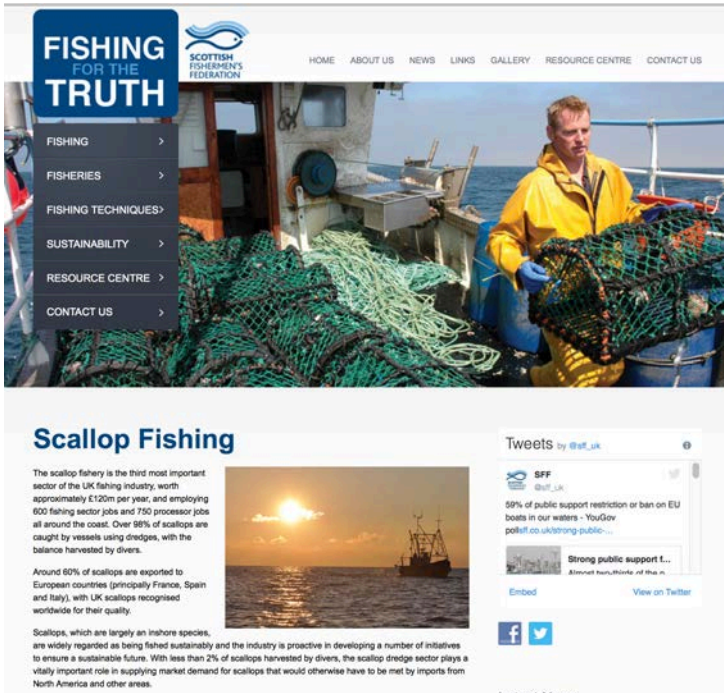
c. 60-80 vessels scallop fishing in Cardigan Bay

£2-4m (2-4000 tonnes) of scallops are landed from Cardigan Bay

Introduction to the Wales seafood industry

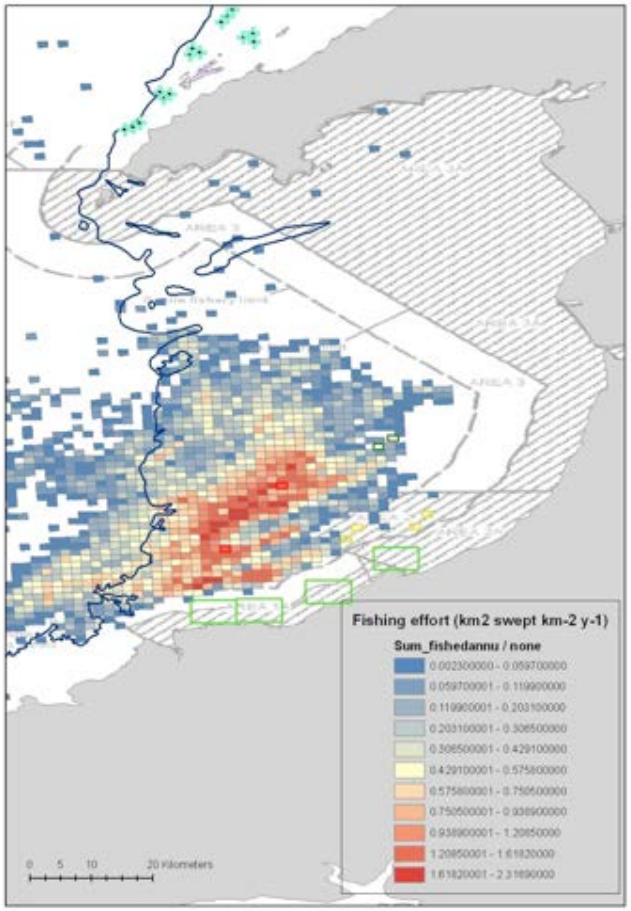
The Wales seafood industry is a vibrant and diverse business that boasts a range of traditional fisheries plus a number of innovative shellfish aquaculture operations. Top quality seafood is landed daily at ports, harbours, and even beaches along the length of the Welsh coast, from Cardiff to Connah's Quay.

With a fleet of over 460 licensed vessels employing 850 full-time and part-time fishermen, Wales' seafood industry is significant to the local economy and vital for the long term sustainability of many coastal communities.



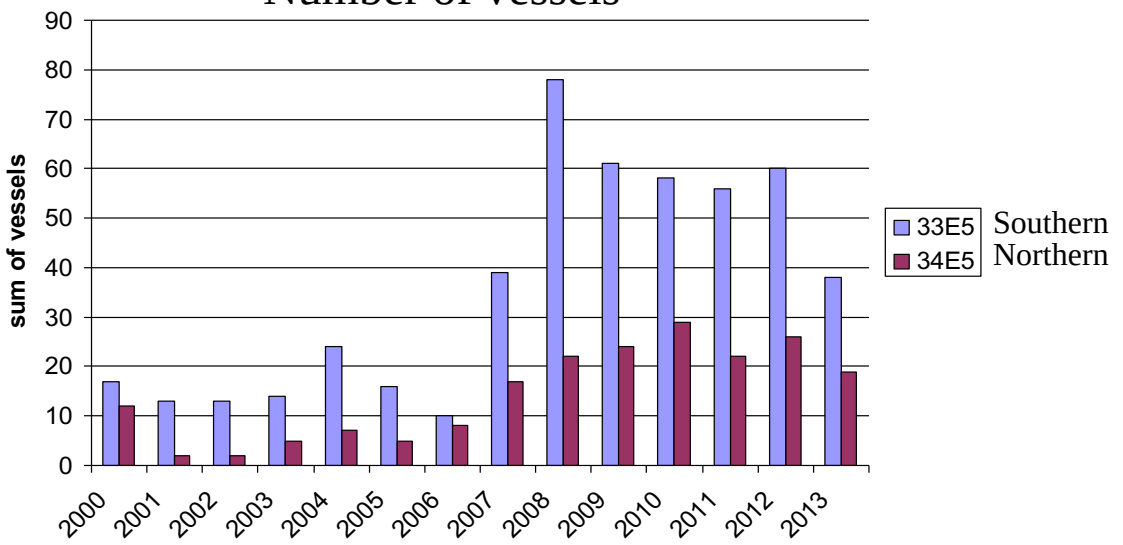
TRENDS IN SCALLOP DREDGING EFFORT, 2000-13

Scallop dredging, 2008

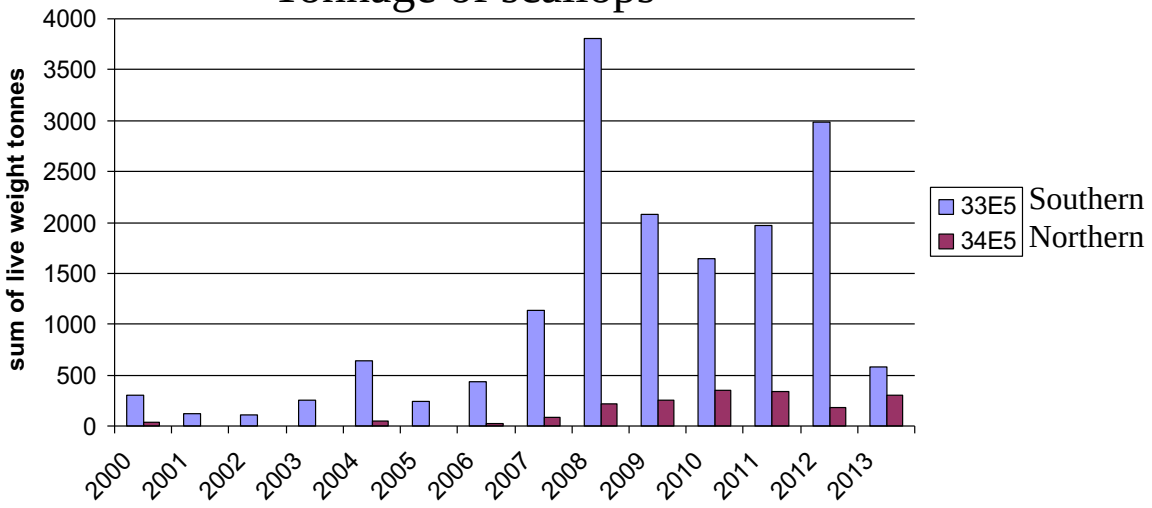


Source: School of Ocean Sciences, Bangor University

Number of vessels

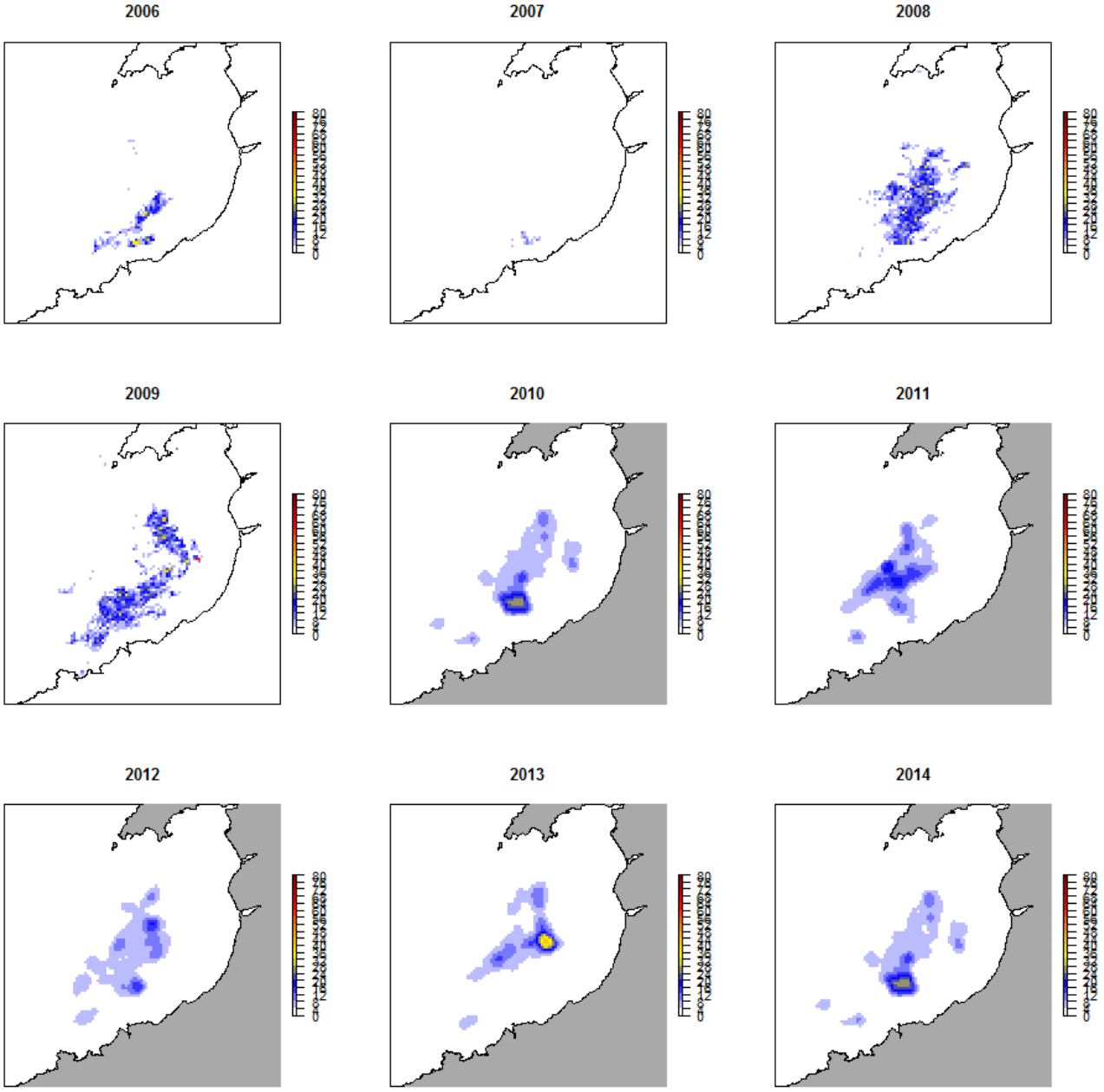


Tonnage of scallops



Source: Marine Management Organisation (data from Jan 2000 – Nov 2013)

DISTRIBUTION OF SCALLOP DREDGING EFFORT, 2006-14



Welsh Fishermens Association – Cymdeithas Pysgotwyr Cymru

The national voice of Welsh fishermen

HOME CONTACT US NEWS AND UPDATES **TOWARDS A SUSTAINABLE SCALLOP FISHERY**

WELSH FISHERIES AND MARINE CONSERVATION

PRIFYSGOL BANGOR UNIVERSITY

Towards a Sustainable Scallop Fishery

The Development of the Welsh Waters Scallop Strategy: Sustainable Scallop Fishery Management

A Welsh fishermen led initiative is developing best practice in scallop fisheries management by working with scientists, managers and conservation bodies to protect seabed habitats.

Findings:

- Offshore seabed dominated by mobile sand waves & infauna resilient to scallop dredging
- Experimental fishing disturbance showed an immediate effect when an area fished more than twice

World's largest ever fishing impact study brings hope for Cardigan Bay Scallop fishermen

Scientists from Bangor University, working together with the Welsh Fishermen's Association, Welsh Government and Natural Resources Wales have published their findings from the world's largest ever fishing impact study, funded in part by the European Fishery Fund.

Scallops (queenies) photographed on the sea bed (here off the Isle of Man).

Cardigan Bay Special Area of Conservation (SAC) was closed to scallop fishing in 2009. Research led by Bangor University has focused on understanding the amount of scallop fishing within the SAC that would be considered sustainable and that would not damage the conservation features of the area.

To do this, the team spent 18 months preparing to undertake a mammoth fishing experiment in which 12 different sites were fished at different intensities by commercial boats. The results of the fishing were compared to four areas left unfished. Having now established that the area can withstand a certain level of fishing, the next step in the work is to provide more information to further guide the agencies responsible to decide on future management measures, and if appropriate, for setting the level of fishing to be permitted.

Professor Michel Kaiser who leads the Fisheries & Conservation Science Group at Bangor University's School of Ocean Sciences said:

"This is the first study of its kind that provides information that would enable us to advise on the amount of fishing that the seabed within the SAC can tolerate, it provides the basis for a truly ecosystem based approach to management of a potential fishery in the area."

- Recovery of invertebrate communities living in seabed was very rapid, occurring after 5 months
- All geological traces of scallop dredging eradicated through natural sediment movements in all but two areas, where faint traces observed 11 months later

Questions relating to Management Effectiveness

Do the SACs have a management authority?	**Yes**
Are they fully equipped for effective management?	**No, limited by financial & human resources**
Do the two SACs have management plans?	**Yes (but mainly descriptive)**
Are these updated at appropriate intervals?	**No (last ones in 2008/2010)**
Do they fully prevent harmful activities?	**No (scalloping, water sports)**
Are all relevant stakeholders fully engaged & supportive?	**No, only partially (see above)**
Is monitoring of the dolphin population adequate?	**No (due to limited resources)**
Are pressures & threats documented and understood?	**Partially (excl. natural changes)**
Do we understand linkages between pressures & responses?	**No, not in a robust way**
Is the dolphin population at FCS within the SACs?	**Probably not**
Do we know what management actions should be taken?	**Yes, to an extent:**

1) ensure no seabed damage to favoured areas (within 12 nm of coast)

2) regulate disturbance impacts (particularly speed craft)

possibly also:

3) reduce legacy pollutants outside SACs (e.g. Liverpool Bay)

4) improve habitat quality (by restoration, e.g. seagrasses)

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