

UTILISING LAND WATCH DATA IN SPECIES MONITORING & CONSERVATION



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Gemma Veneruso, Caroline R. Weir, & James Waggitt**

AIMS OF THE STUDY

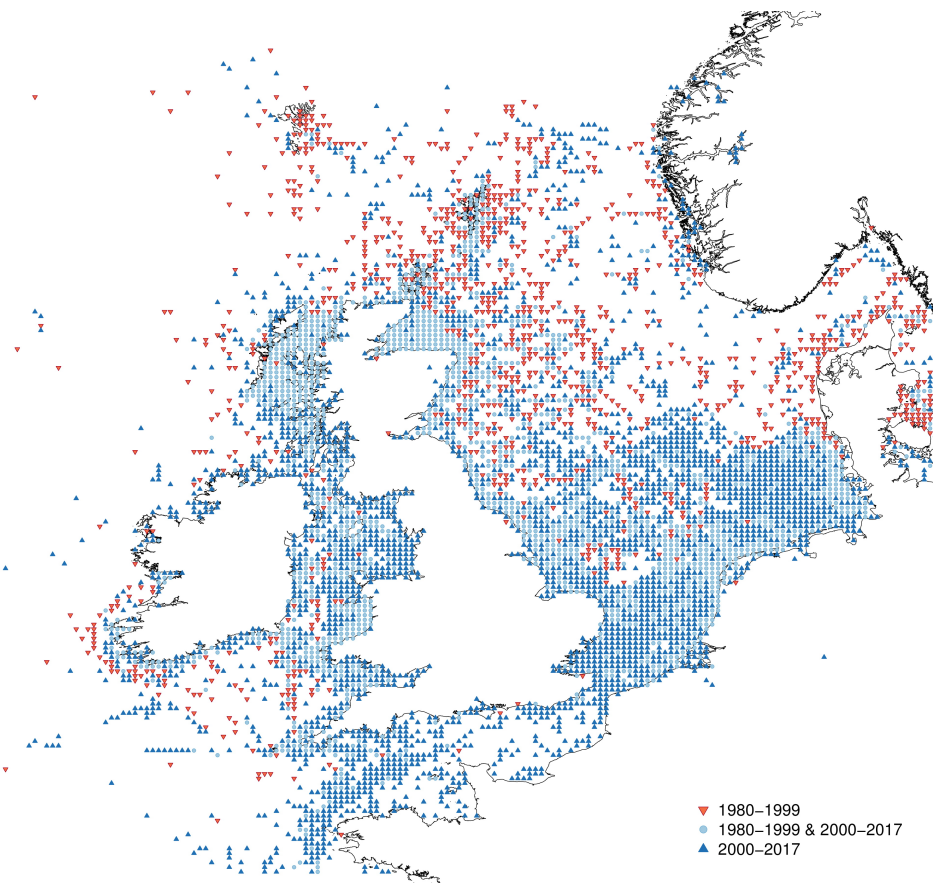
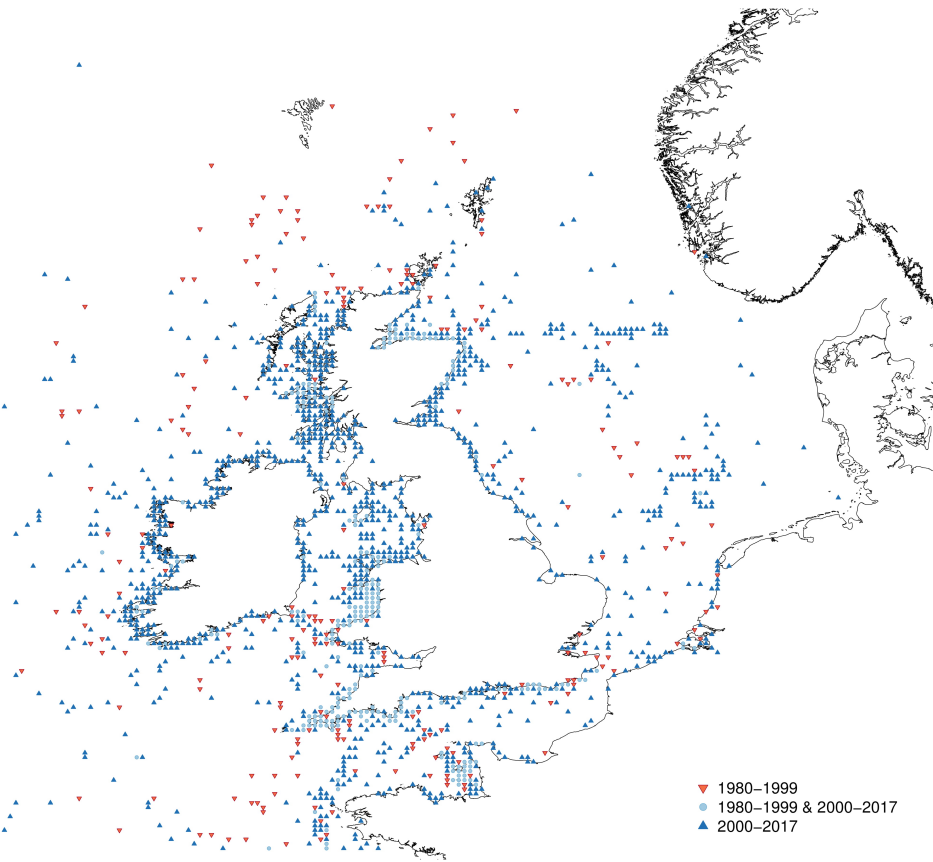


- 1) Determine whether land watches can reveal spatial trends for two cetacean species that reflect information from wider scale offshore surveys
- 2) Examine seasonal and longer term trends in sighting rates and compare with trends from the wider offshore surveys
- 3) Identify potential coastal hot spots for harbour porpoise and bottlenose dolphin with a view to recommending sites as Special Areas of Conservation
- 4) Consider potential improvements to land watch methodologies to maximise the value of the data collected
- 5) Use land watch data to assess impact of recreational activities on coastal bottlenose dolphin

TWO CETACEAN SPECIES, ONE WITH A PREDOMINANTLY COASTAL, AND THE OTHER A MORE WIDESPREAD DISTRIBUTION

Bottlenose Dolphin

Harbour Porpoise

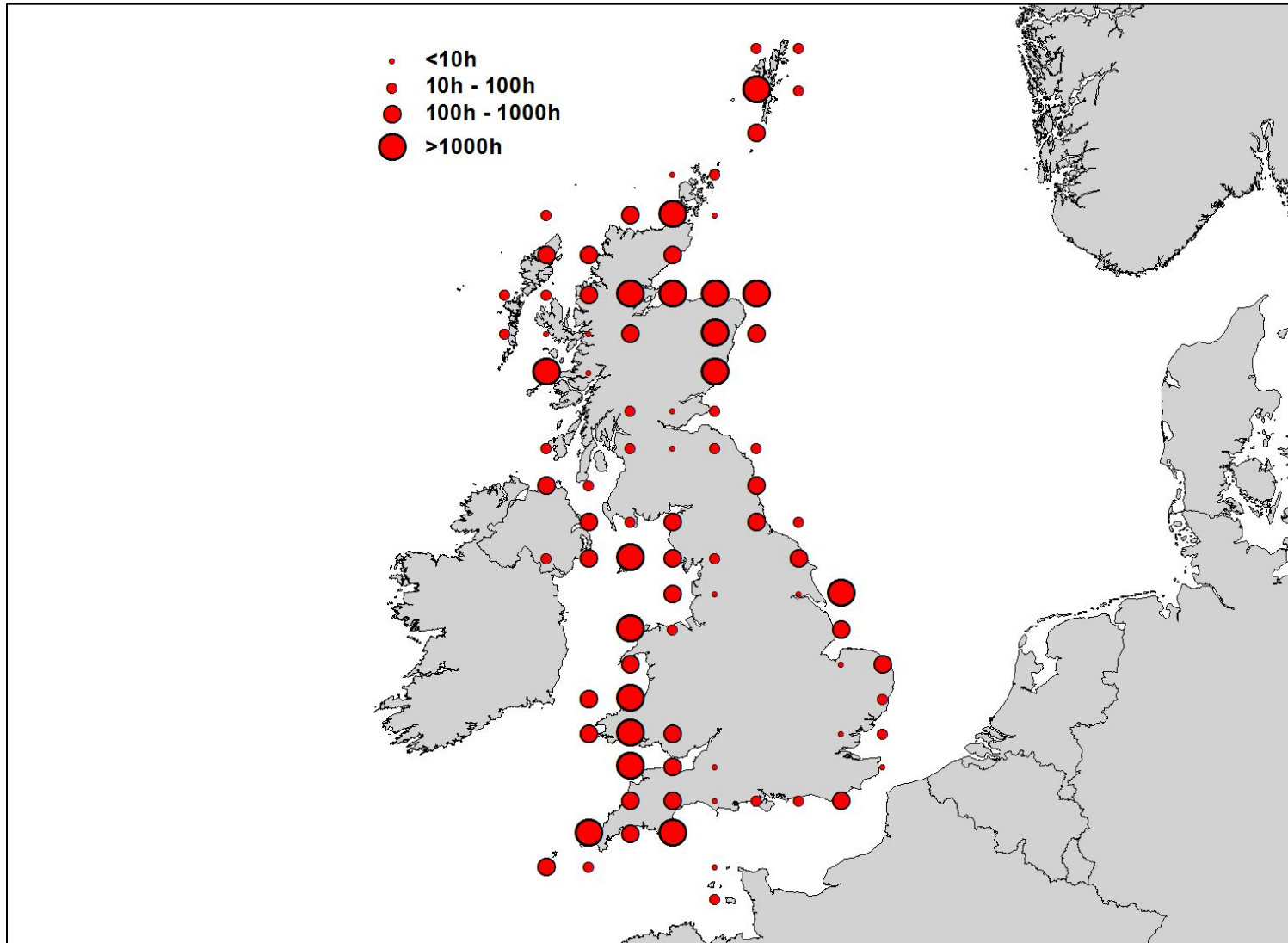


LAND WATCH FIELD PROTOCOLS



- Choice of site on the basis of raised elevation, good field of view, and safety
- Watches commenced any time of day & state of tide on the basis of good weather, and NOT on sighting a cetacean
- Generally one or sometimes two primary observers (number recorded)
- Naked eye scans interspersed with optics to verify cues, determine species & group size
- In some situations, instantaneous scan counts at regular intervals (recorded separately)
- Environmental information recorded at start & end of watch, 15-min or 30-min intervals, or if conditions changed

LAND WATCH EFFORT BY ICES GRID CELL

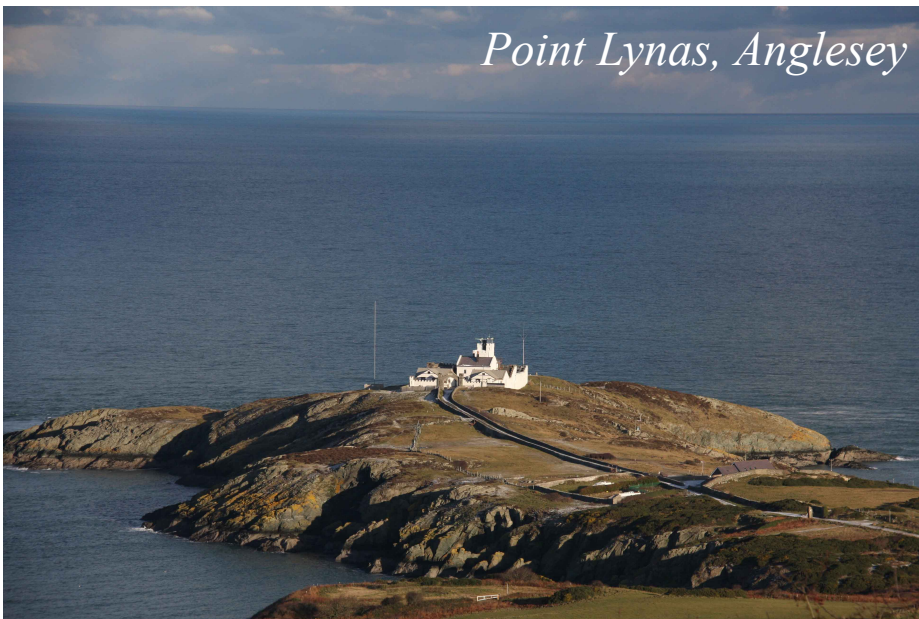


- good overall coverage except SE England, W Scotland & Borders

SUMMARY OF UK LAND WATCH DATA & ANALYSIS



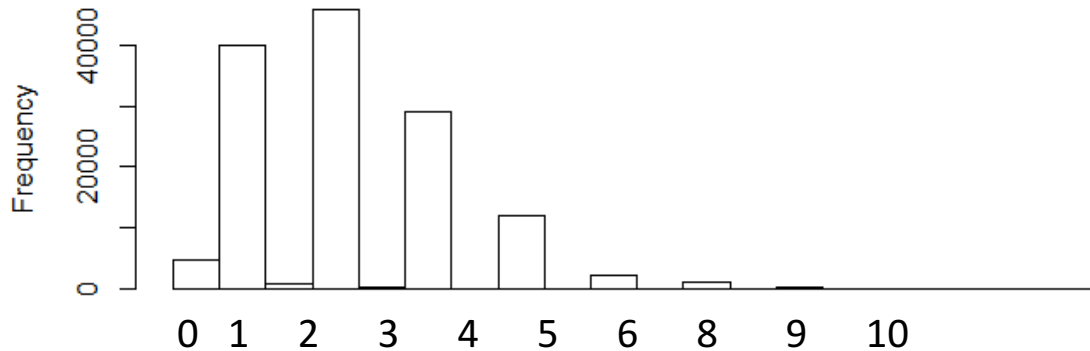
- >145,000 effort records
- c. 84,000 hours of effort
- 50-year time period: 1965-2014
- Number of sites: 732
- c. 20,000 harbour porpoise records
- c. 27,000 bottlenose dolphin records



- Presence, sighting and count rates calculated for each site, for both species
- Results summarised by site and by day (to eliminate within-day autocorrelation)
- GAMs & GAMMs run (the latter to quantify any effect of autocorrelation between consecutive days of observation)
- GAMs with a site x year interaction to reveal interannual changes in distribution

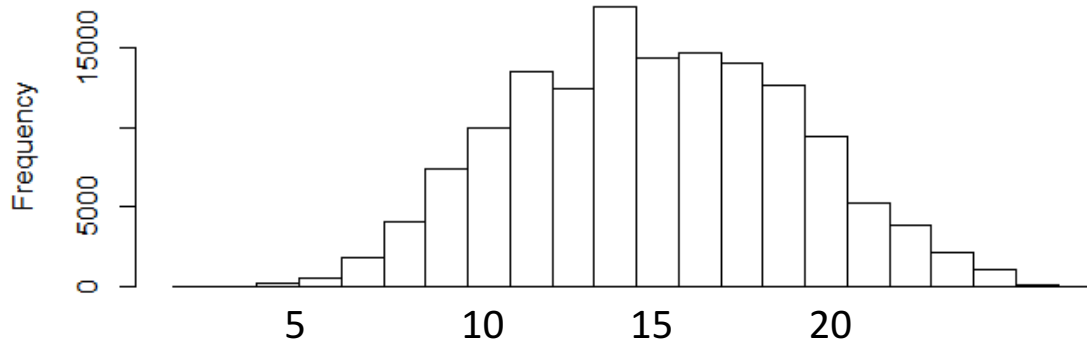
DISTRIBUTION OF EFFORT ACCORDING TO SEA STATE AND TIME OF DAY

Land Watch Effort by Sea State



- Most effort in sea states 1 and 2
- Little effort in sea states >4

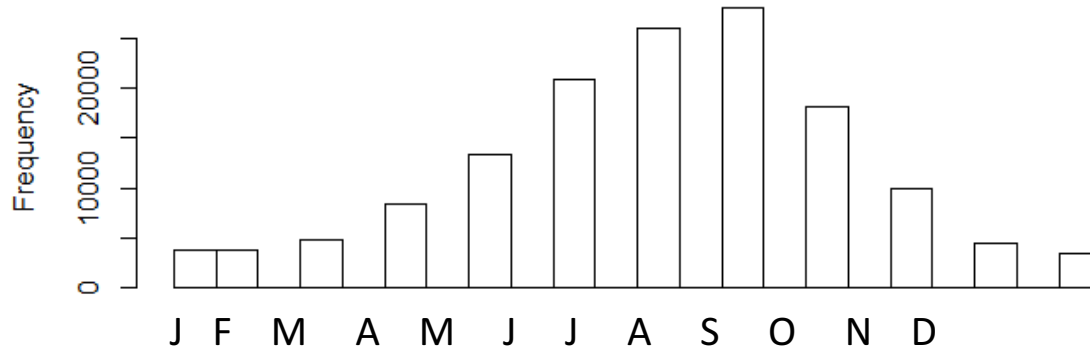
Land Watch Effort by Time of Day



- Most effort between 09:00 to 17:00 hrs GMT
- Little effort between sunrise and 06:00 hrs or 18:00 hrs to sunset

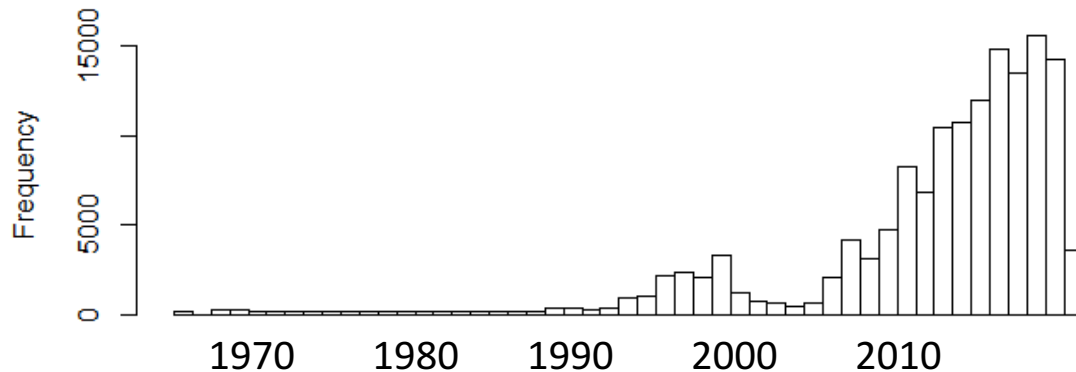
DISTRIBUTION OF EFFORT ACCORDING TO MONTH AND YEAR

Land Watch Effort by Month



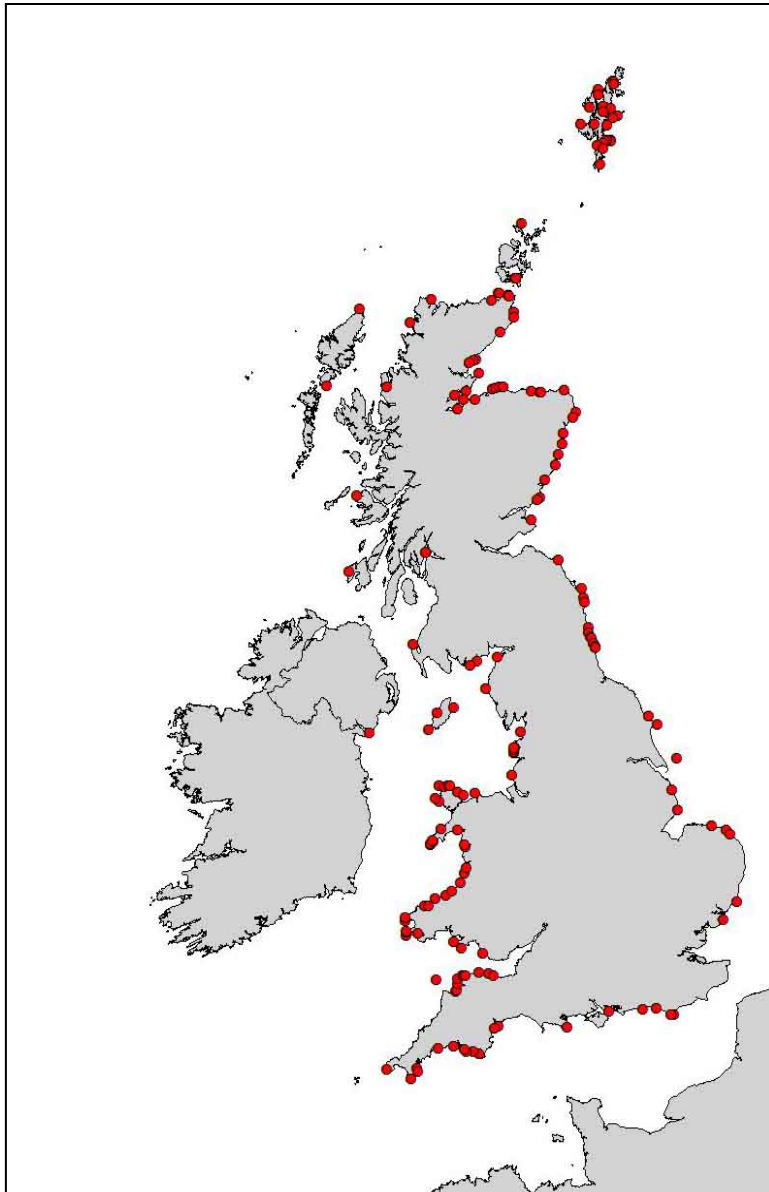
- Most effort between May and September
- Little effort between November and February

Land Watch Effort by Year

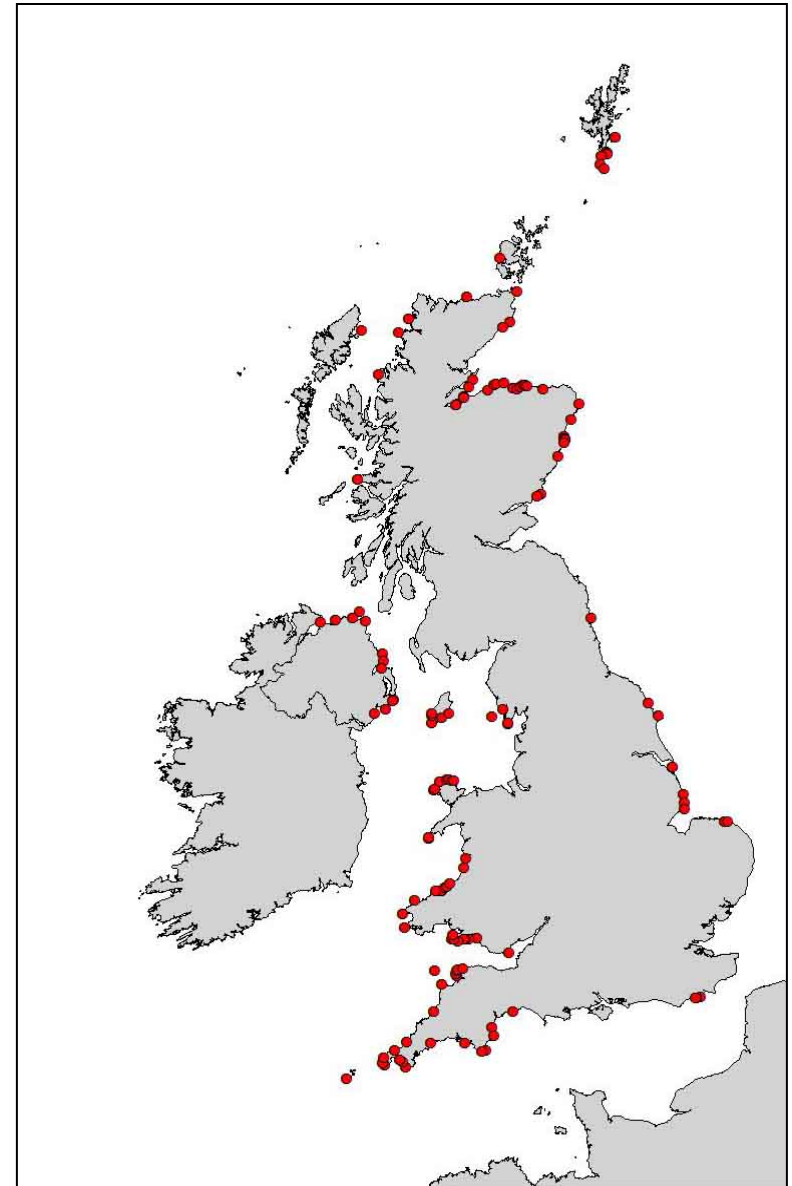


Land Watch Sites with different levels of Effort

a) 10-50 hours of effort

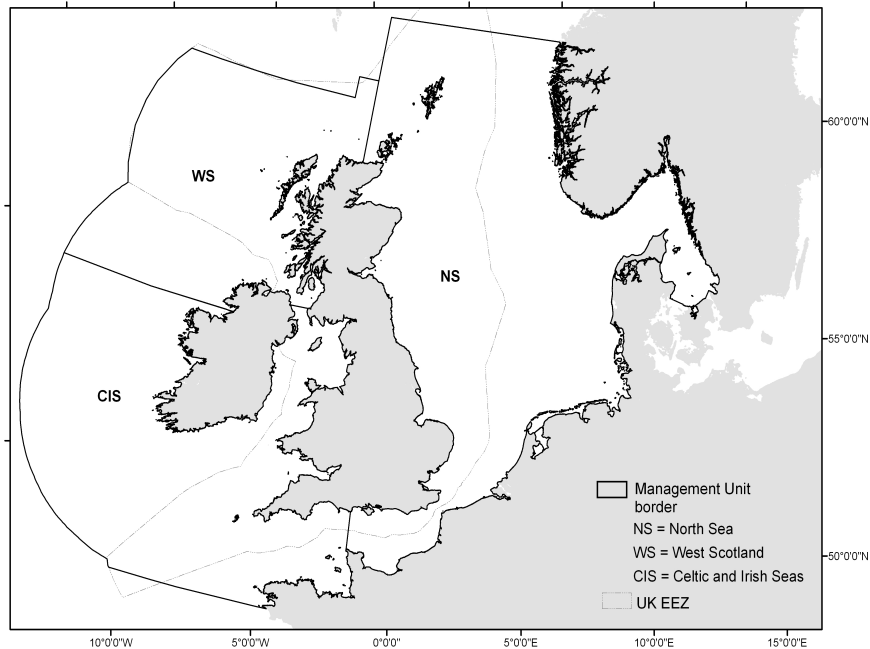


b) >50 hours of effort



POPULATION ASSESSMENT UNITS

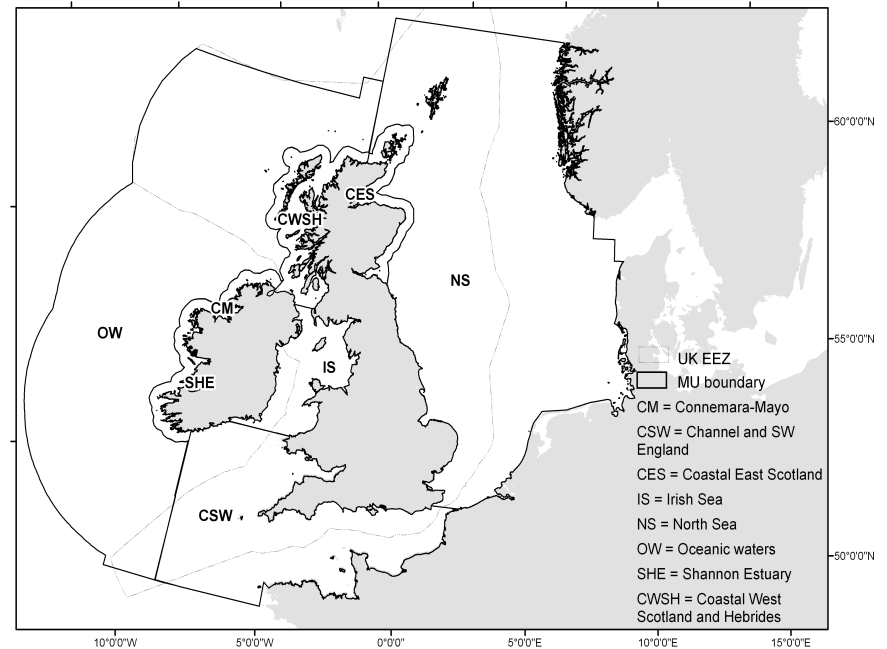
a) Harbour Porpoise



Three areas in the UK:

- North Sea (NS)
- Celtic & Irish Seas (CIS)
- West Scotland (WS)

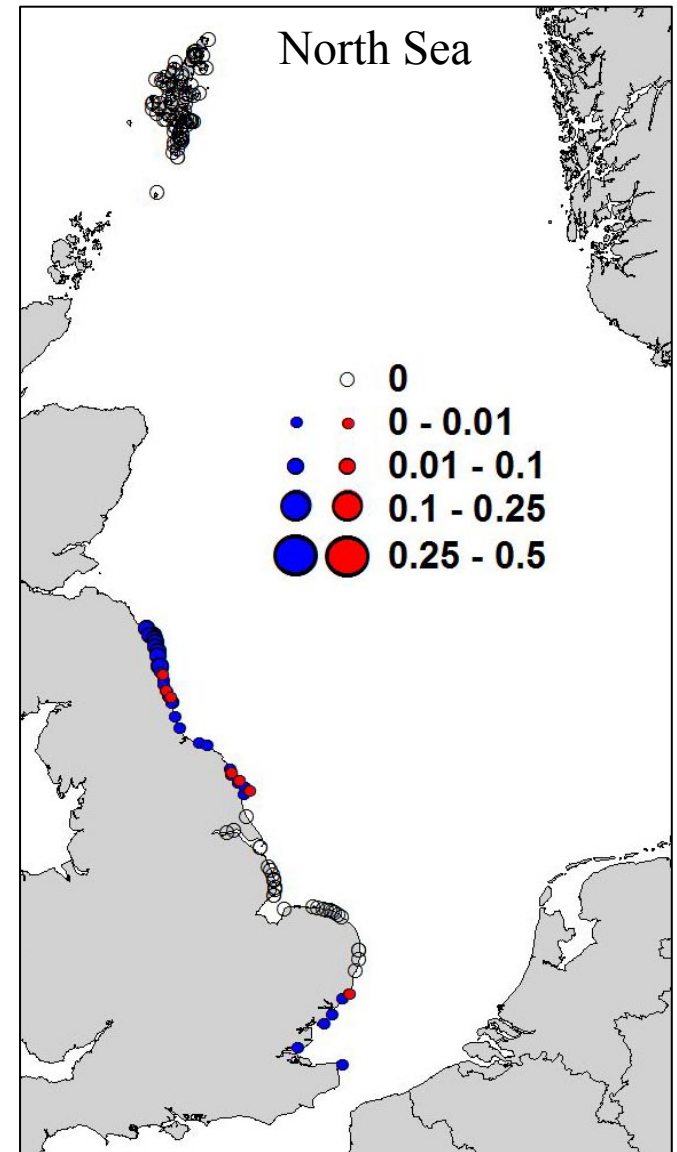
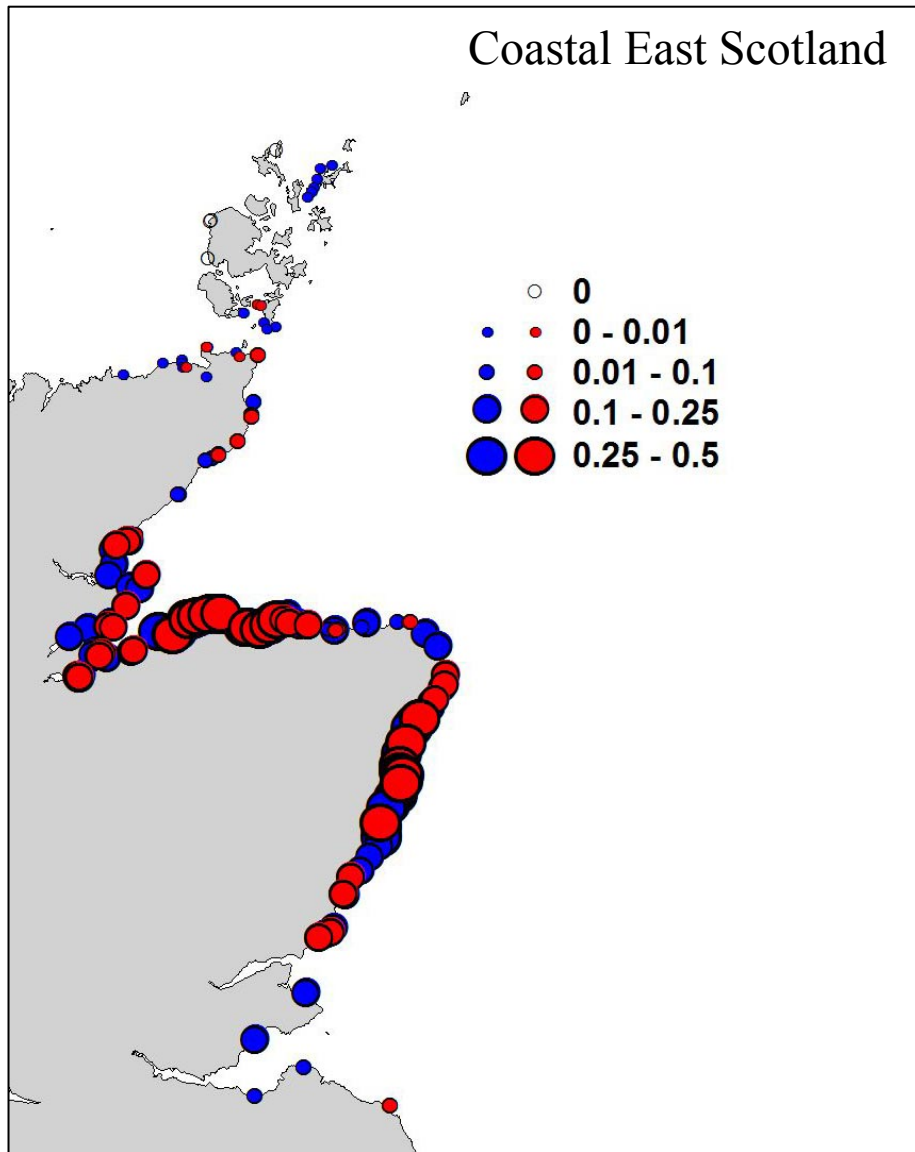
b) Bottlenose Dolphin



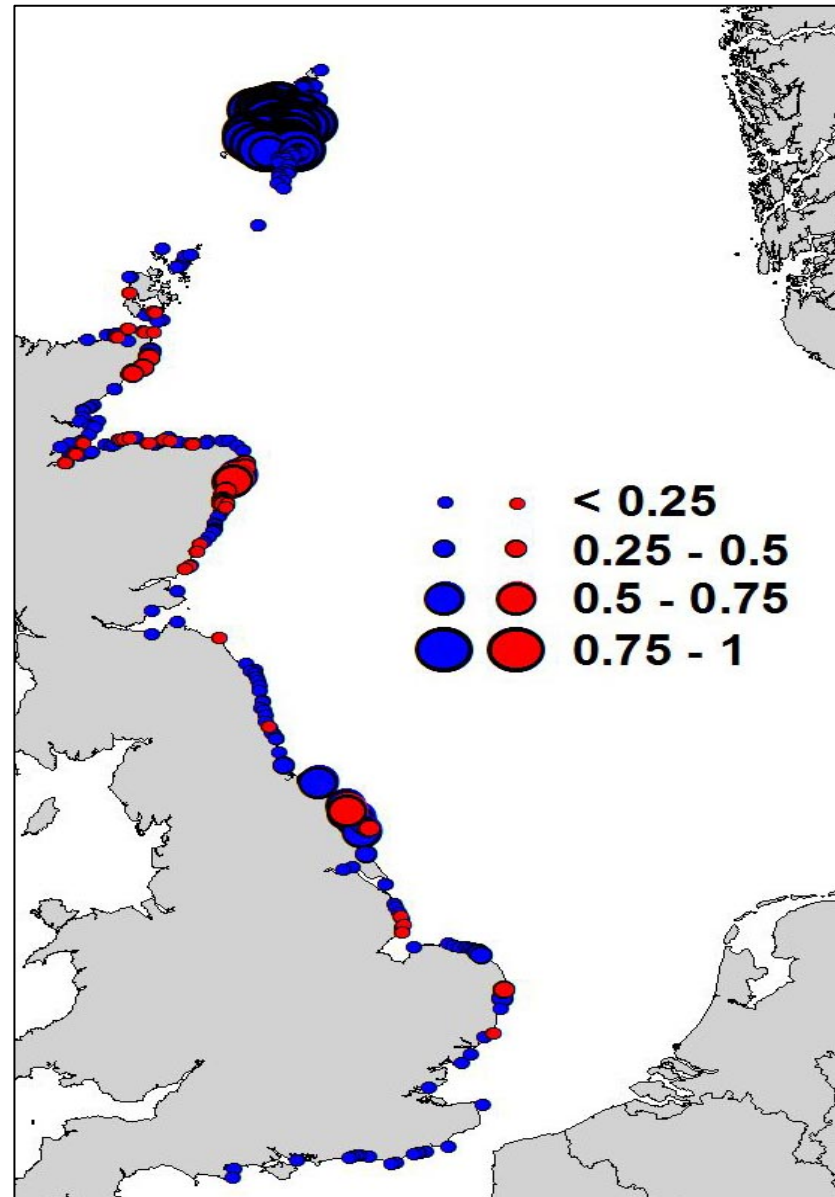
Five areas in the UK:

- Coastal East Scotland (CES)
- North Sea (NS)
- Coastal Southwest England (CSW)
- Irish Sea (IS)
- Coastal West Scotland & Hebrides (CWSH)

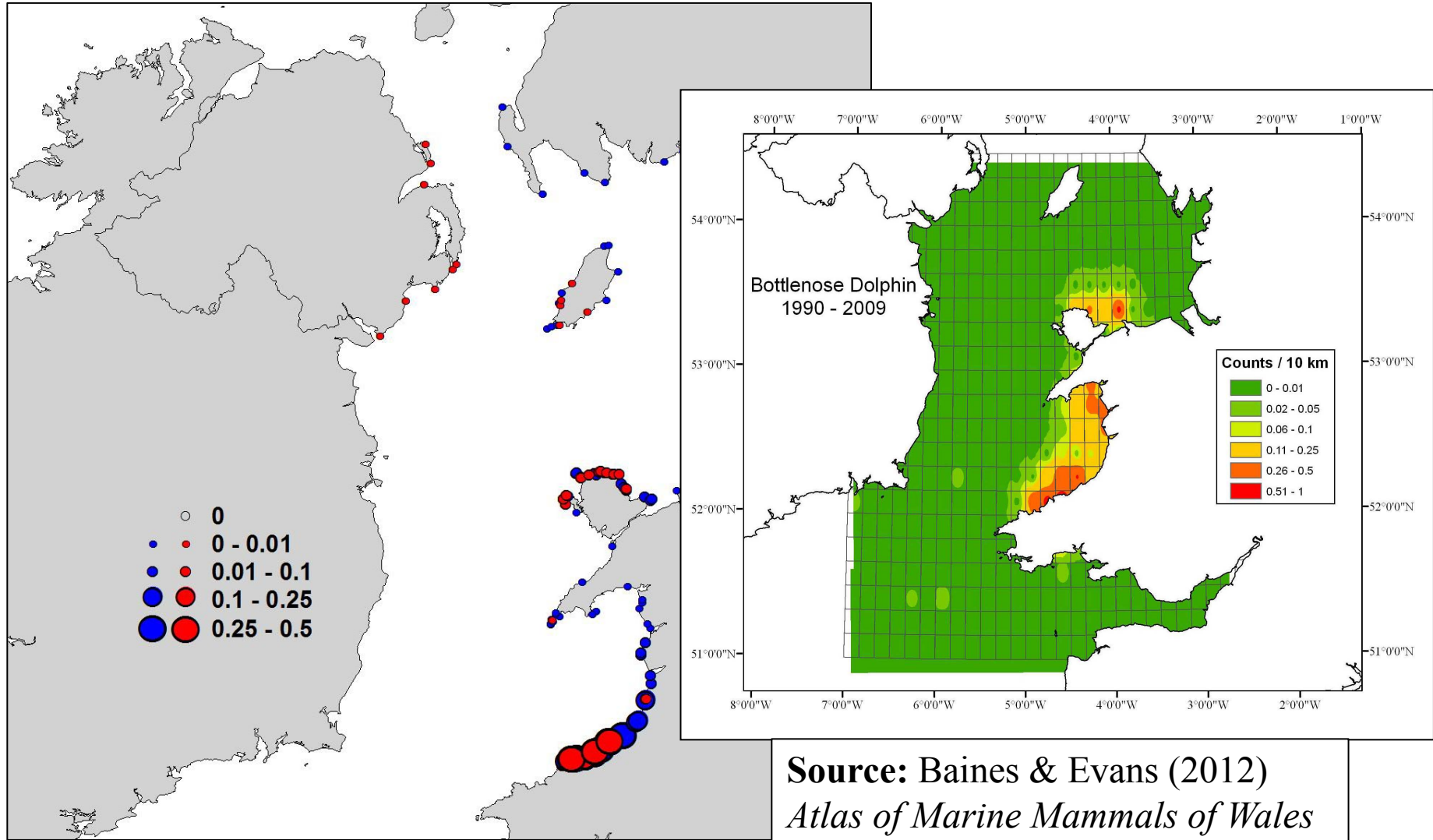
Map of GAM predicted likelihood of occurrence for Bottlenose Dolphin Coastal East Scotland & North Sea Assessment Units



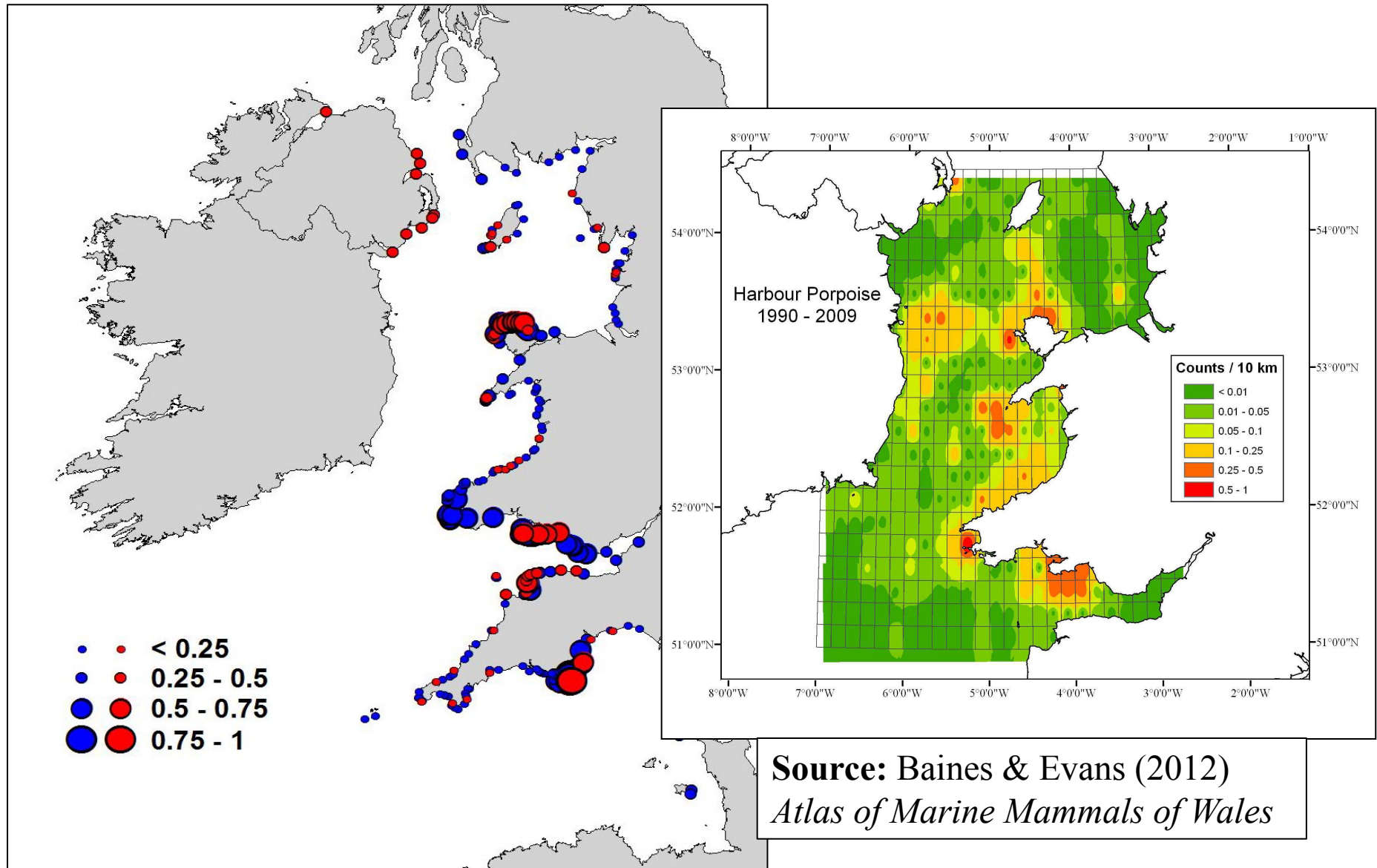
Map of GAM predicted likelihood of occurrence for Harbour Porpoise North Sea Assessment Unit



Map of GAM predicted likelihood of occurrence for Bottlenose Dolphin Irish Sea Assessment Unit



Map of GAM predicted likelihood of occurrence for Harbour Porpoise Celtic & Irish Sea Assessment Unit



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

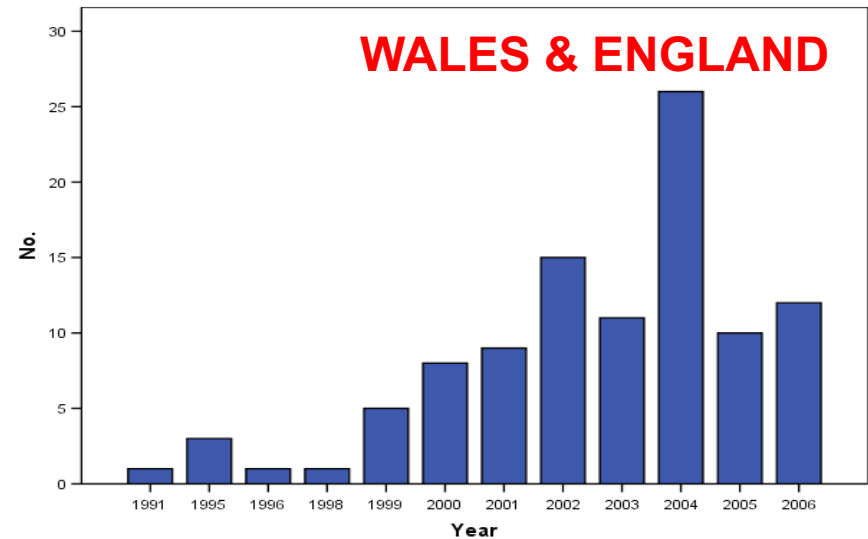
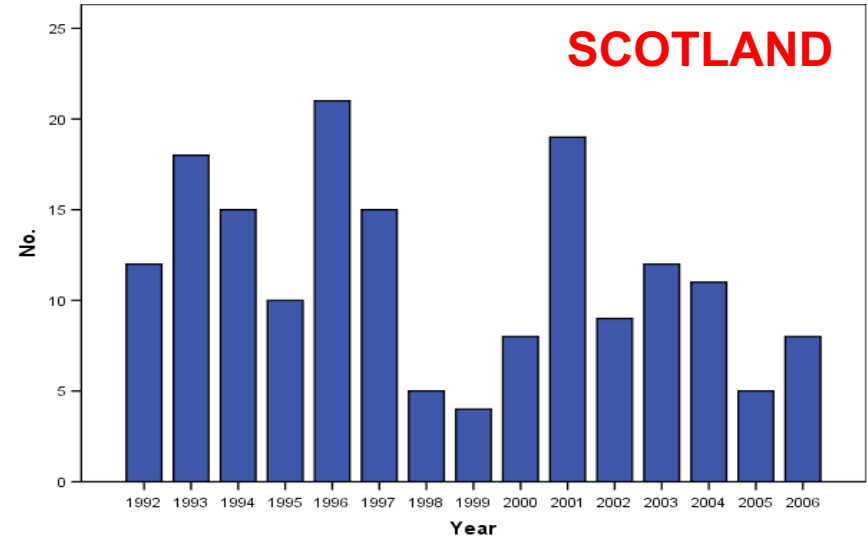
Bottlenose Dolphin killing a Porpoise



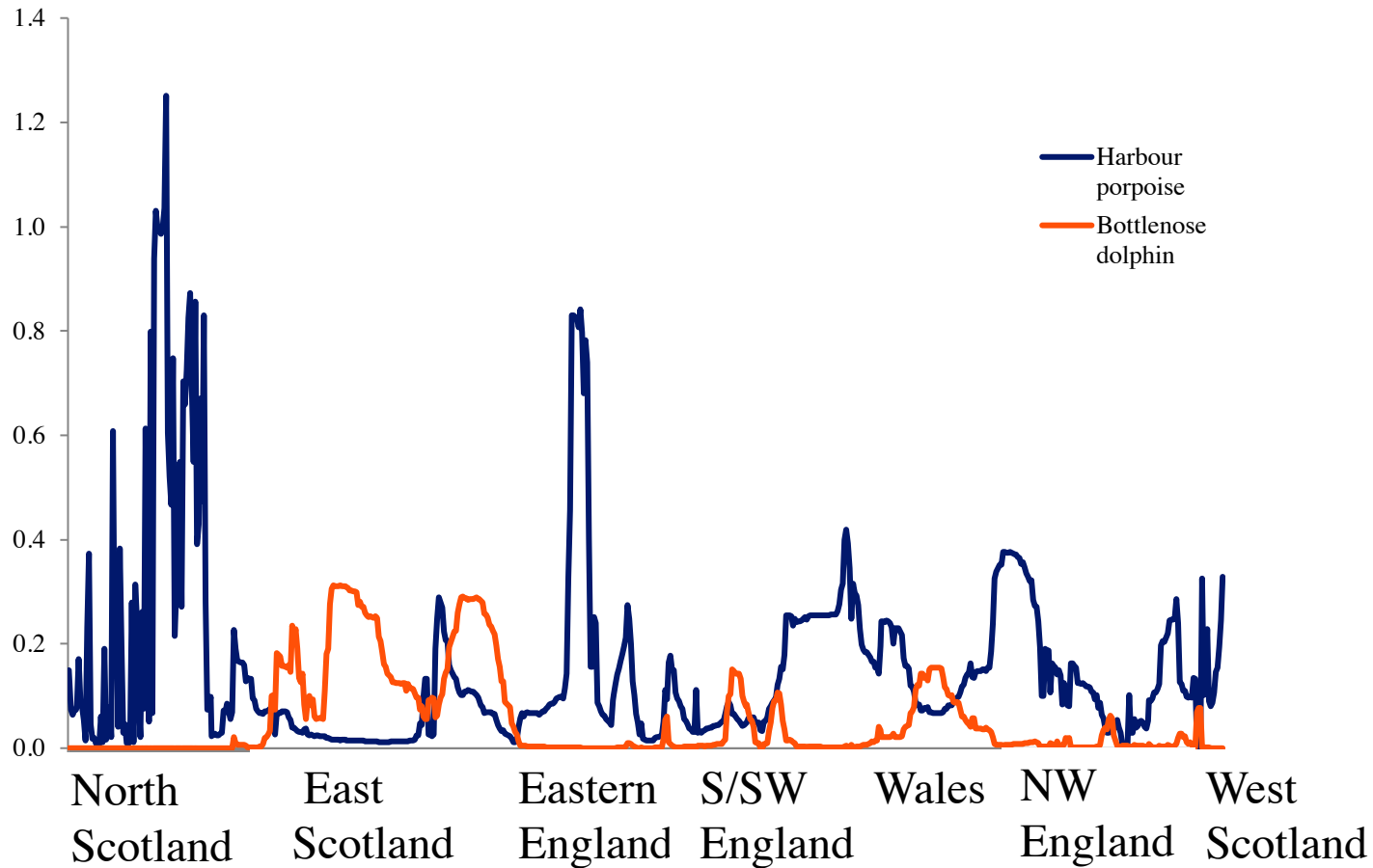
Southern Cardigan Bay, 13 June 2014

DISTRIBUTION OF UK-STRANDED PORPOISES KILLED BY BOTTLENOSE DOLPHINS

ZSL

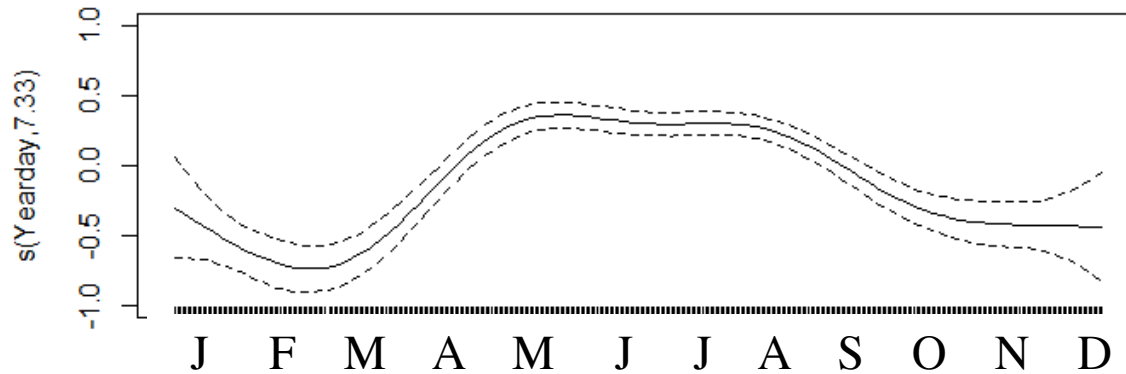


BOTTLENOSE DOLPHIN vs HARBOUR PORPOISE DISTRIBUTIONS



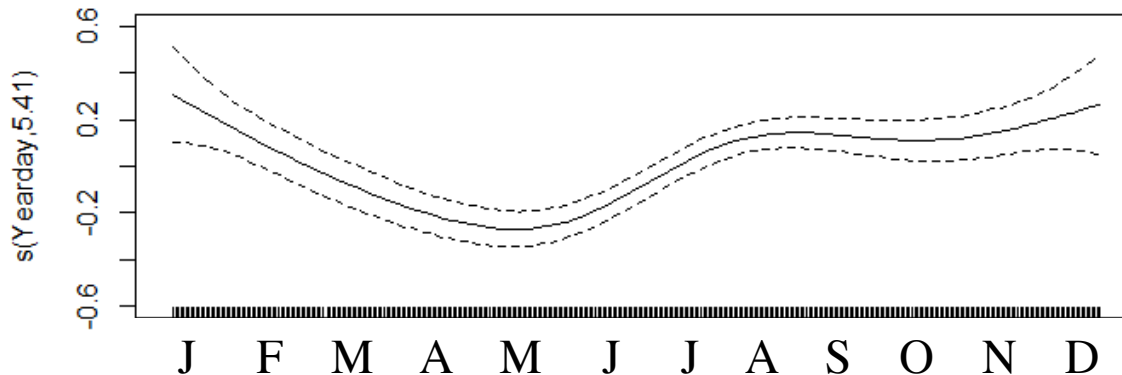
SEASONAL TRENDS IN OVERALL PRESENCE OF BOTTLENOSE DOLPHIN & HARBOUR PORPOISE: 1990-2014

a) Bottlenose Dolphin



- Increase between March & May
- Stable high between May & Aug
- Decrease between Aug & Oct

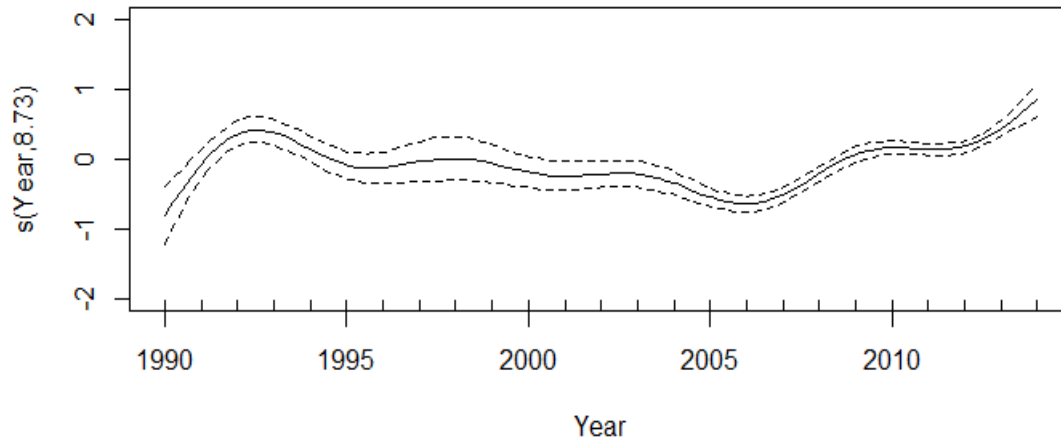
b) Harbour Porpoise



- Decrease between Feb & May
- Increase between May & Aug

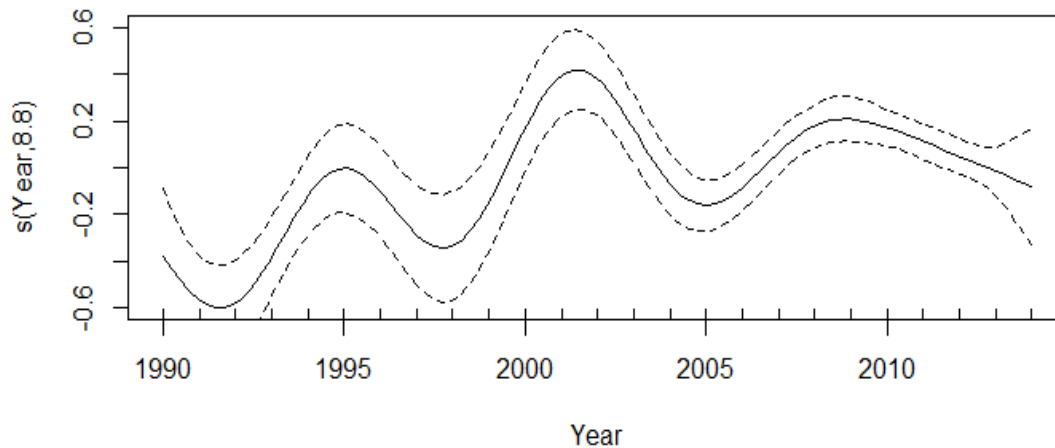
LONG-TERM TRENDS IN OVERALL PRESENCE OF BOTTLENOSE DOLPHIN & HARBOUR PORPOISE

a) Bottlenose Dolphin



- Little change between 1995 and 2005
- General increase between 2006 and 2014

b) Harbour Porpoise

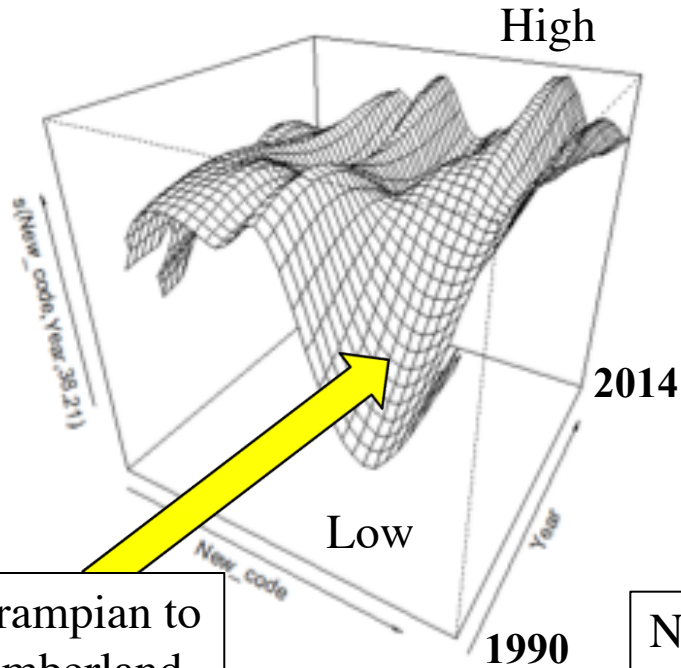


- General increase between early 1990s and 2010
- Peaks around 2001-02 and 2008-09
- Lows around 1992 & 2005

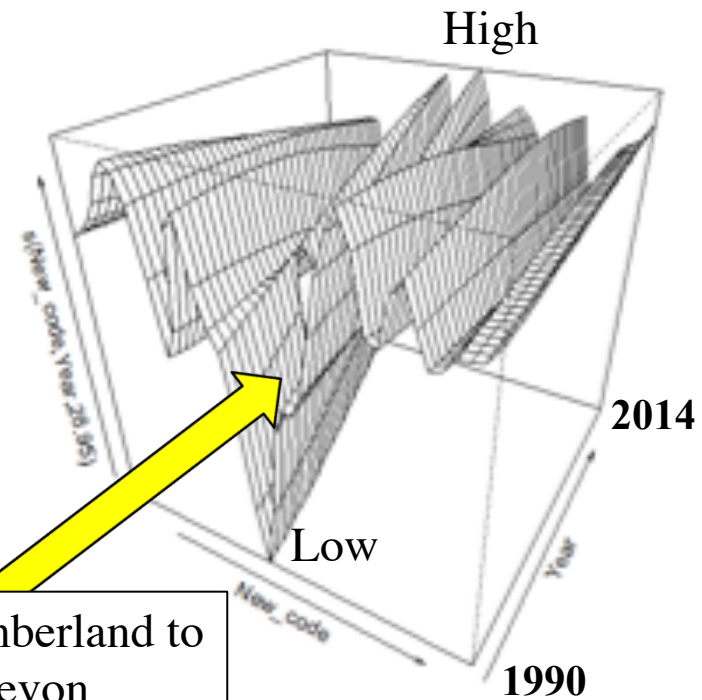
REGIONAL LONG-TERM TRENDS IN PRESENCE OF BOTTLENOSE DOLPHIN & HARBOUR PORPOISE

a) Bottlenose Dolphin

b) Harbour Porpoise



East Grampian to
Northumberland
N = 56 sites

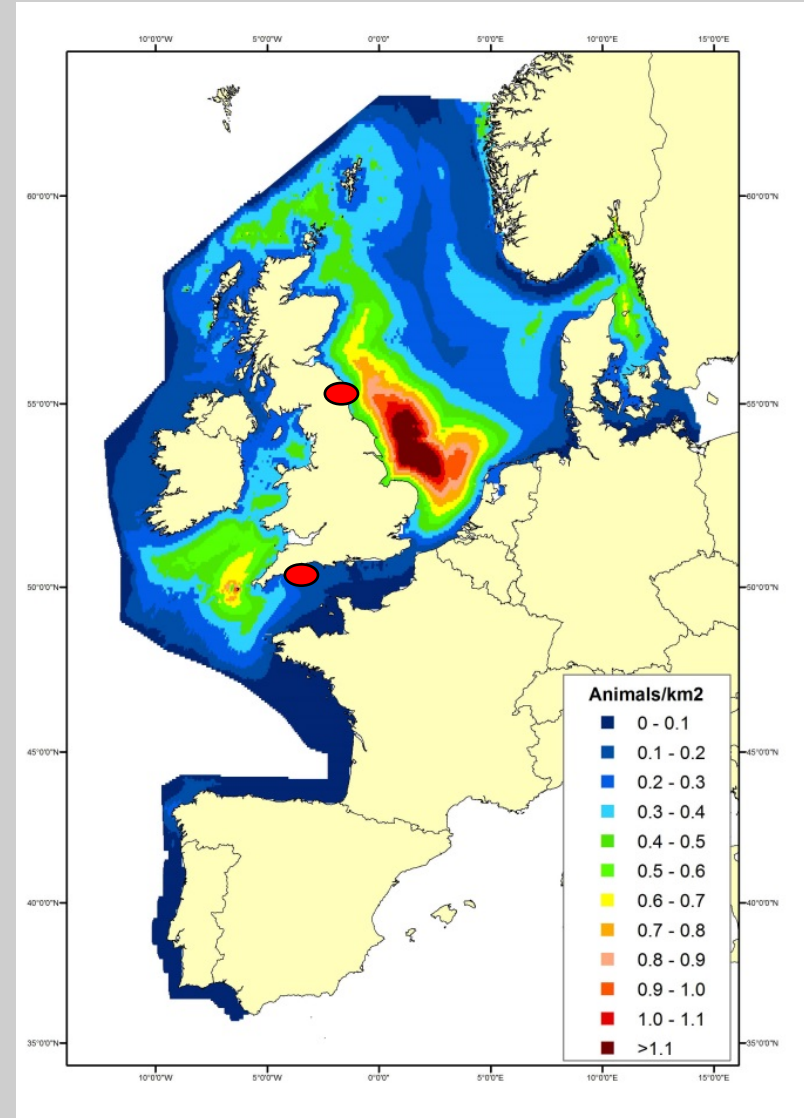
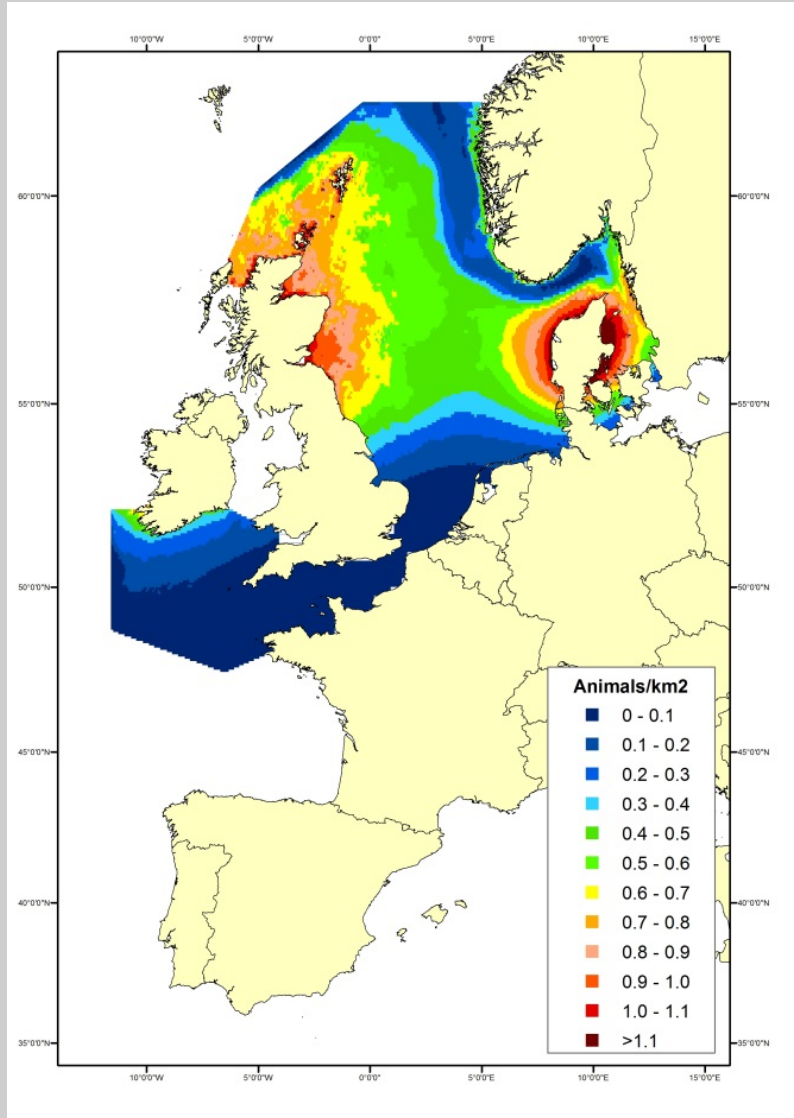


Northumberland to
South Devon
N = 112 sites

July Density Distributions of Harbour Porpoise from SCANS + SCANS II Abundance Surveys

1994

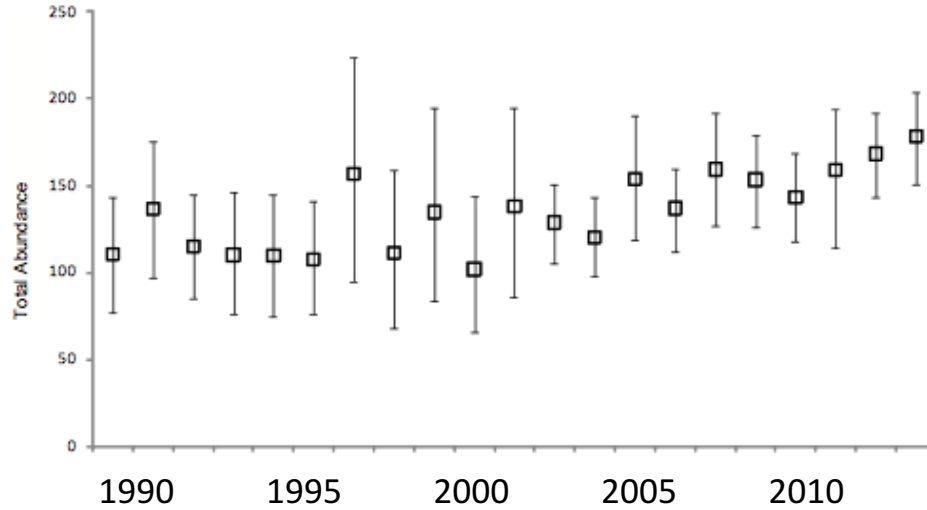
2005



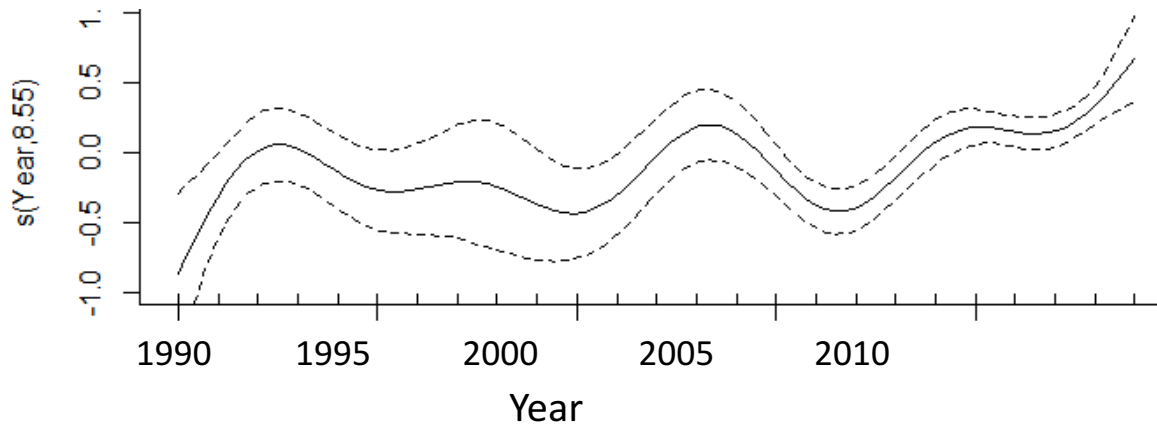
Source: Hammond *et al.*, 2013

COMPARING BOTTLENOSE DOLPHIN ABUNDANCE TRENDS WITH TRENDS FROM THE LAND WATCH MODELLING IN EAST SCOTLAND

a) From Mark-Recapture estimates (Thompson et al., 2012)



b) From Land Watch data (this study)



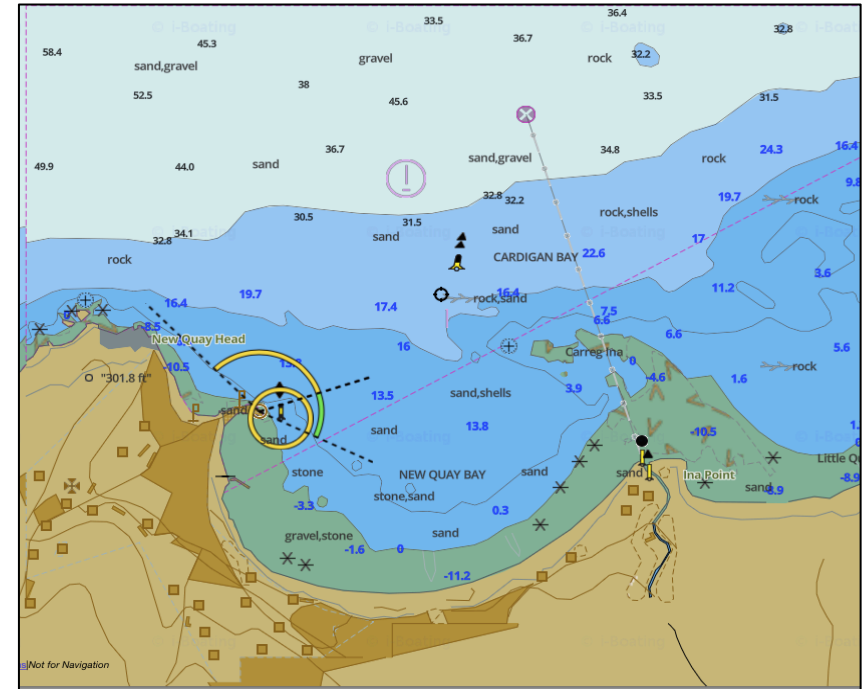
SUMMARY

- c. 84,000 hours of land watch effort from c. 700 sites around the UK, mainly since 2000
- Overall spatial coverage good but relatively few sites in SE England, the Borders and parts of West Scotland
- Bottlenose dolphins concentrated in two regions: Eastern Scotland and West Wales, mirroring offshore survey information
- Harbour porpoises more widely distributed but concentrations in N & E Scotland, Eastern England, SW & N Wales, and West Scotland. Coastal hotspots also in similar areas to results from offshore surveys
- Coastal distributions of the two species appear to be inversely related
- Overall abundance trends indicate slight increases for both species (since early 1990s for harbour porpoise, and since 2006 for bottlenose dolphin), but with some regional variation
- Land watches have the potential to supplement more costly vessel/aerial surveys to provide early indications of population change for these two species

RECOMMENDATIONS FOR FUTURE WORK

- Improve coverage in Western Scotland, The Borders and Southeast England
- Conduct power analysis to determine optimum watch durations
- Promote more year-round watching at sites distributed evenly around the UK
- Calculate effective search areas for sites at different elevations so as to derive absolute densities
- Continue development of analytical procedures to optimise use of available data

LAND WATCHES TO INVESTIGATE THE EFFECTS OF RECREATIONAL VESSEL TRAFFIC ON BOTTLENOSE DOLPHINS



Aleksandra Koroza
(MSc Bangor University)

Types of Vessels using Cardigan Bay SAC



CODES

LS = Large Ship

R = Research Boat

FI = Fishing Boat

VPB = Visitor Passenger Boat

YA = Yacht

mMB = medium sized Motor Boat

sMB = small sized Motor Boat

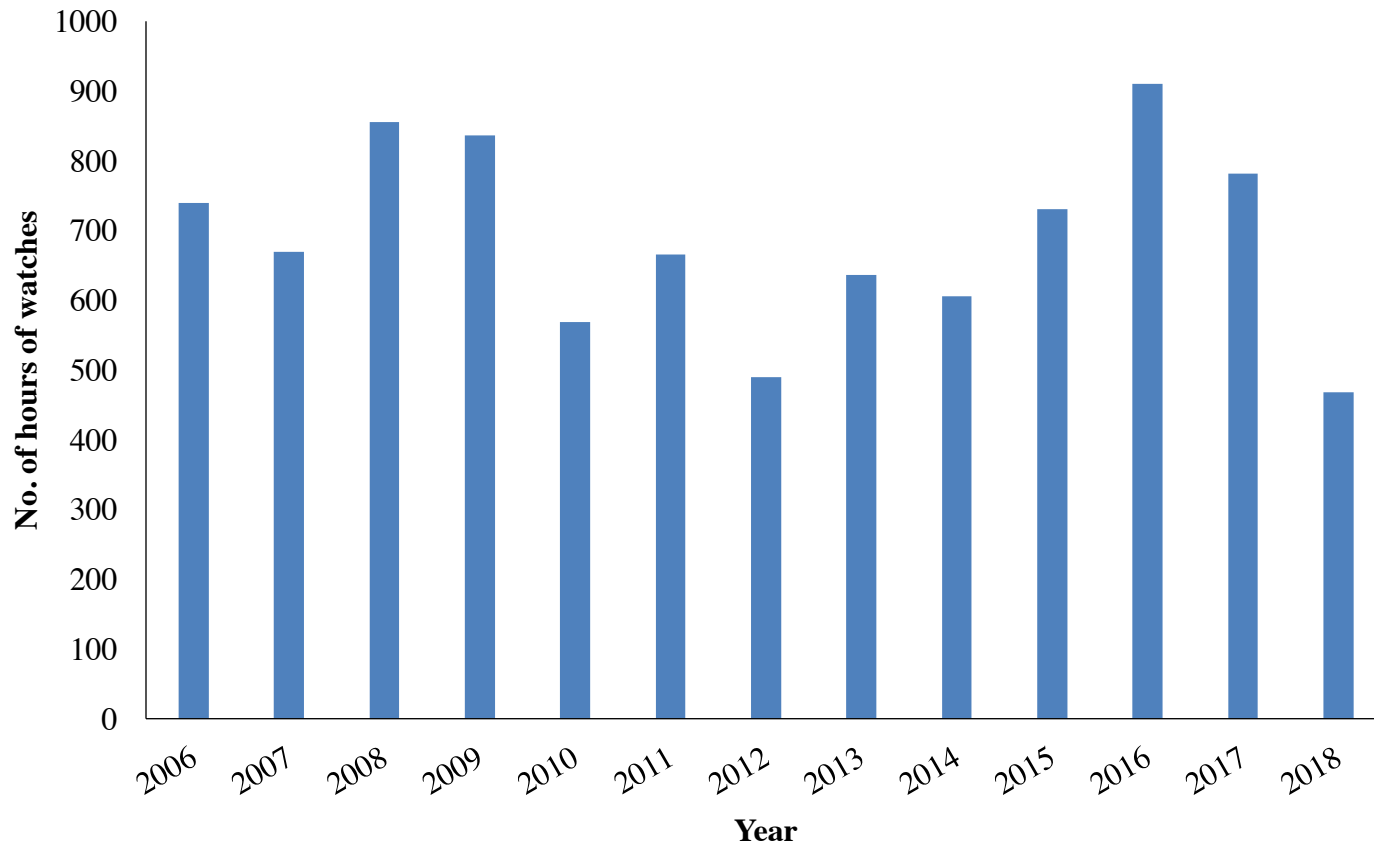
RB = Row Boat or Kayak

JS = Jet Ski

Compliance with local Code of Conduct

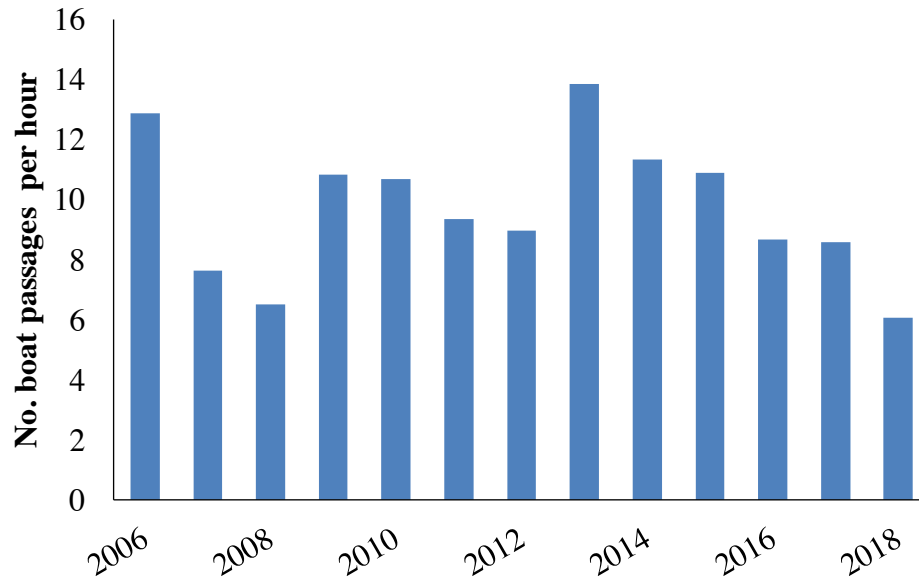
Code	Definition
Y1	Passing cetaceans with no-wake speed or no rapid changes in course
Y2	Boat slows down and stops in the presence of dolphins
N1	Boat does not slow down within 300m of dolphins
N2	Following dolphins by rapid changes in course and speed
N3	Following, touching, and/or feeding dolphins
R	Boat is a vessel with permission under licence from CCC (vessels under flag when on research)

Land Watch Effort, New Quay Pier, 2006-18



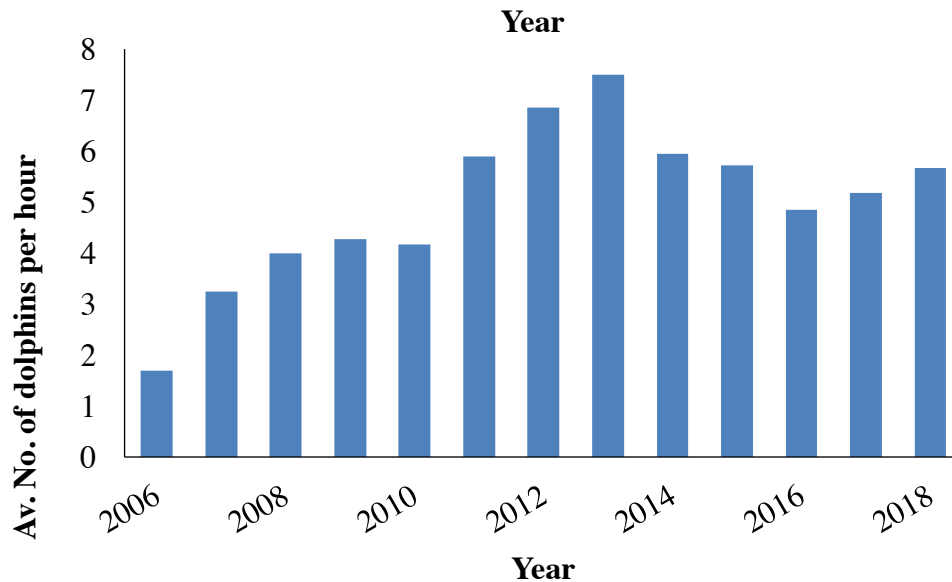
- 8,950 hours of land watches analysed

LONG-TERM TRENDS



No. of Boat Passages per hour, 2006-18

- No significant long-term trend

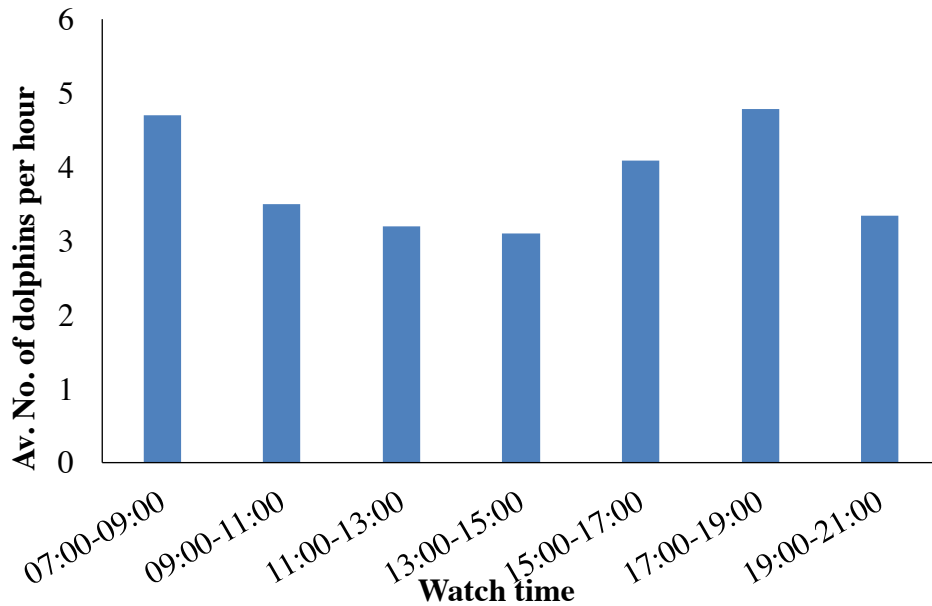
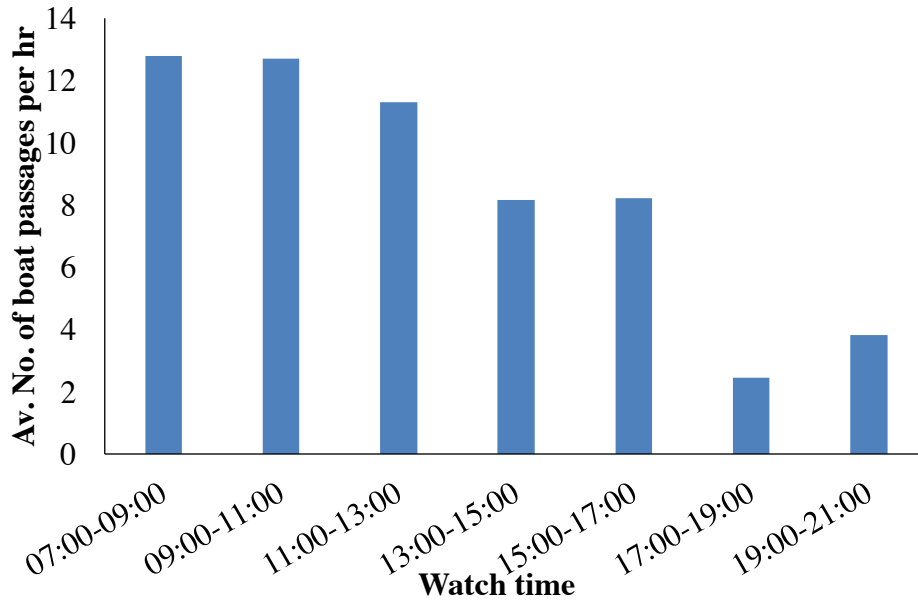


No. of Bottlenose Dolphins per hour, 2006-18

- Significant fewer dolphins per hour during 2006-10 compared with 2011-18, but not in the last 8 years

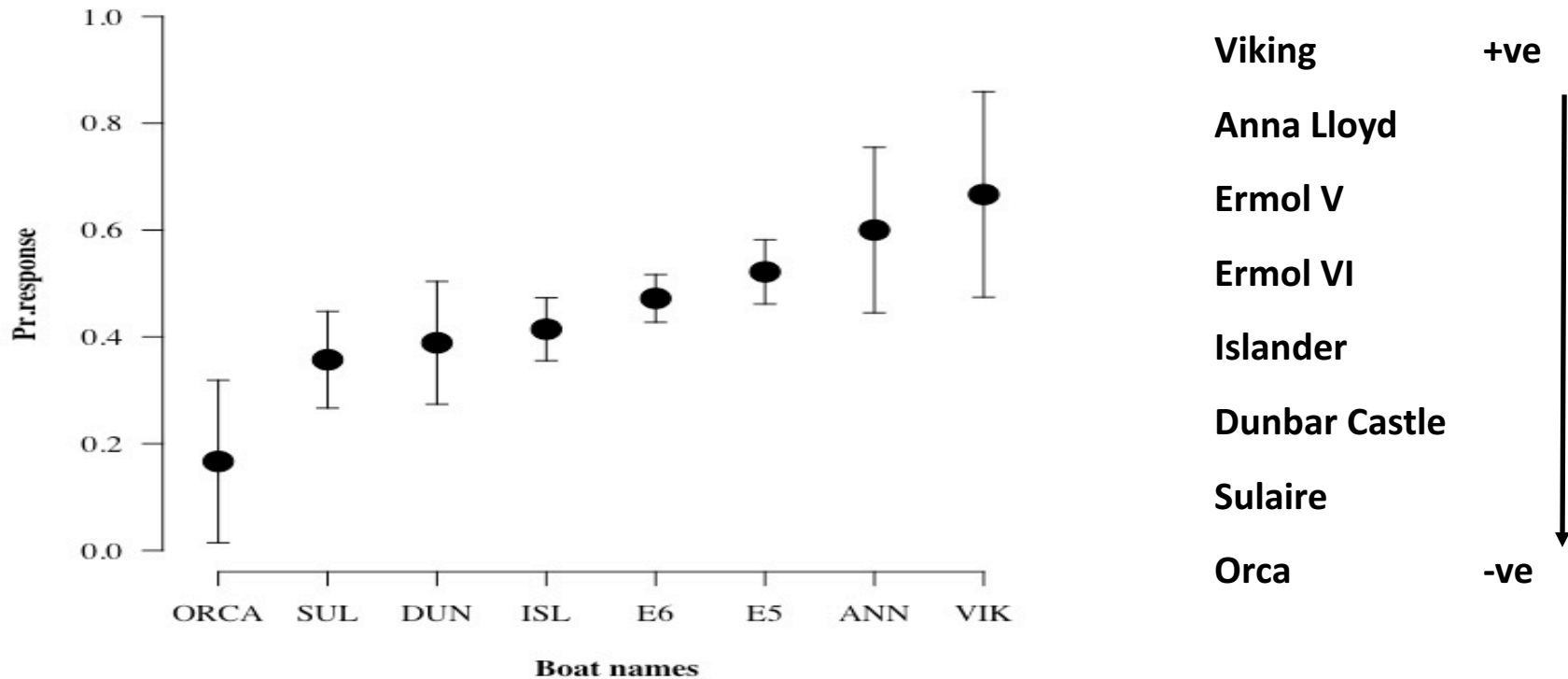
DIURNAL PATTERNS

**No. of Boat Passages
per hour,
between 07:00 and 21:00**



**No. of Bottlenose Dolphins
per hour,
Between 07:00 and 21:00**

Probability of a Response to Individual Boats, 2010-18

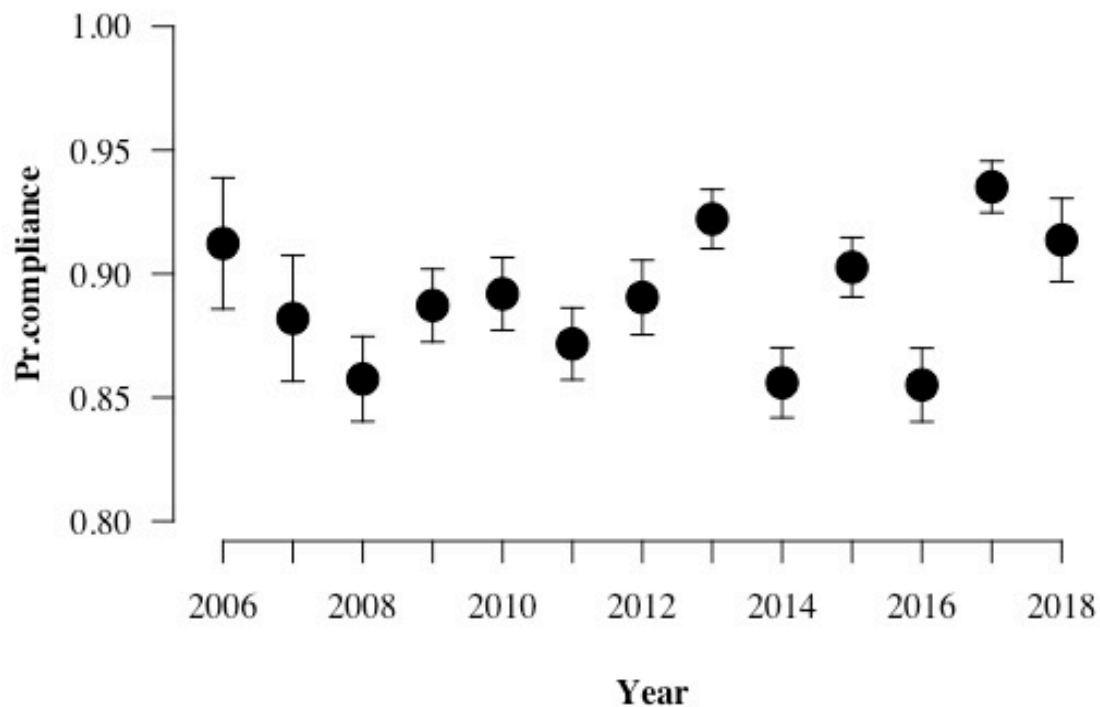


1.0 = Positive Response; 0.0 = Negative Response

60% probability of positive response for Viking & Anna Lloyd

whereas only 20% probability of positive response for Orca

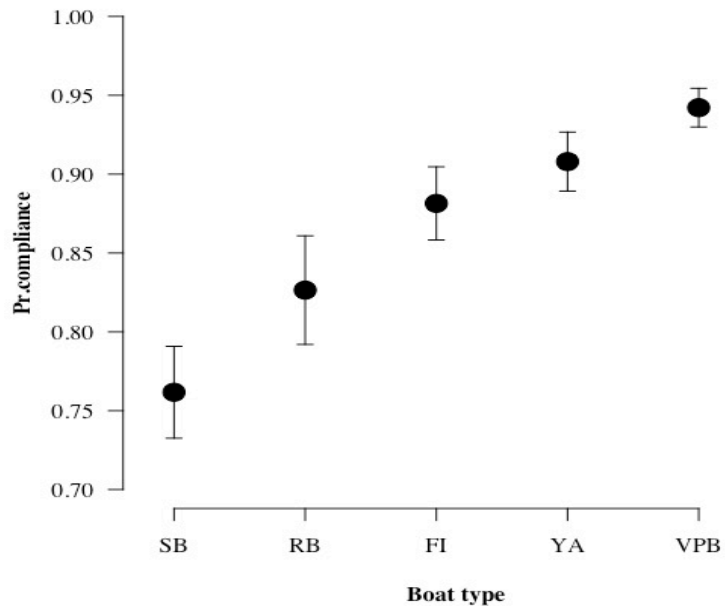
Long-term Trends in Probability of Boat Compliance with Code of Conduct, 2016-18



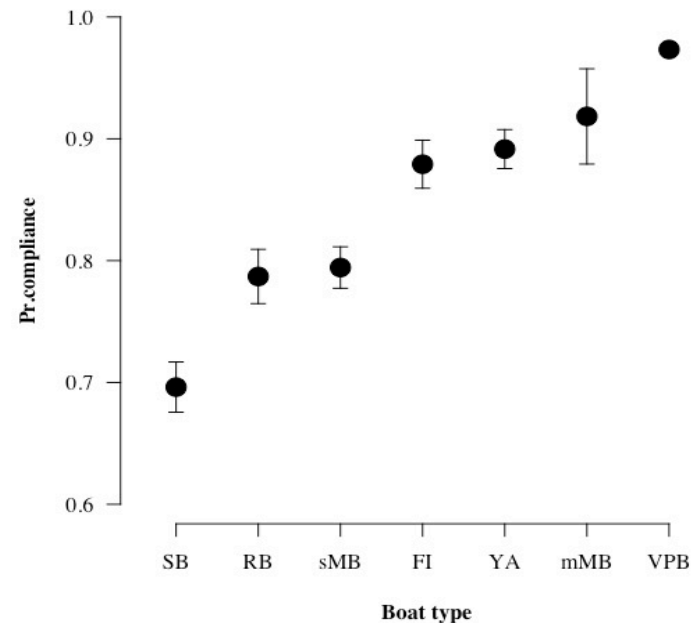
- Compliance remains high (between 0.85 and 0.95) with no obvious trend

Probability of Compliance to Code of Conduct by Boat Type

a) 2006 - 2009

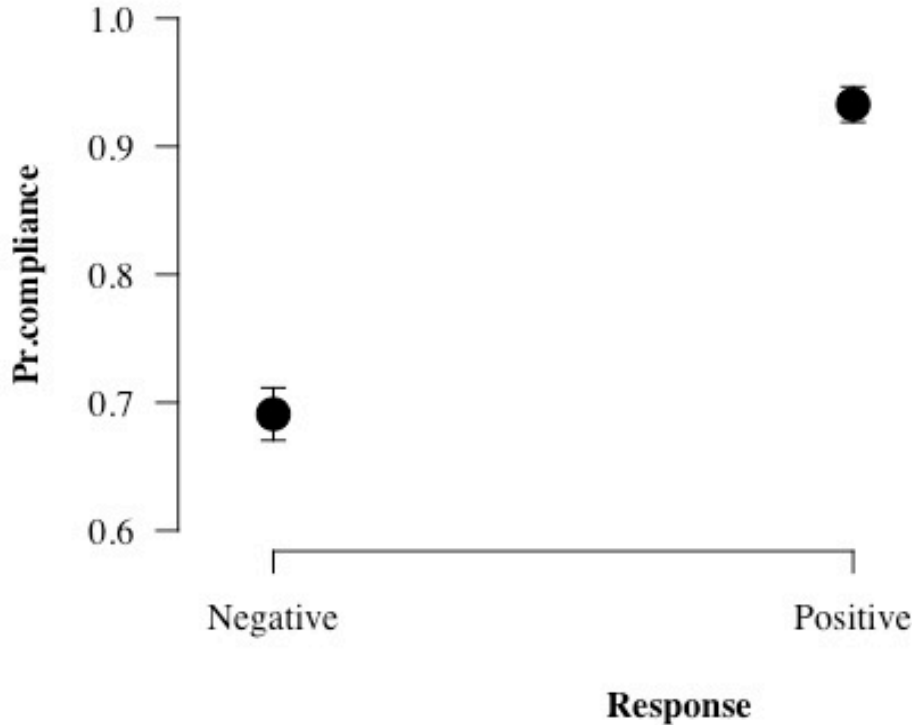


b) 2010 - 2018



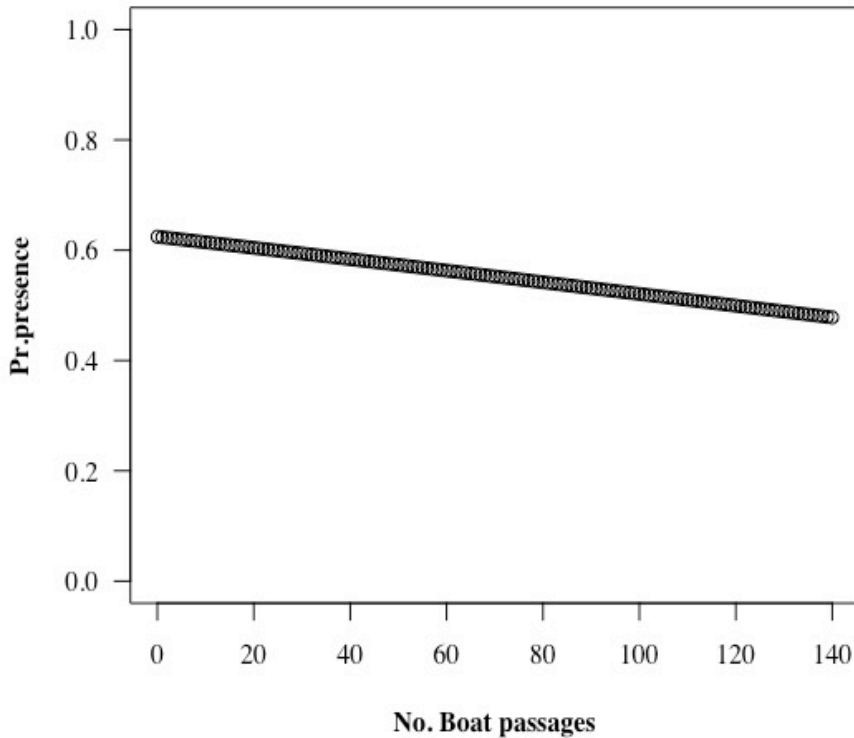
- Visitor Passenger Boats show highest compliance and Speed Boats lowest compliance in both time periods

Relationship between Compliance to Code of Conduct and Probability of a Response by Dolphins

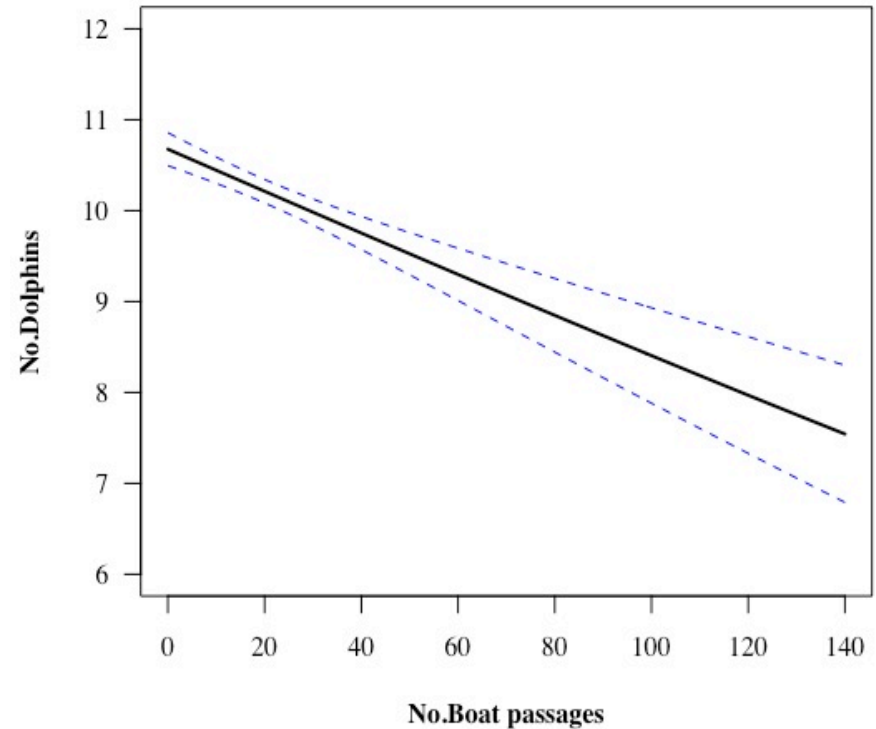


- Based upon 835 dolphin-boat encounters
- 327 positive responses & 508 negative responses
- Compliance: n = 656, Non-compliance: n = 179
- Significant difference in dolphin responses to boats complying and non complying with the Code of Conduct

Overall Relationships between Dolphin Presence and Numbers of Dolphins and the Number of Boat Passages/2 hrs



- Significant negative relationship between the presence of dolphins and the no. of boat passages recorded in a 2-hr watch



- Significant negative relationship between the number of dolphins and the no. of boat passages recorded in a 2-hr watch

SUMMARY

- c. 9,000 hours of land watches conducted across New Quay Bay between 2006 and 2018 were analysed. Number of boat passages, Presence & number of dolphins seen per unit effort were recorded along with Type of boat and whether they complied with the code of conduct. In 2018, names of individual boats were recorded. Coverage was fairly evenly spread between years
- Number of boat passages per hour fluctuated across years but with no particular trend. Number of dolphins per hour was significantly lower between 2006-10 compared with 2011-18, but has not changed significantly in the last 8 years
- Number of boat passages per hour highest in the morning; number of dolphins per hour showed no significant diurnal trend though highest in early morning and from late afternoon
- Dolphins showed different responses to different individual vessels
- Compliance to the code of conduct was high (0.85-0.95), and showed no long-term trend between 2006 and 2018. However, the probability of compliance was highest for Visitor Passenger Boats and lowest for Speed Boats
- Non compliance to the code of conduct had a negative effect on responses by dolphins
- Both dolphin presence and number of dolphins were significantly negatively related to the number of boat passages per two-hour watch

ACKNOWLEDGEMENTS

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- UK Joint Nature Conservation Committee



Data Contributors

- Sea Watch Observers
- Ceredigion County Council
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- Whale & Dolphin Conservation
- MANW and The Wildlife Trusts
- European Marine Energy Centre
- IWDG, HWDT, ORCA and MarineLife