

# SCANS, SCANS-II & CODA

## Distribution, abundance and monitoring of cetaceans in the European Atlantic

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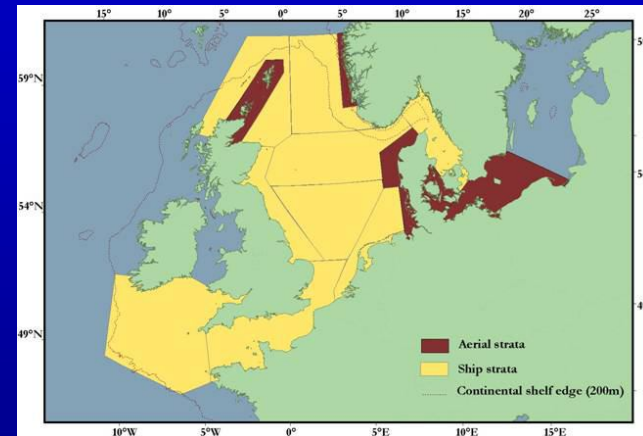
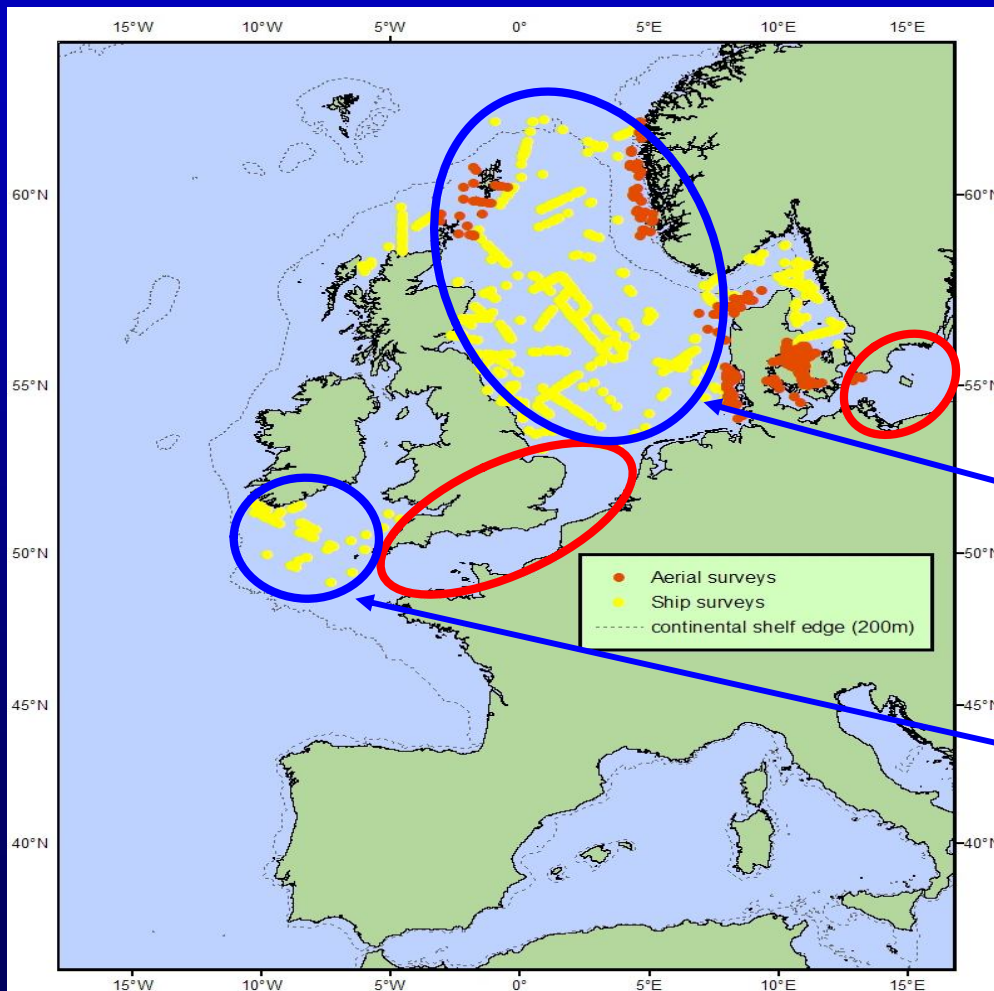
# Background: harbour porpoise bycatch



- European Union Habitats Directive (1992)
  - Article 12.4: “Member States shall ... ensure that [incidental capture] does not have a serious negative impact”
- Information on abundance essential to assess impact

# SCANS 1994 – Harbour porpoise

## Small Cetacean Abundance in the North Sea and adjacent waters



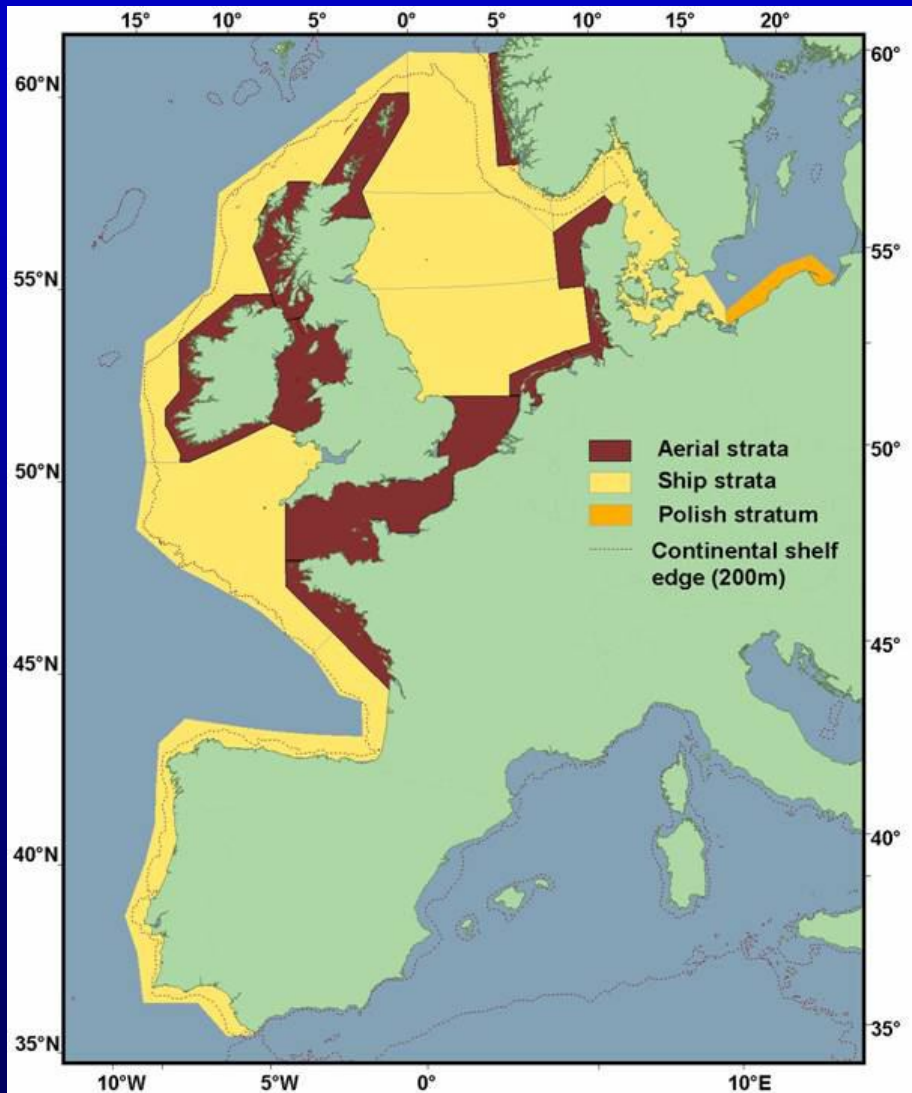
### North Sea

- Bycatch  $\approx 8,000 \text{ yr}^{-1}$
  - Abundance = 250,000
- } 3%

### Celtic Sea

- Bycatch  $\approx 2,200 \text{ yr}^{-1}$
  - Abundance = 36,000
- } 6%

# 11 years later ... SCANS-II 2005



## Small Cetaceans in the European Atlantic and North Sea

- Update abundance estimates
  - Extend coverage to whole European Atlantic shelf
  - Compare results with those from 1994
- Explore methods for monitoring
- Develop management framework for bycatch



# Institutional support



- **European Commission:** LIFE Nature programme
- **Belgium:** Royal Belgian Institute for Natural Sciences
- **Denmark:** National Environmental Research Institute; Danish Forest and Nature Agency
- **France:** University de La Rochelle; Ministry of Ecology and Sustainable Development
- **Germany:** Christian Albrechts-University of Kiel; Federal Ministry of Environment
- **Ireland:** University College Cork; Department of the Environment, Heritage and Local Government
- **Netherlands:** Alterra, Ministry of Agriculture, Nature and Food Quality
- **Norway:** Institute of Marine Research
- **Poland:** University of Gdansk
- **Portugal:** Institute of Nature Conservation
- **Spain:** Spanish Cetacean Society; Ministry of Agriculture, Fisheries and Food
- **Sweden:** Swedish Environmental Protection Agency
- **UK:** University of St Andrews; Department for Environment, Food and Rural Affairs; Joint Nature Conservation Committee



# Scientific participants



- **Project coordination:** Philip Hammond, Kelly Macleod (Sonja Heinrich)
- **Project participants:** Per Berggren, David Borchers, Louise Burt, Ana Cañadas, Geneviève Desportes, Greg Donovan, Anita Gilles, Douglas Gillespie, Jonathan Gordon, Sharon Hedley, Lex Hiby, Iwona Kuklik, Russell Leaper, Kristina Lehnert, Mardik Leopold, Phil Lovell, Nils Øien, Charles Paxton, Vincent Ridoux, Emer Rogan, Filipa Samarra, Meike Scheidat, Ursula Siebert, Marina Sequeira, Henrik Skov, Steve Smart, Rene Swift, Mark Tasker, Jonas Teilmann, Erika Urquiola, Olivier Van Canneyt, Toño Vázquez, Arliss Winship
- **Shipboard and aerial survey observers**
- **Seabird observers**

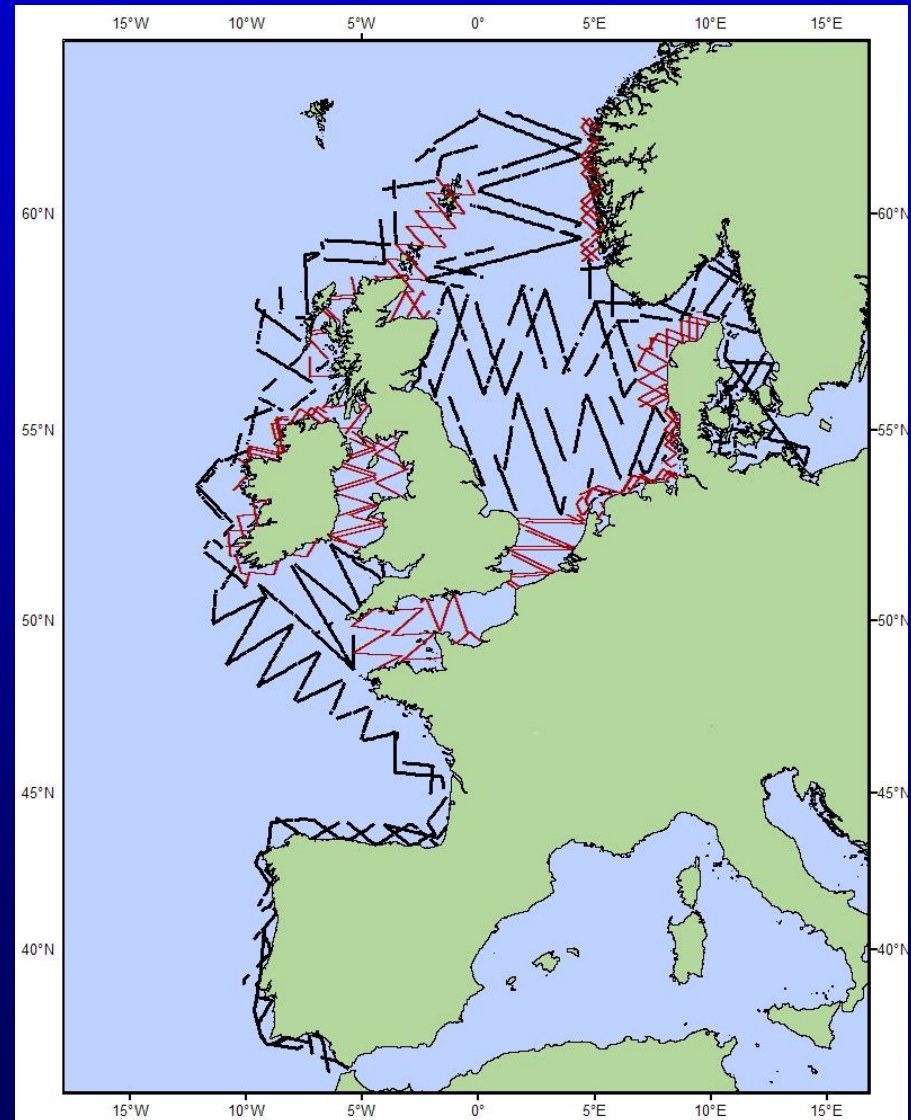
# Implementation of methods

- Shipboard survey
  - Two observation platforms
    - Estimation of  $g(0)$
    - Responsive movement accounted for
- Aerial survey
  - “Circle-back” method
    - Estimation of  $g(0)$



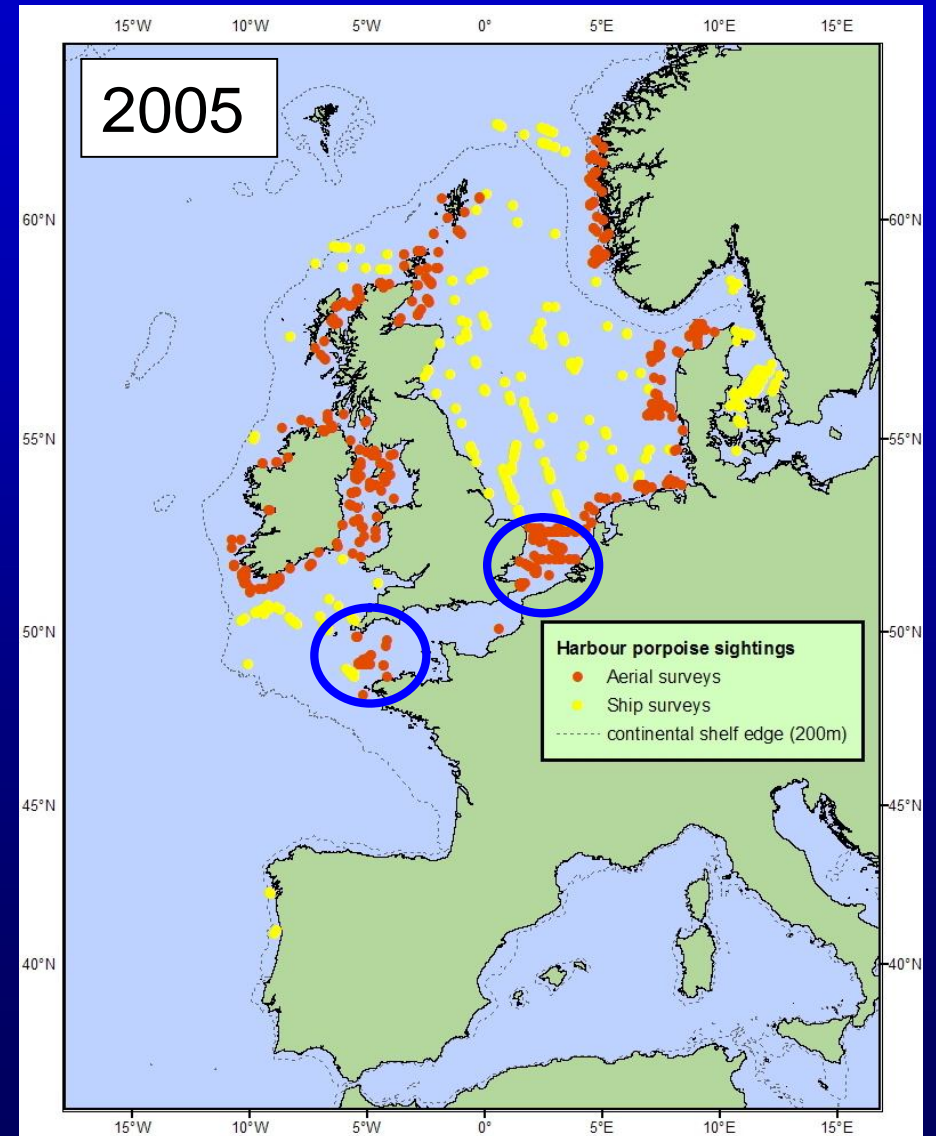
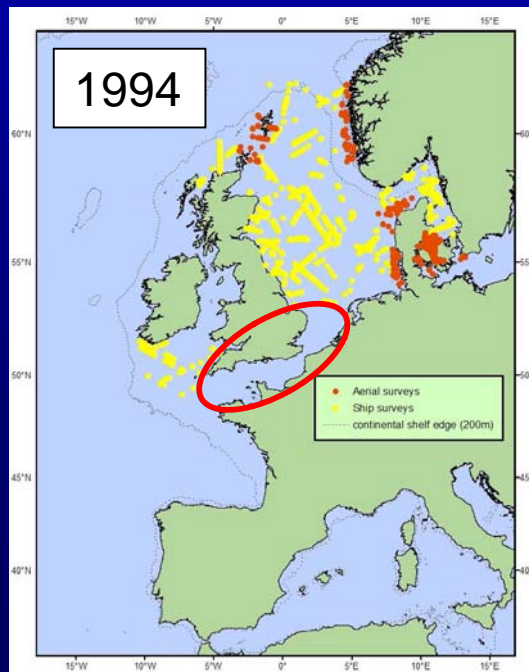
# Survey

- 27 June - 29 July 2005
- 7 ships
  - Area = 1,006,000 km<sup>2</sup>
  - 19,900 km survey effort
- 3 aircraft
  - Area = 364,000 km<sup>2</sup>
  - 15,800 km survey effort



# Harbour porpoise

- 481 shipboard sightings
- 543 aerial sightings
  - including many in southern North Sea and Channel

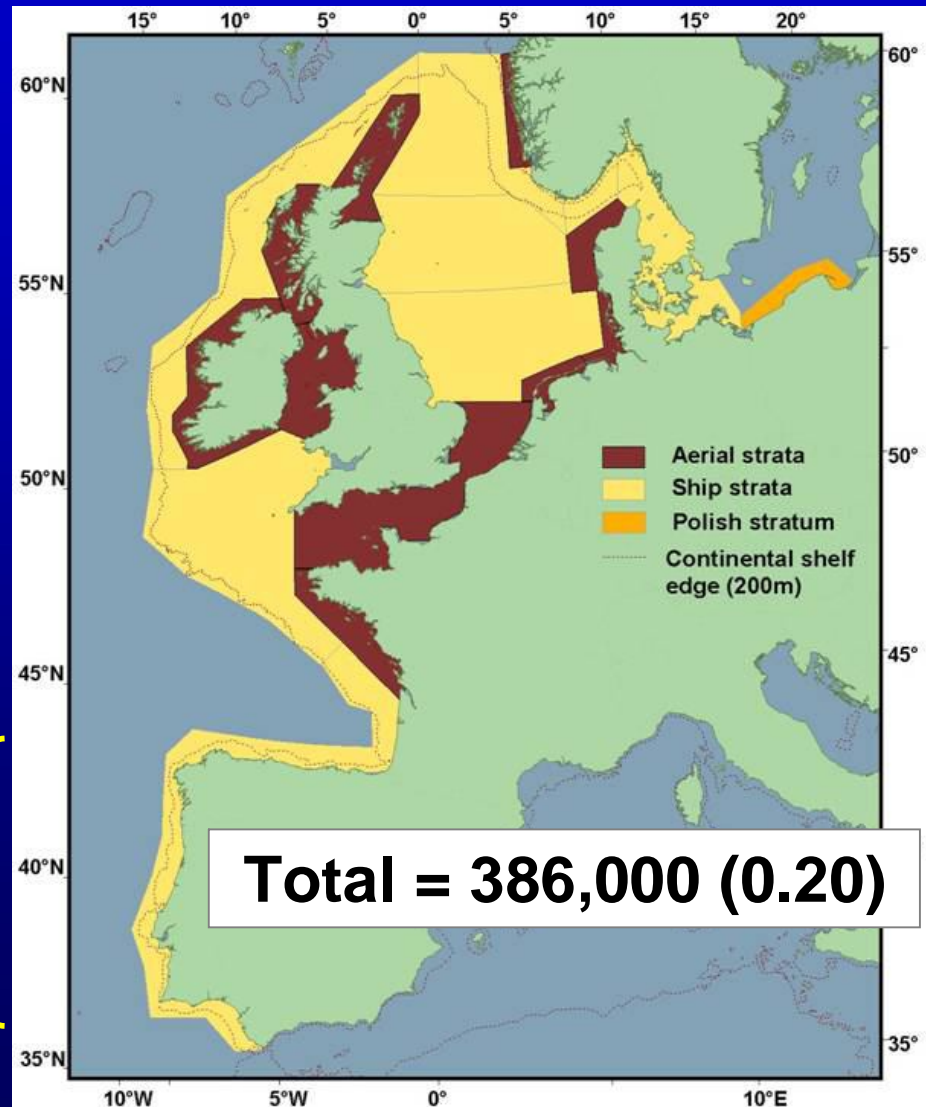


# Harbour porpoise abundance

48,000 (0.31)

80,600 (0.50)

2,600 (0.80)



231,100 (0.14)

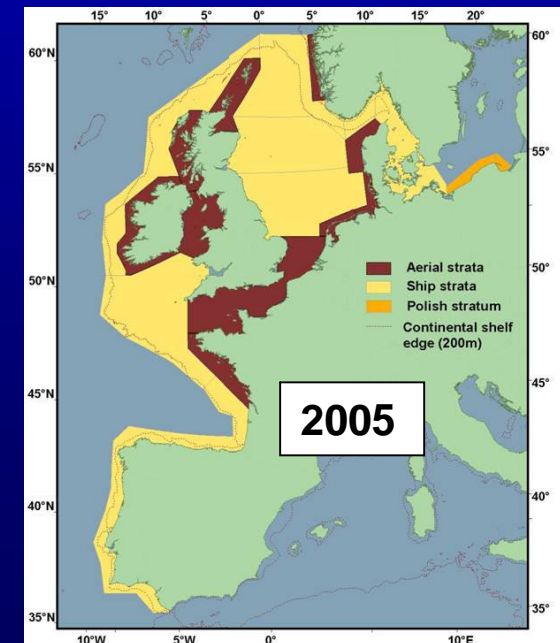
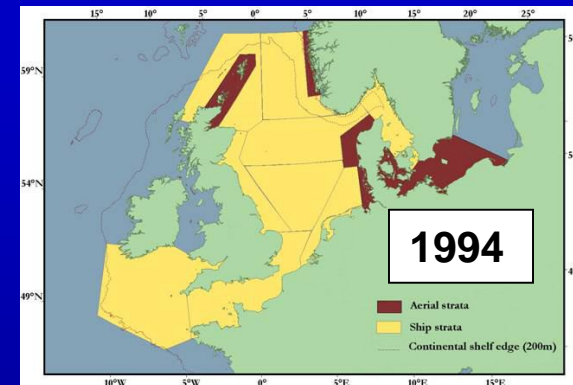
# Porpoise abundance: 1994 vs 2005

- **Total survey area**

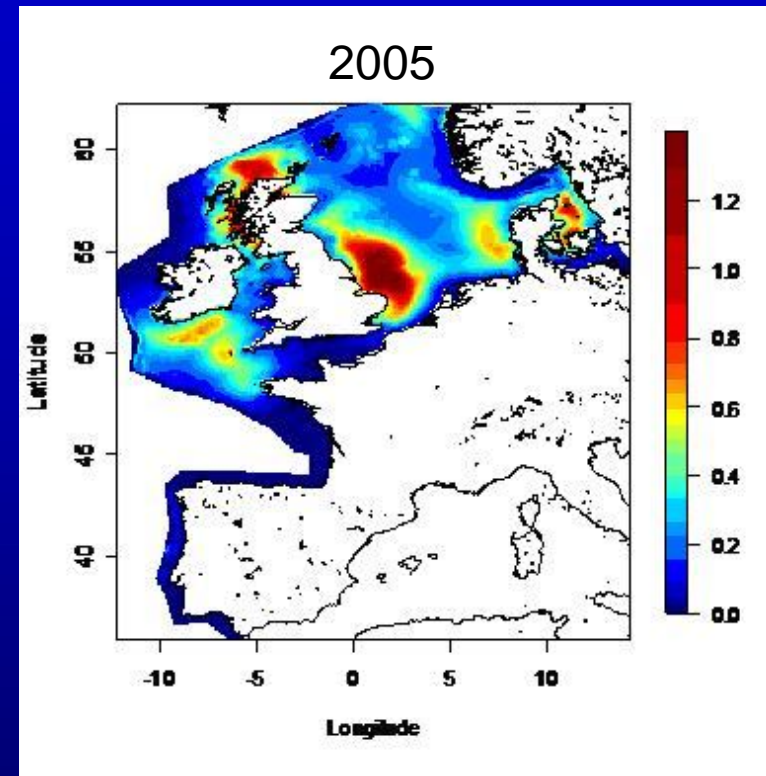
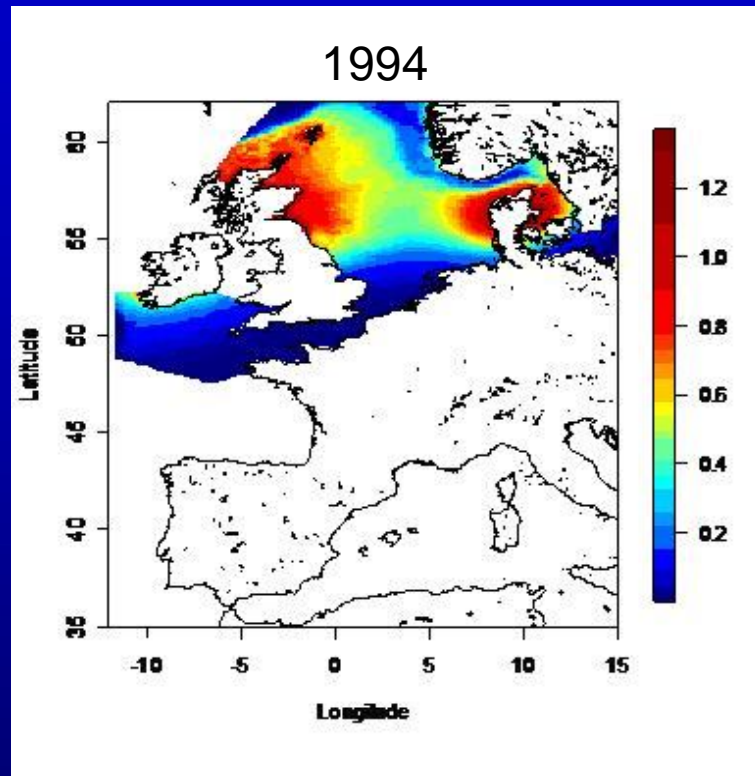
- 1994 (SCANS): **341,000 (0.14)**
- 2005 (SCANS-II): **386,000 (0.20)**

- **SCANS-94 area**

- 1994 (SCANS): **341,000 (0.14)**
- 2005 (SCANS-II): **~335,000 (~0.21)**



# Porpoise distribution: 1994 vs 2005



- Inter-annual variation?
- Effects of bycatch?
- Immigration/emigration?
- Changes in prey availability?



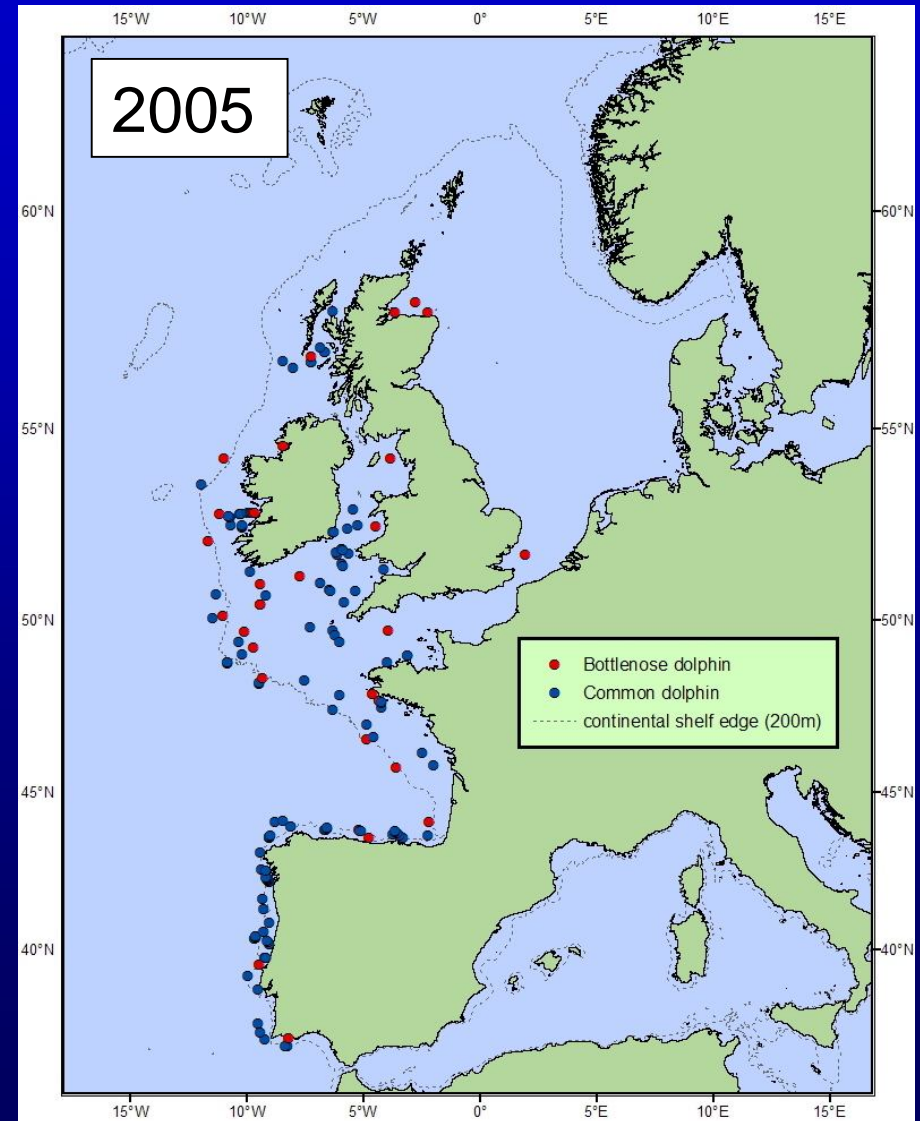
# Abundance estimates: 1994 vs 2005

<b>Species</b>	<b>1994</b>	<b>2005</b>	<b>2005 (<math>\approx</math>1994)</b>
Harbour porpoise	341,000	386,000	335,000
White-beaked dolphin	7,900	22,700	10,500
Minke whale	8,400	18,600	13,500



# Bottlenose and common dolphin




- Bottlenose dolphin
  - Coastal areas as expected
  - Also in offshore areas
- Common dolphin
  - Restricted to western areas
  - Frequently sighted along shelf edge
- Both species occur in deeper waters off the shelf

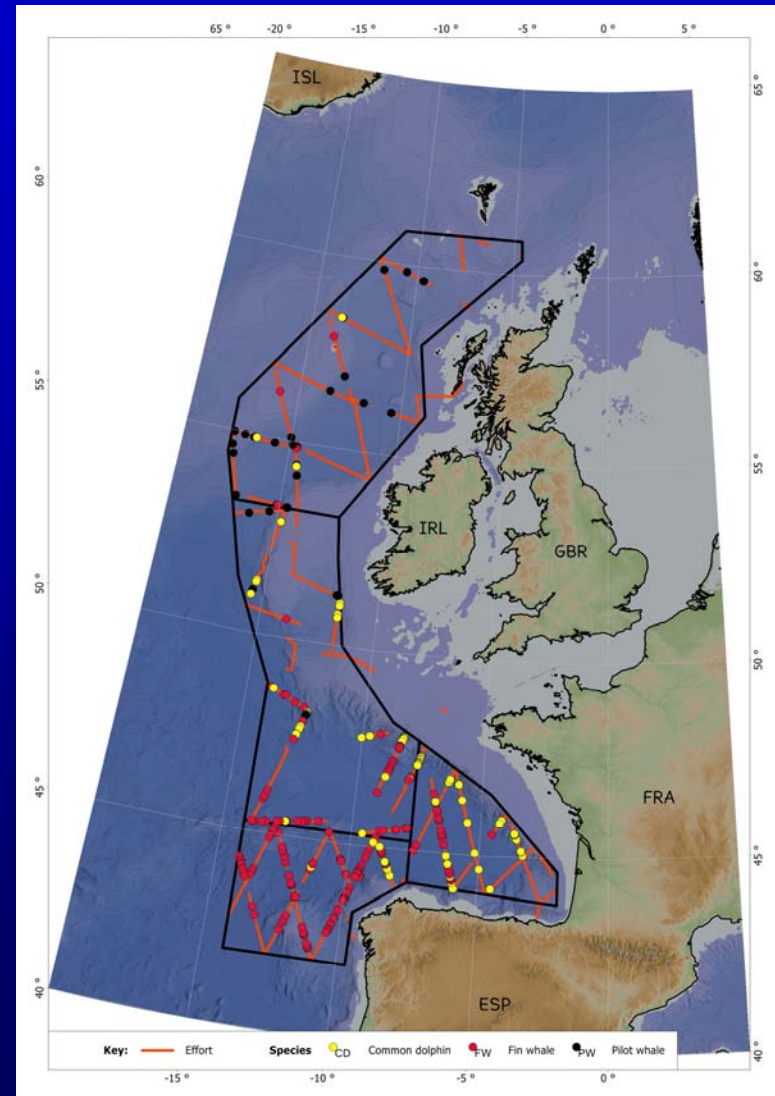


# CODA 2007

## Cetacean Offshore Distribution and Abundance

- Surveys in July 2007
- Data currently being analysed

Species	Sightings
Bottlenose dolphin	35
Common dolphin 	159
Striped dolphin	49
Pilot whale 	91
Sperm whale	63
Fin whale 	353





# Monitoring cetaceans

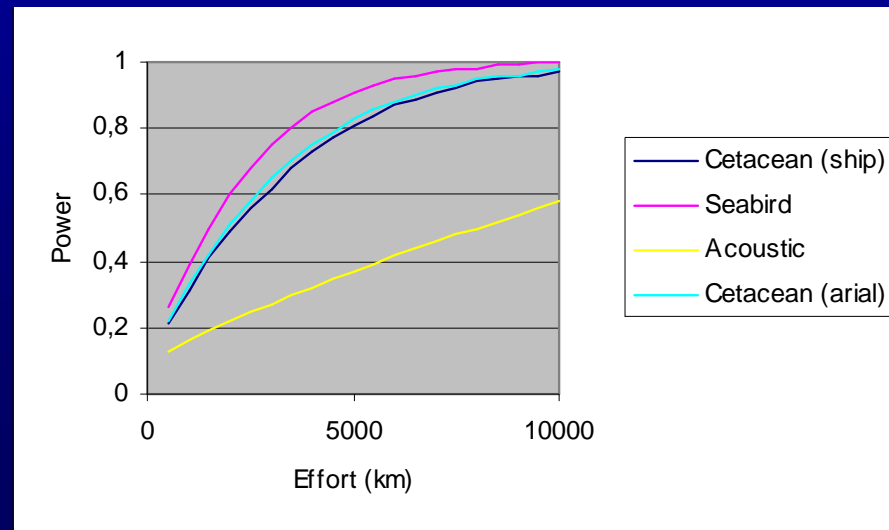
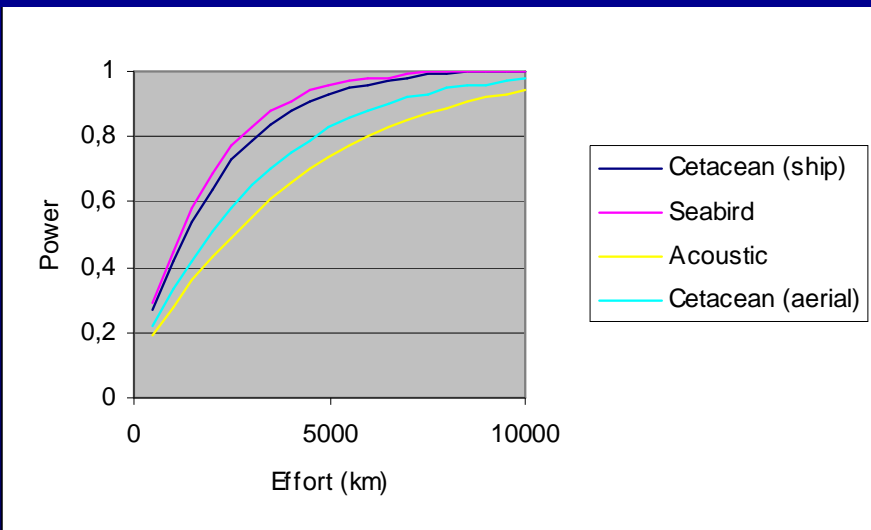
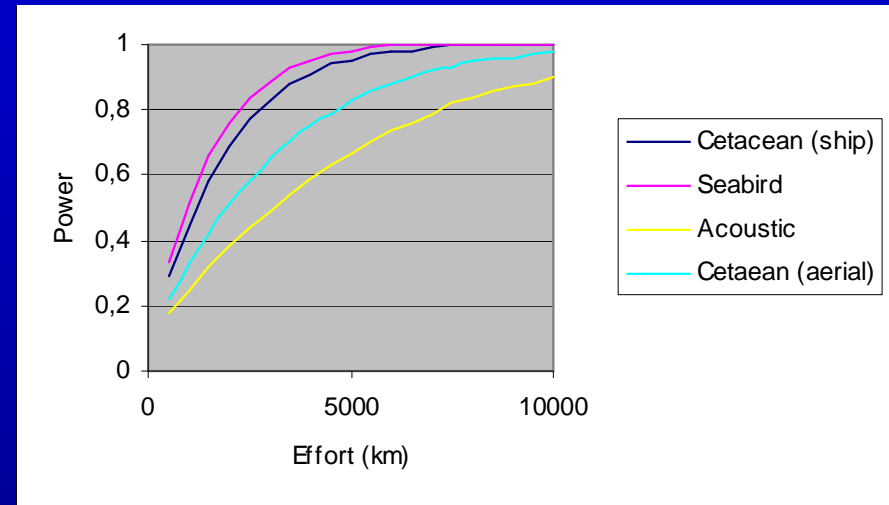
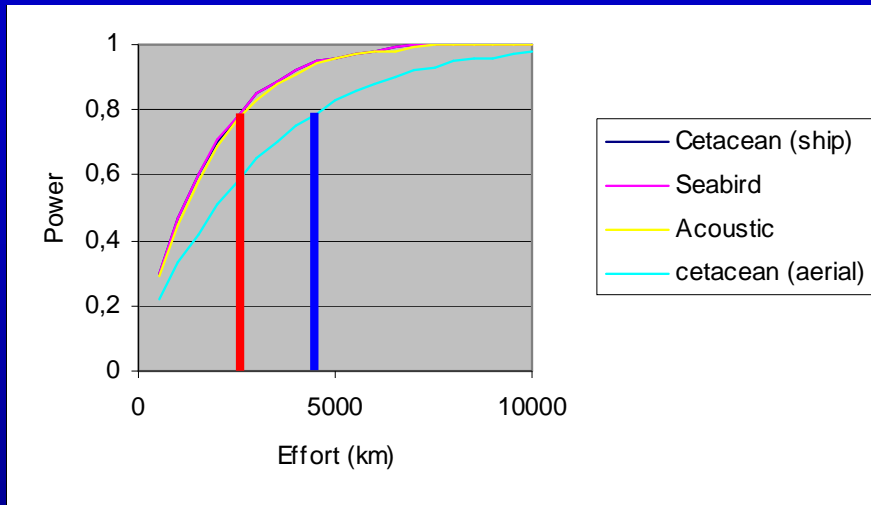
- Considerations for a monitoring programme
  - Which species?
  - Population monitoring or area use?
  - Define population or area
  - Define monitoring objectives
  - Conduct statistical power analysis to find best method to meet objectives
  - Conduct a cost benefit analysis
  - Consider logistical constraints



# SCANS-II: Methods for monitoring

- **Methods investigated**
  - Ship surveys
    - Two-platform visual - absolute abundance
    - One person visual - “seabird” observer
    - Towed acoustics
  - Aerial surveys
- **Analysis to determine statistical power of methods ...**
  - to detect a 5% per annum decline in abundance over 10 years
- **Cost-benefit analysis**
- **Consideration of logistics**

# Power to detect trends: harbour porpoise



# Cost-benefit analysis: harbour porpoise

Method	Power	Annual effort (km)	Annual survey cost (€)	Annual analysis cost (€)	Total equipment cost (€)	Total cost (€) (10 years)
<b>SCANS-II ship (absolute)</b>	78%	2,500	152,334	15,000	40,000	<b>1,713,000</b>
<b>Visual large ship</b>	78%	2,500	130,221	3,750	4,000	<b>1,344,000</b>
<b>Visual small ship</b>	78%	2,500	56,511	3,750	4,000	<b>607,000</b>
<b>Visual PoO ship</b>	77%	2,500	3,686	3,750	4,000	<b>78,000</b>
<b>Towed acoustic large ship</b>	78%	2,500	31,634	1,875	20,000	<b>355,000</b>
<b>Towed acoustic small ship</b>	78%	2,500	13,206	1,875	20,000	<b>171,000</b>
<b>Towed acoustic PoO ship</b>	78%	2,500	921	1,875	20,000	<b>48,000</b>
<b>Aerial survey</b>	79%	4,500	19,946	3,845	10,000	<b>248,000</b>



# Monitoring conclusions

- Best method depends on species and objectives
- Keep features of method as consistent as possible
  - To minimise variability and maximise power to detect trends
- Power to detect trends will be low for uncommon species
- Platforms of opportunity are cheap
  - But have important logistical constraints