

# Distribution and abundance of cetaceans in the European Atlantic: results from SCANS-III aerial and ship surveys in 2016

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## SCANS-III

### **Funded by:**

Miljø- og Fødevareministeriet, Denmark; Agence des Aires Marines Protégées, France; Bundesamt für Naturschutz, Germany; Rijkswaterstaat, Netherlands; Havforskningsinstituttet, Norway; Sociedade Portuguesa de Vida Selvagem, Portugal; Instituto Español de Oceanografía, Spain; Havs och Vatten myndigheten, Sweden; Department for Environment, Food and Rural Affairs, UK

### **Equipment development**

Douglas Gillespie  
SMRU, University of St Andrews, UK

Russell Leaper  
University of Aberdeen, UK

### **Aerial cruise leaders**

Mario Acquarone  
Arctic University of Norway, Tromsø

Helder Araújo  
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Ghislain Dorémus & Olivier van Canneyt  
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Steve Geelhoed & Hans Verdaat  
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### **Ship cruise (co)leaders**

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José Antonio Vázquez  
Alnilam Research and Conservation, Spain

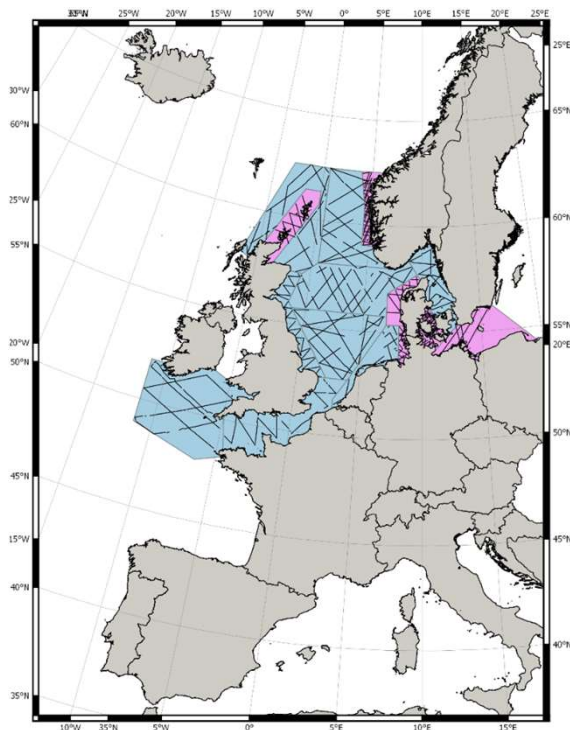
### **Aerial and shipboard observers**

### **Pilots, captains and crew**

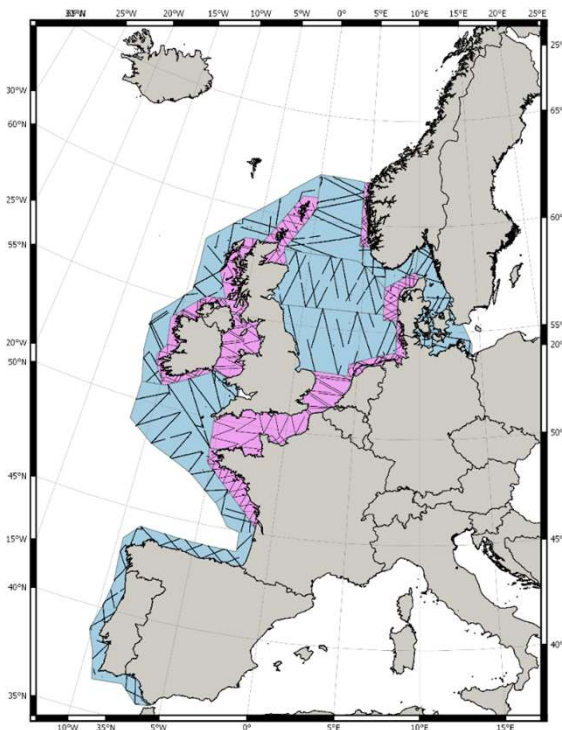
## Points to address

- Revision of abundance estimates from SCANS-II (2005)
- Estimates from SCANS-II (2005) + CODA (2007) combined
- SCANS-II/CODA and SCANS-III (2016) density surface modelling

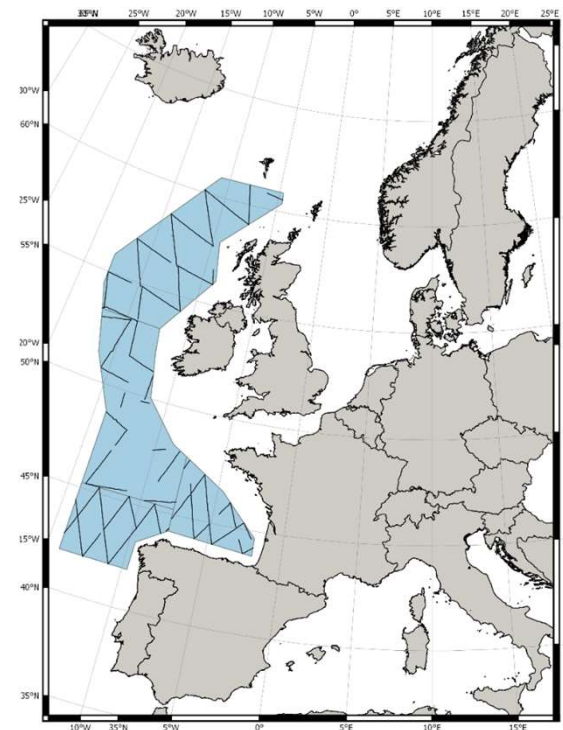
SCANS 1994



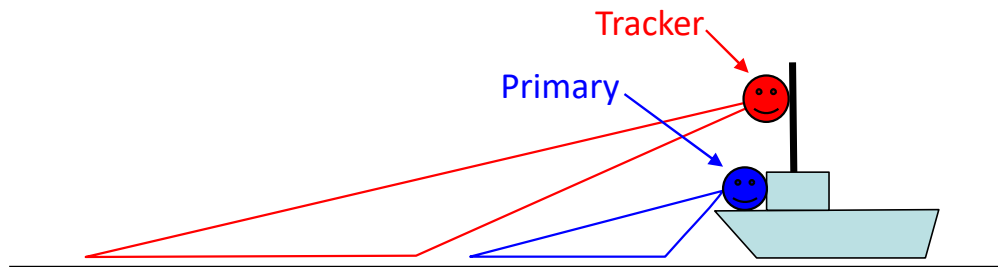
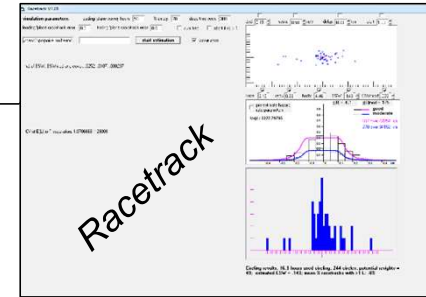
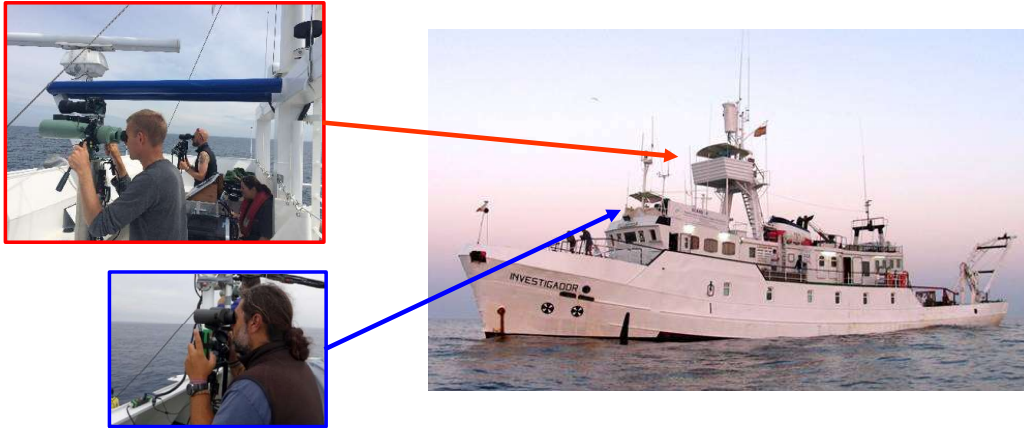
SCANS-II 2005



CODA 2007

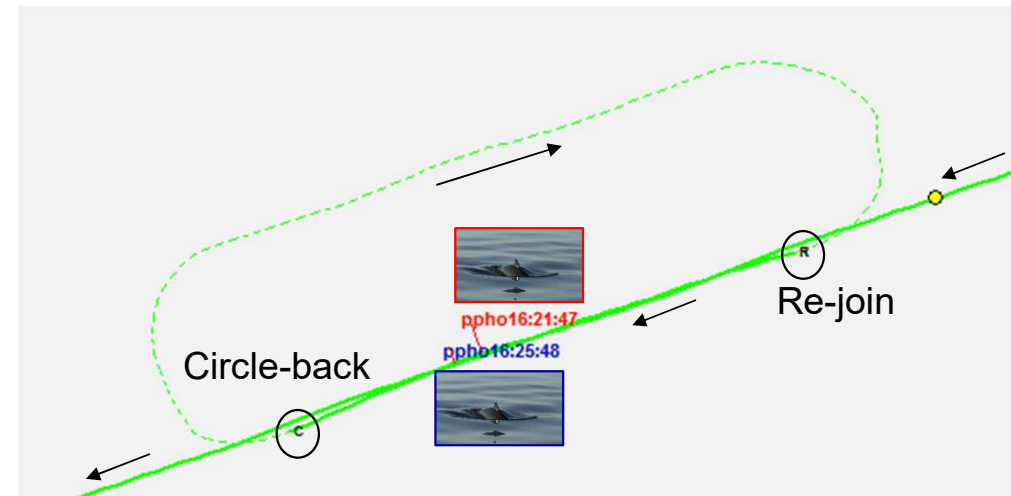


# Methods: data collection and analysis



- Primary data  $\rightarrow$  conventional detection function  $\rightarrow p_a(\text{esw})$
- Tracker/Primary data  $\rightarrow$  mark-recapture estimate of  $g(0)$

 DISTANCE *mrds*



## Abundance estimates SCANS-II (2005)

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- Shipboard surveys
  - Two models available for analysis of tracker-configuration 2-team data (DISTANCE *mrds*)
    - Point (track-line) independence – most robust model to be used as a default
    - Full independence – much less robust and only to be used if evidence of responsive movement
  - Original analysis
    - Evidence of responsive movement (attraction) for common dolphins so full independence model used
      - Responsive movement assessed using Palka & Hammond (2001). Can. J. Fish. Aquat. Sci. 58: 777-787
    - BUT - evidence of responsive movement later found to be a result of error in analysis
    - Correct analysis showed no evidence for responsive movement
  - Revised analysis
    - Used point independence model
    - Revised abundance estimates larger
- Aerial surveys
  - Estimates revised to use SCANS-III circle-back estimate of  $g(0)$  instead of dive data from elsewhere
  - Minimal difference in estimated abundance

## Abundance estimates SCANS-II (2005)

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	Revised estimates			<i>Previously published estimates</i>		
Platform	N	CV	95% CI	<i>N</i>	<i>CV</i>	<i>95% CI</i>
Ship	142,445	0.34	74,090 - 273,864	36,225	0.21	
Aerial	18,730	0.47	7,825 - 44,833	19,995	0.51	
<b>Total</b>	<b>161,174</b>	<b>0.31</b>	<b>89,340 - 290,767</b>	<b>56,221</b>	<b>0.23</b>	<b>35,748 - 88,419</b>

## Abundance estimates SCANS-II (2005) + CODA (2007) combined

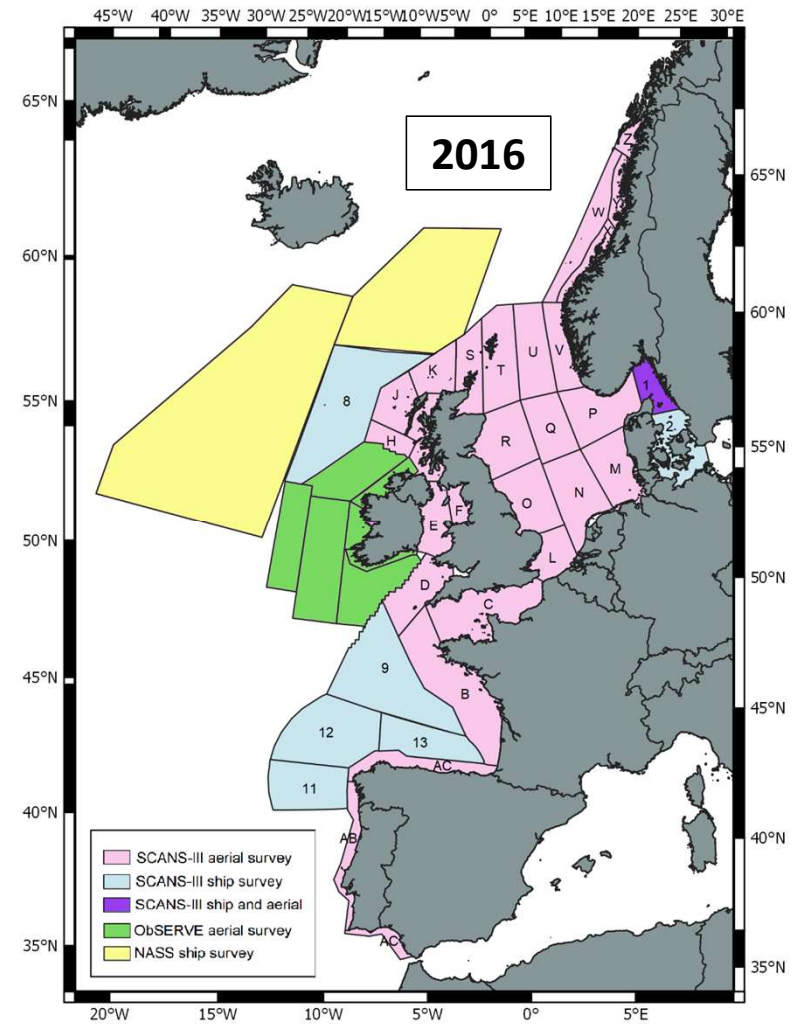
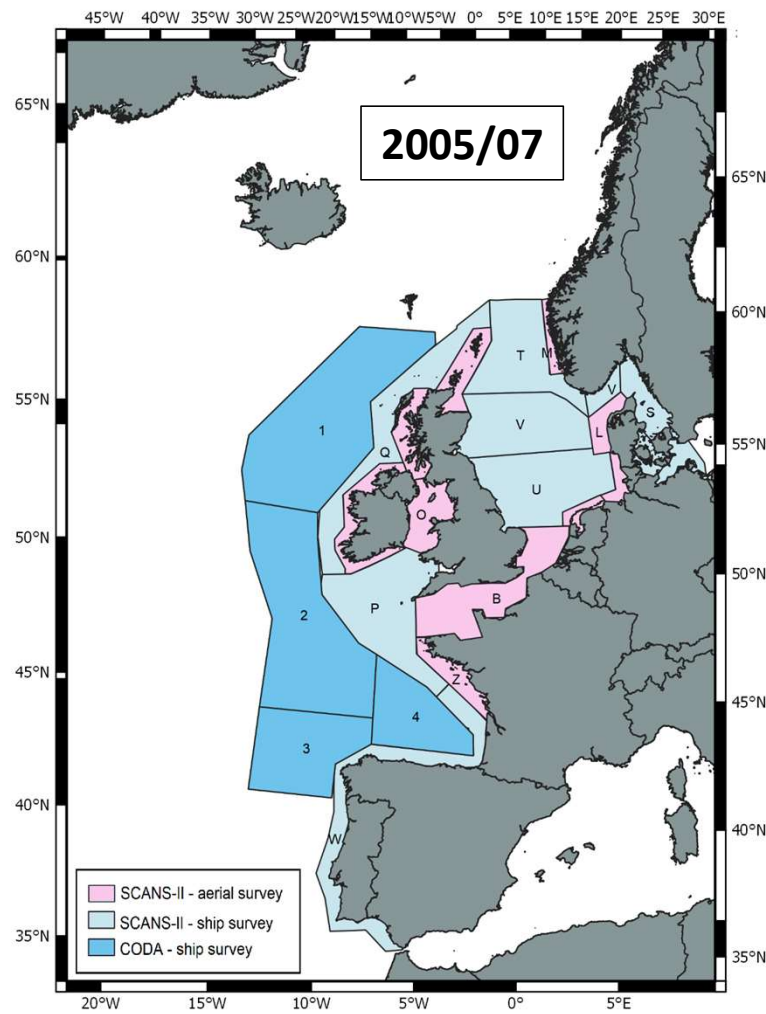
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- No aerial surveys in CODA
- Shipboard surveys
  - To inform OSPAR M4 assessment (2016), ICES WGMME previously summed old estimates using full independence models
  - To inform OSPAR M4 assessment in 2021, combined SCANS-II and CODA datasets analysed using point independence models

Survey	Platform	N	CV	95% CI
CODA	Ship	345,694	0.43	154,962 - 771,186
SCANS-II	Ship	103,932	0.27	61,809 - 174,762
<b><i>CODA + SCANS-II</i></b>	<b><i>ShipTotal</i></b>	<b><i>449,626</i></b>	<b><i>0.5</i></b>	<b><i>223,684 - 903,792</i></b>
SCANS-II	Aerial	18,730	0.47	10,818 - 28,347
<b>CODA + SCANS-II</b>	<b>Total</b>	<b>468,356</b>	<b>0.33</b>	<b>247,921 - 884,789</b>



# Density surface modelling 2005/07 and 2016



## Common dolphin density surface model results

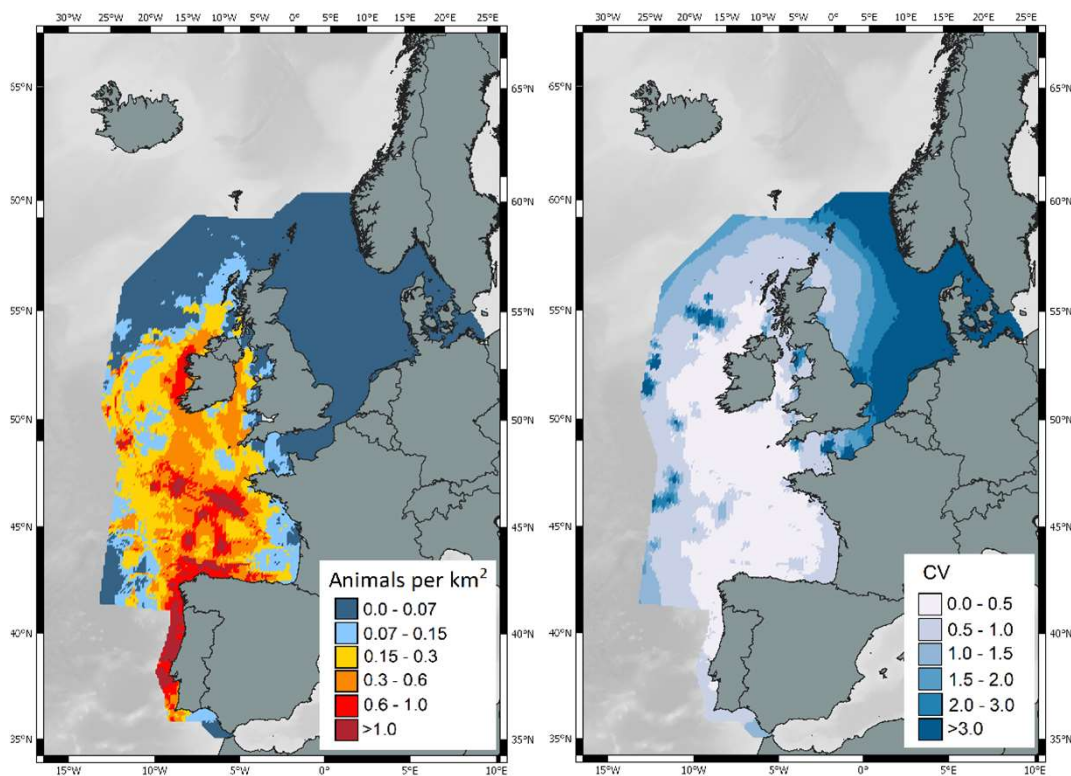
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Dataset	Error distribution	Model covariates	Estimated degrees of freedom	Model degrees of freedom	Deviance explained
SCANS-III (2016)	Negative binomial	X, Y	12.7	19.0	64%
		Depth	1.0		
		Slope	2.5		
		Aspect	1.8		
SCANS-II + CODA (2005/07)	Negative binomial	X, Y	15.6	21.6	43%
		SLA	4.0		
		Slope	0.9		

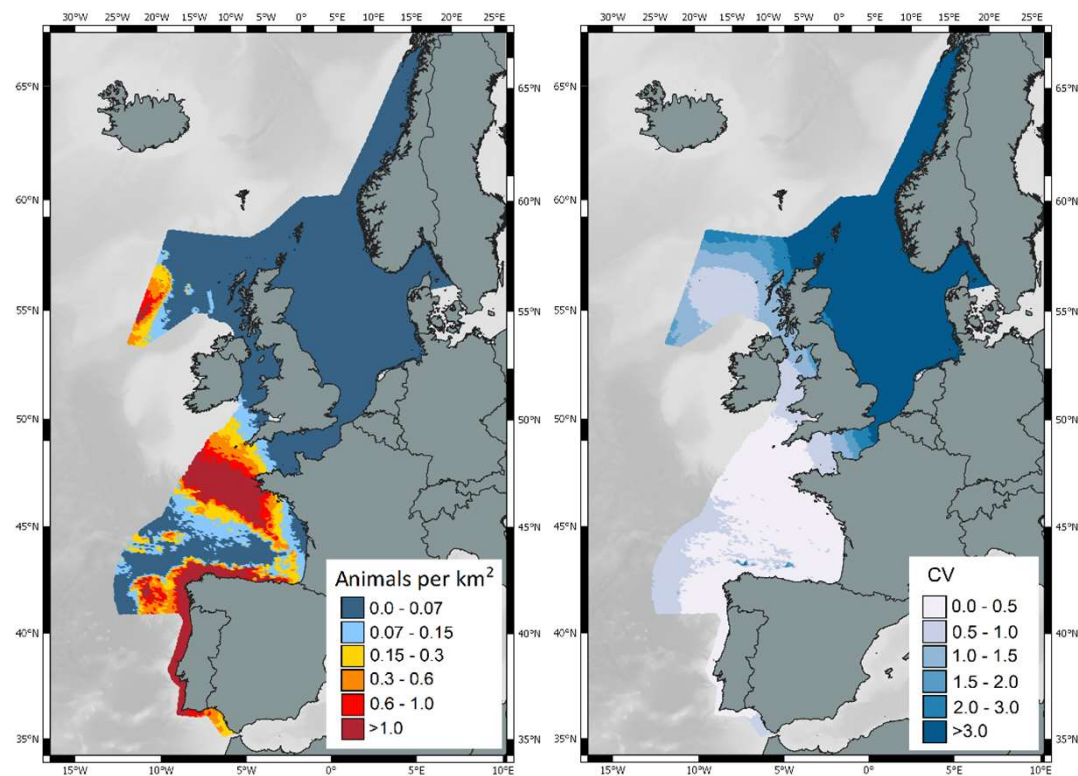


# SCANS-II + CODA and SCANS-III density surface modelling

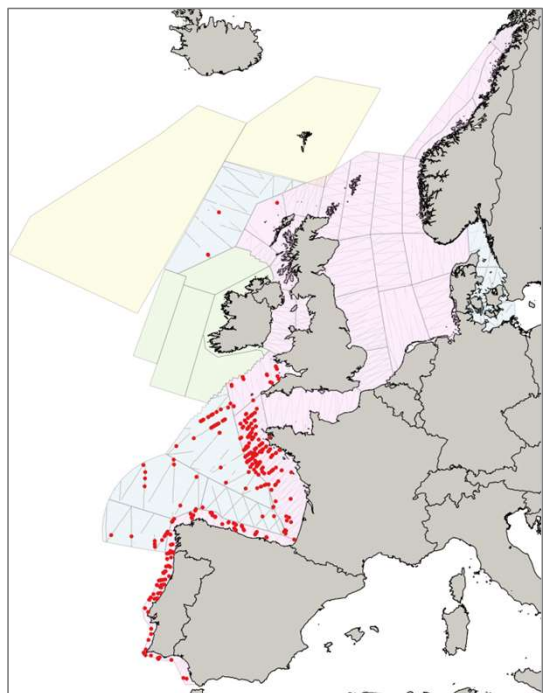
## SCANS-II (2005) + CODA (2007)



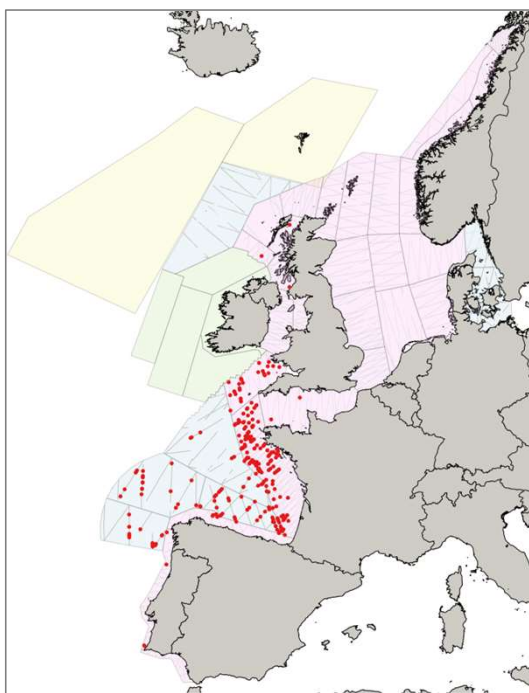
## SCANS-III (2016)



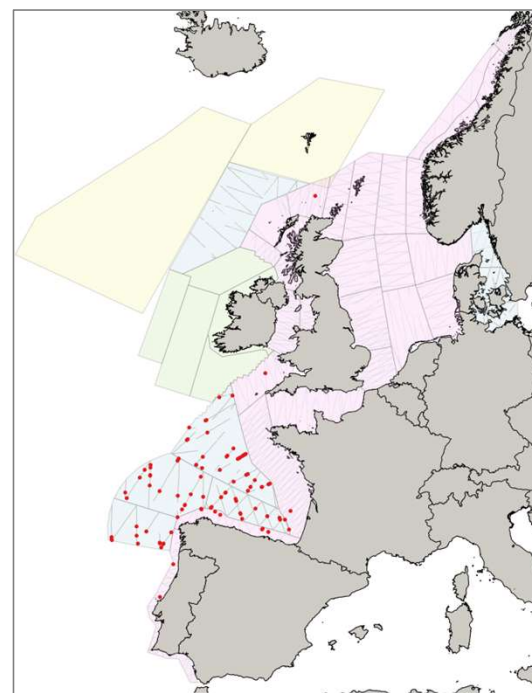
## Common and striped dolphins



**Common dolphin**  
N = 467,700 (0.26)



**Unidentified Common/Striped**  
N = 158,200 (0.19)



**Striped dolphin**  
N = 372,300 (0.33)