

## Identification of high-risk areas for harbour porpoise *Phocoena phocoena* bycatch using remote electronic monitoring and satellite telemetry data

Lotte Kindt-Larsen\*, Casper Willestofte Berg, Jakob Tougaard, Thomas Kirk Sørensen,  
Kerstin Geitner, Simon Northridge, Signe Sveegaard, Finn Larsen

\*Corresponding author: lol@aqua.dtu.dk

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### Supplement 1.

A list of the tagging sites, sex and age ratio, length, weight and year the porpoises were satellite-tagged is provided in Table S1. Porpoises 27, 25 and 14 were tagged in the Skagerrak, Inner Danish waters and the Kattegat, respectively. Skagen and Fjellerup were the only tagging sites used in the Skagerrak and Kattegat Sea, respectively, while several tagging sites were used in inner Danish waters with Korsør as the main one. The sex ratio was 38% females and 62% males. In relation to age distribution: 32% were estimated to be adults, 60% were juveniles and age was not estimated for 8% of the individuals. The mean length and weight of adults and juveniles were 145cm and 45kg and 118cm and 31kg, respectively.

Table S1. Information on tagging site, area, sex, age, length (cm), weight (kg) and year of tagging of the porpoises used within the satellite analysis

Number	Tagging site	Area	Sex	Age	Length	Weight	Year of tagging
1	Kerteminde	Innner DK	F	Juvenile	98	25	2000
2	Skagen	Skagerrak	M	Juvenile	129	33	2000
3	Skagen	Skagerrak	M	Juvenile	129	34	2000
4	Skagen	Skagerrak	M	Adult	142	50	2000
5	Skagen	Skagerrak	M	Juvenile	134	37	2001
6	Skagen	Skagerrak	M	Juvenile	123	31	2001
7	Hesnæs	Innner DK	M	Juvenile	121	36	2001
8	Kerteminde	Innner DK	F	Juvenile	116	28	2001
9	Korsør	Innner DK	M	Adult	140	49	2001
10	Fjellerup	Kattegat	M	Juvenile	128	34	2001
11	Skagen	Skagerrak	M	Juvenile	130	38	2001
12	Skagen	Skagerrak	M	Juvenile	109	23	2001
13	Skagen	Skagerrak	M	Juvenile	123	26	2001
14	Skagen	Skagerrak	F	Juvenile	128	24	2001
15	Skagen	Skagerrak	F	Juvenile	119	29	2001
16	Skagen	Skagerrak	M	Juvenile	114	-	2001
17	Skagen	Skagerrak	M	Adult	138	-	2001
18	Korsør	Innner DK	F	Adult	170	58	2002
19	Korsør	Innner DK	F	Juvenile	129	39	2002
20	Skagen	Skagerrak	F	Juvenile	126	33	2002
21	Fjellerup	Kattegat	M	Adult	140	43	2002
22	Fjellerup	Kattegat	M	Adult	143	42	2003
23	Skagen	Skagerrak	M	Juvenile	110	29	2003
24	Skagen	Skagerrak	M	Adult	134	38	2003
25	Skagen	Skagerrak	M	Juvenile	113	32	2003

Number	Tagging site	Area	Sex	Age	Length	Weight	Year of tagging
26	Skagen	Skagerrak	M	Juvenile	121	-	2003
27	Fjellerup	Kattegat	M	Juvenile	111	-	2006
28	Fjellerup	Kattegat	F	Juvenile	106	-	2006
29	Fjellerup	Kattegat	F	Adult	166	62	2007
30	Korsør	Inner DK	F	Adult	150	41	2010
31	Fjellerup	Kattegat	M	Juvenile	107	22	2010
32	Skagen	Skagerrak	M	Adult	139	-	2002
33	Skagen	Skagerrak	M	Juvenile	134	32	2001
34	Skagen	Skagerrak	F	Juvenile	136	39	2001
35	Skagen	Skagerrak	F	Juvenile	124	32	2001
36	Skagen	Skagerrak	M	Adult	150	-	2002
37	Skagen	Skagerrak	M	Juvenile	108	27	2001
38	Skagen	Skagerrak	F	Adult	163	55	2002
39	Korsør	Inner DK	M	Juvenile	119	31	2010
40	Fjellerup	Kattegat	M	Juvenile	115	24	2010
41	Båring Vig	Inner DK	M	Juvenile	120	29,5	2005
42	Køge	Inner DK	F	Juvenile	127	42	2008
43	Fjellerup	Kattegat	M	-	117	24	2011
44	Fjellerup	Kattegat	M	Adult	126	22	2011
45	Fjellerup	Kattegat	M	-	118	22	2011
46	Skagen	Skagerrak	F	Adult	163	55	2002
47	Korsør	Inner DK	F	-	125	23	2011
48	Knebel	Inner DK	F	Adult	147	39	2011
49	Korsør	Inner DK	M	Adult	130	32	2011
50	Fjellerup	Kattegat	M	-	125	30	2011
51	Korsør	Inner DK	F	Adult	155	61	2012
52	Kolding	Inner DK	M	Adult	142	34	2012
53	Korsør	Inner DK	M	Adult	139	41	2009
54	Fjellerup	Kattegat	F	Juvenile	110	-	2009
55	Fjellerup	Kattegat	M	Juvenile	114	-	2009
56	Roedby	Inner DK	F	-	160	51	2009
57	Keteminde	Inner DK	F	Juvenile	109	-	1999
58	Båring Vig	Inner DK	F	Juvenile	116	30	1999
59	Korsør	Inner DK	F	Adult	138	45	1999
60	Langø	Inner DK	F	Juvenile	112	31	1999
61	Æbelø	Inner DK	M	Juvenile	107	18	2000
62	Båring Vig	Inner DK	M	Adult	138	37	1997
63	Korsør	Inner DK	M	Juvenile	119	34	1998
64	Korsør	Inner DK	M	Juvenile	119	34	1998
65	Korsør	Inner DK	F	Juvenile	110	26	1998
66	Båring Vig	Inner DK	M	Juvenile	116	32	1998

## Supplement 2. Autocorrelation in the satellite data

One concern about the analysis of the satellite data has been whether the spatial patterns were stable over time, allowing for the comparison of satellite data from one period with bycatch data from a different period. This concern is addressed below.

As the satellite data falls into two natural groups of approximately the same number of positions: from 1996-2003 and from 2006-2012, it is possible to ask whether the patterns seen in the two periods are identical.

The same analysis performed for the main manuscript was likewise undertaken with data separated into the two periods and the four seasons. Maps are shown in Figs. S1 & S2. Spatial resolution was reduced to 4x4 km to reduce computation time and allow for the calculation of variograms.

To compare the maps, variograms were computed (Fig. S3). The variogram presents the spatial variation in 2-dimensional data and is useful to qualitatively address the question of whether cells in a grid are more similar to other cells nearby than to more distant ones. If this is the case, the variance will increase gradually with distance and finally level out. Variograms were computed for all four seasons and both periods (8 variograms in total) and 4 additional (“between-groups”) variograms were computed. The “between-groups” variograms represents the variance between all grid cells of the first (1997-2003) dataset and all grid cells in the subsequent dataset (2006-2012).

The overall patterns seen in the data from the two periods are closely similar, when compared from period to period, and even when compared across seasons within periods. Therefore, this analysis does not support a change in distribution during the whole period.

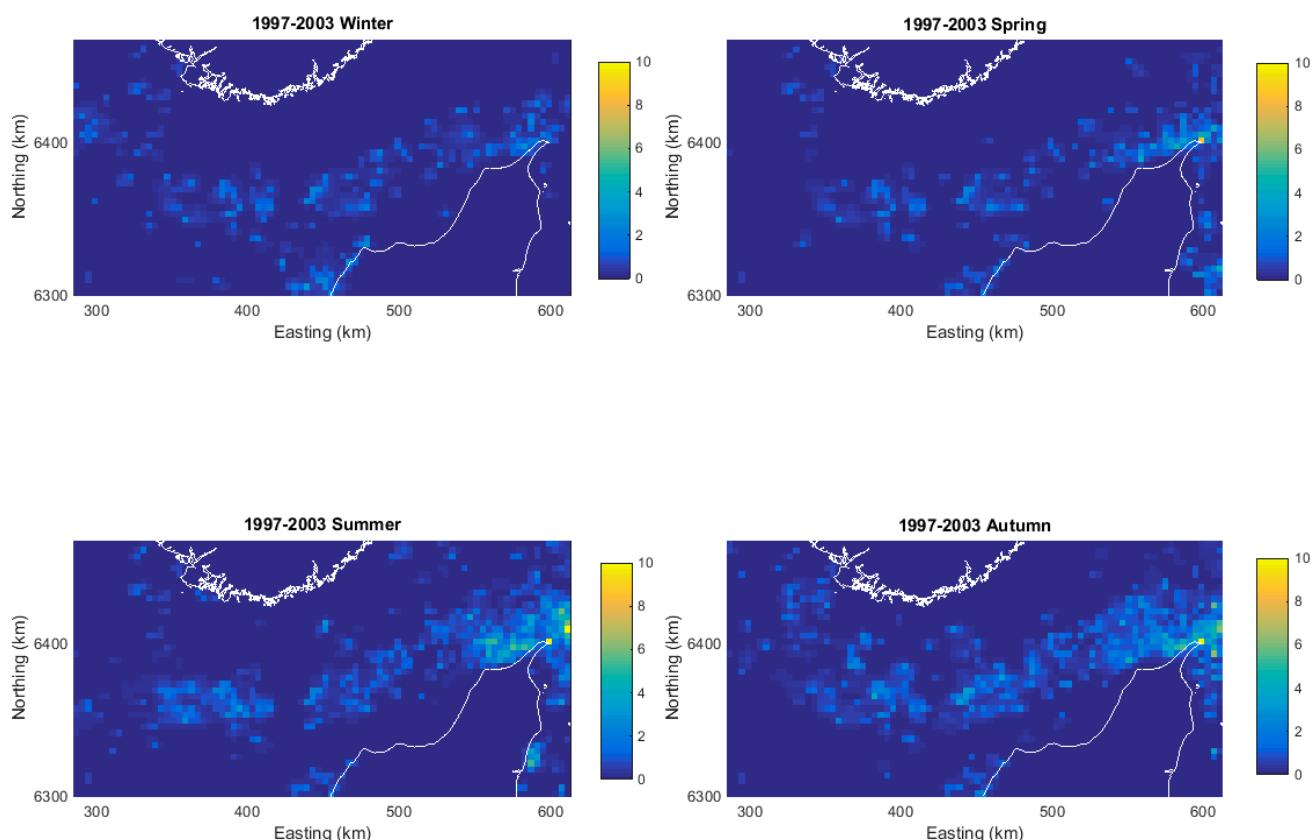


Fig. S1. Spatial patterns of satellite tagged porpoise positions, 1997-2003.

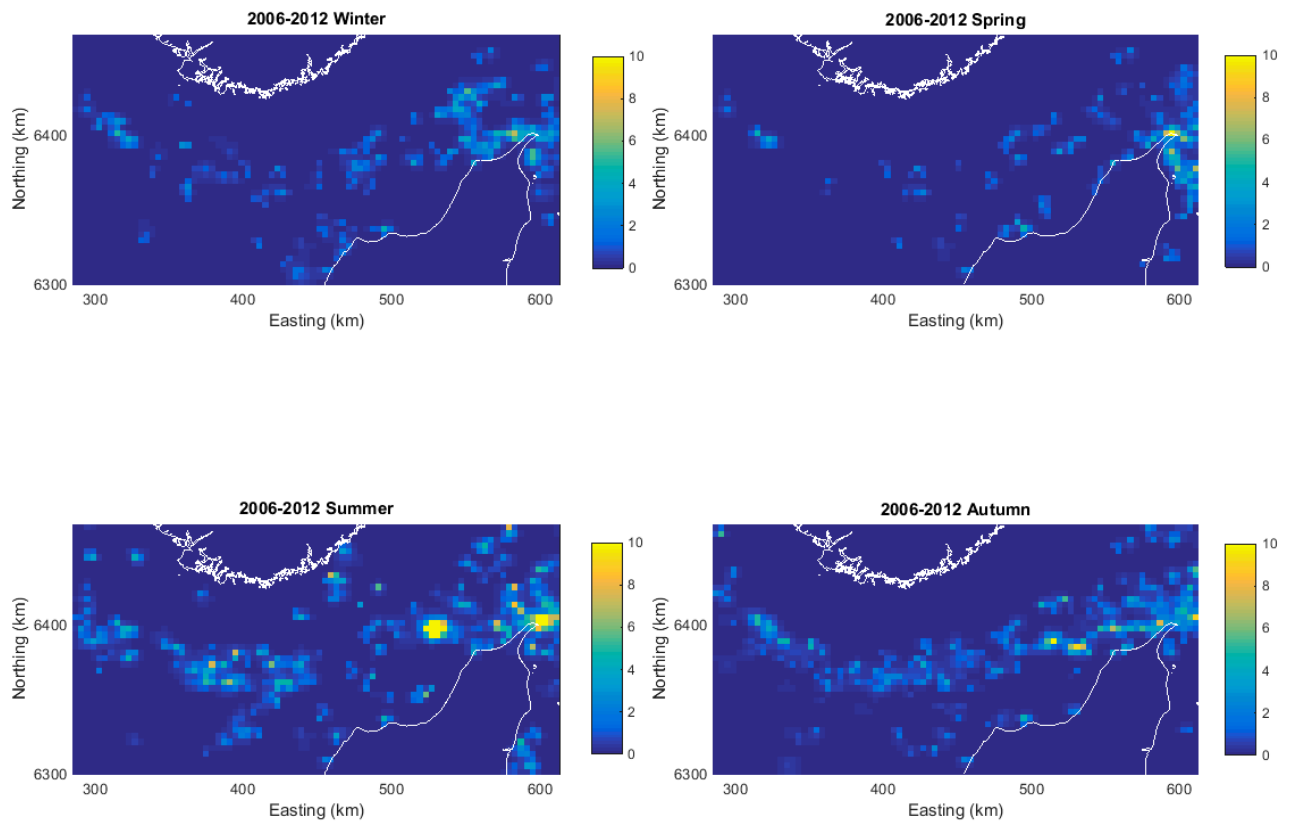


Fig. S2. Spatial patterns of satellite tagged porpoise positions, 2006-2012.

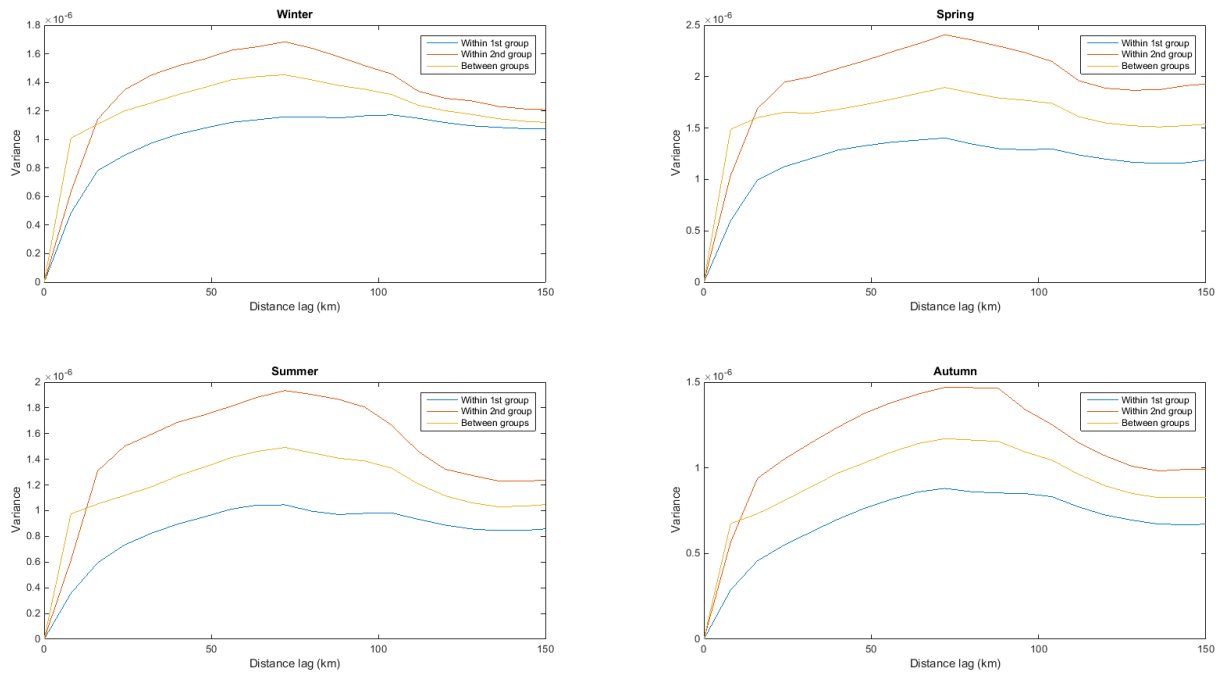


Fig. S3. Variograms of porpoise satellite data. Between-groups represent the variance between all grid cells of the first (1997-2003) dataset and all grid cells of the subsequent dataset (2006-2012).