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A preliminary photo-identification study of the individual bottlenose dolphins using the Northumberland coastline in northeast England

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Introduction The Moray Firth in north-east Scotland (57°41' N, 02°20' W) contains the only year-round, resident population of bottlenose dolphins (*Tursiops truncatus*) in the North Sea. Studies in this region have been conducted since the late 1980s, and have greatly increased our understanding of these coastal delphinids and assisted in their management in Scottish waters. However, identifiable animals from the Moray Firth range far beyond the northeast coastline—from the inner firth, throughout the wider, outer southern Moray Firth, along the Grampian coastline to Tayside and Fife and even further south to Northumberland in northern England (Figure 1)—with individuals exhibiting a high degree of spatial and temporal variability in their distribution and movements (Thompson *et al.* 2011; Robinson *et al.* 2012, Cheney *et al.* 2014). In this respect, a better understanding of the movements and fidelity of these animals is necessary to inform impact assessments concerning marine development and exploration activities affecting this population throughout its range.

In the present study, photo-identification was used to investigate the occurrence and site faithfulness of individual dolphins frequenting the Northumberland coastline in northeast England, at the southern extreme of the population's range. Photographs collated from opportunistic encounters by tour boats in this region between 2014 and 2016 were analysed and matched against a long-term database of approximately 200 known individuals to, firstly, provide crude estimates of the number, composition and fidelity of the individual dolphins net utilising this area and, secondly, to examine the spatio-temporal movements of identified animals between the northeast English coastline and the Scottish Moray Firth.

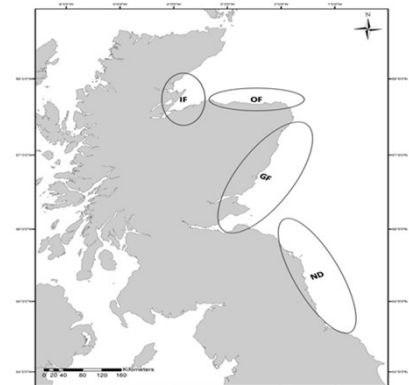


Fig. 1. Showing the geographic regions used by this east coast UK bottlenose population. IF = inner Moray Firth, OF = outer Moray Firth, GF = Grampian-Fife region and ND = Northumberland coastline (adapted from Wilson *et al.* 2004).

Results



Fig. 2. Example images of some of the "marked" bottlenose dolphins photographed along the Northumberland coastline between 2014 and 2016, as cross-referenced from the Cetacean Research & Rescue Unit (CRRU) and Aberdeen University (AU) databases. Clockwise, from top left: Black 'n' Decker (CRRU#149/AU#020); Runny Paint (CRRU #055/AU#116), Floppy Fin (CRRU#631 /AU#1150) and Delilah (CRRU#596/ AU#1054).

- Bottlenose dolphins were found to be present year-round along the Northumberland (ND) coast.
- Approximately 35% of the entire known east coast population (62 animals) was recorded using the ND coastline from 2014 to 2016.
- Of the 37 "marked" bottlenoses identified during the study period (e.g. Figure 2), 55% were recaptured in two or more years, suggesting high site fidelity by these individuals for this region.
- All the recapturable ND animals photo-identified in this study notably also frequented the adjacent Grampian-Fife coastline (Quick *et al.* 2014), whilst only 63% were recorded in the CRRU and Aberdeen University (AU) Moray Firth catalogues (Table 1).
- A total of 7 known females with calves in tow were recorded in the ND dataset from 2014 to 2016—of which 4 gave birth in ND between 2014 and 2016 and 3 in the Moray Firth in 2013 (noted in Robinson *et al.* 2017). However, the latter all apparently travelled to and remained in ND from 2014 onwards (i.e. they were not recaptured in the Moray Firth).

Table 1. Detailing the dolphins recorded along the ND coastline (with cross-reference ID#s to the CRRU and Aberdeen University (AU) catalogues), showing their presence/absence long other areas of the east coast.

ND #	CRRU #	AU #	IF Region†	OF Region	GF Region†	ND Region
001		881			√	√
002	102	227	√	√	√	√
004		1054			√	√
006		1119			√	√
008	517	1118		√	√	√
009		1062	√*		√	√
011		1121			√	√
012	002	102	√	√	√	√
013	387	1002	√	√	√	√
015		1115			√	√
016		1123			√	√
018		1043	√*		√	√
020		1058			√	√
025	178	344	√	√	√	√
027	055	116	√	√	√	√
028	634	1052		√	√	√
029	516	1037		√	√	√
035		1096			√	√
037	149	020	√	√	√	√
038	032	068			√	√
039		1050			√	√
041		1156			√	√
044	554	1048		√	√	√
045		1150			√	√
046	556	1047		√	√	√
050	560	1076		√	√	√
054	529	1064	√	√	√	√
056	078	009		√	√	√
059	384	1039	√	√	√	√
060		1089			√	√
062	423	886	√	√	√	√
063	593	1091			√	√

*2009 †2008 ‡Data obtained from Quick *et al.* (2014) †Barbara Cheney, pers. comm.

Discussion Thompson *et al.* (2011) noted the value of photographic contributions from the public and wildlife watching boats towards long-term studies of UK coastal *T. truncatus* populations, and the photographs and data assembled herein provide an initial insight into the occurrence and site fidelity of the individual East Coast bottlenose dolphins utilising this southernmost region of the populations range. The establishment of a first photo-identification for the Northumberland coastline and the development of an existing network of observers in this region provide the basis for future collaboration and study. Further studies will serve to increase our predictive power for the consequences from ongoing development projects (such as wind farm installations and oil and gas activities) and fishing interactions affecting the animals utilising the northeast English coastline—a better understanding of the spatio-temporal distribution and ecology of the animals using this area being crucial for their effective conservation management and protection.

References

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