

**Spatial and temporal habitat use by bottlenose dolphins
(*Tursiops truncatus*) and other cetaceans on the west coast
of Ireland – 2012**



**Report to the National Parks and Wildlife Service Department of the
Environment, Heritage and Local Government**

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Emer Rogan¹, Anneli Englund¹ and Simon Ingram²

¹ School of Biological, Ecological and Environmental Science, University College Cork, Ireland

² School of Marine Science and Engineering, Plymouth University, Drake Circus, Plymouth
Devon, PL4 8AA, United Kingdom

Introduction

Bottlenose dolphins (*Tursiops truncatus*) are a protected species under national and European legislation and are listed under Annex II (and Annex IV) in the EU Habitats Directive, requiring protection and monitoring in designated areas (i.e. Special Areas of Conservation; SAC). To date, the outer Shannon estuary is the only SAC for this species in Ireland and thus better knowledge of bottlenose dolphin populations is required to appropriately address further conservation efforts, specifically to investigate the abundance, population structure and ranging behaviour of the apparent mosaic of sympatric coastal communities. Of particular interest is the spatial and temporal distribution of bottlenose dolphins using west-coast waters.

Recent genetic work has revealed at least three genetically distinct populations in the waters around Ireland (Mirimin et al. 2011): one distinct population is comprised by the resident group from the Shannon estuary with an estimated population of over a hundred animals ($n=107 \pm 12$, 95% CI = 83 to 131 (Berrow et al. 2012) plus a small related group of 8 individuals from Cork harbour; a second, more mobile population, using the west coast of Ireland, (referred to as the Connemara-Mayo group but likely to range throughout the west coast), with an estimated abundance (for at least part of their geographic range) of $171 (\pm 48)$ 95% CI = 100-294 (Ingram et al. 2009); and a third population, primarily represented by stranded animals, that may represent a more pelagic community (Mirimin et al. 2011). The fine-scale spatial structure in the two coastal populations is of note, and consistent with results from photo-identification studies, which suggests that there is no overlap between these two coastal populations.

Photo-identification of individuals has shown that some identified individuals are long term coastal residents, with a degree of inter-annual site fidelity at various coastal locations in Irish waters, particularly on the west coast, but also that some dolphins are highly mobile, as sightings of individuals range from as far south as Youghal and as far north as Donegal (Ingram et al. 2001, 2003). Movement of individuals seen on the west coast have also been reported on a smaller scale (e.g. Ingram et al. 2009); (Oudejans et al. 2010), with some individuals moving over a larger geographical scale and between national jurisdictions (O'Brien et al. 2009; Ryan et al. 2010; Robinson et al. 2012; Cheney et al. 2013). The population structure of these apparently far ranging individuals is unknown. Effective management and conservation of animal populations requires information on population size as well as ranging behaviour. The most recent abundance estimate of the number of bottlenose dolphins using the north-western Connemara waters (Ingram et al. 2009), is likely to be an underestimate due to the ranging behaviour of animals and the limited geographic and temporal scale of sampling.

To gain a better understanding of bottlenose dolphin population structure, habitat use and movement patterns, we commenced a project with the general aim to increase spatial and temporal sampling and survey effort throughout the west coast. For the year 2012, our objective was to examine residency and movement patterns and to collect data which would allow us to estimate the abundance of bottlenose dolphins along the northwest coast region by collecting photo-id data during dedicated surveys at key sites.

Methods

Six boat-based surveys were carried out in the coastal waters off Connemara and Donegal in 2012. The dedicated boat surveys were conducted using a 6m rigid hull inflatable boat (RIB). The surveys followed standardised routes in the waters covering 3 different locations, Connemara (north and south) and north and south Donegal (see Figure 1) – the dates are summarised in Table 1. Survey speed was maintained at approximately 20 km per hour for the duration of the surveys, with a reduction in speed during encounters with cetaceans.

During dedicated surveys observers scanned 90° either side of the bow of the boat. Vessel position, speed and direction were recorded using a GPS. Dedicated surveys were conducted in Beaufort sea-states <4, with suitable ambient light and swell conditions, in order to minimise the effect of weather and sea conditions on the probability of sighting dolphins and obtaining high quality photographs. When weather conditions deteriorated during a survey, the survey was abandoned.

In addition to the surveys, we also established some new contacts, particularly in Donegal, re-established old contacts, with which we were in frequent communication in relation to sightings and obtained photographs that were taken on an opportunistic basis from members of the public, which we matched with our existing catalogue.

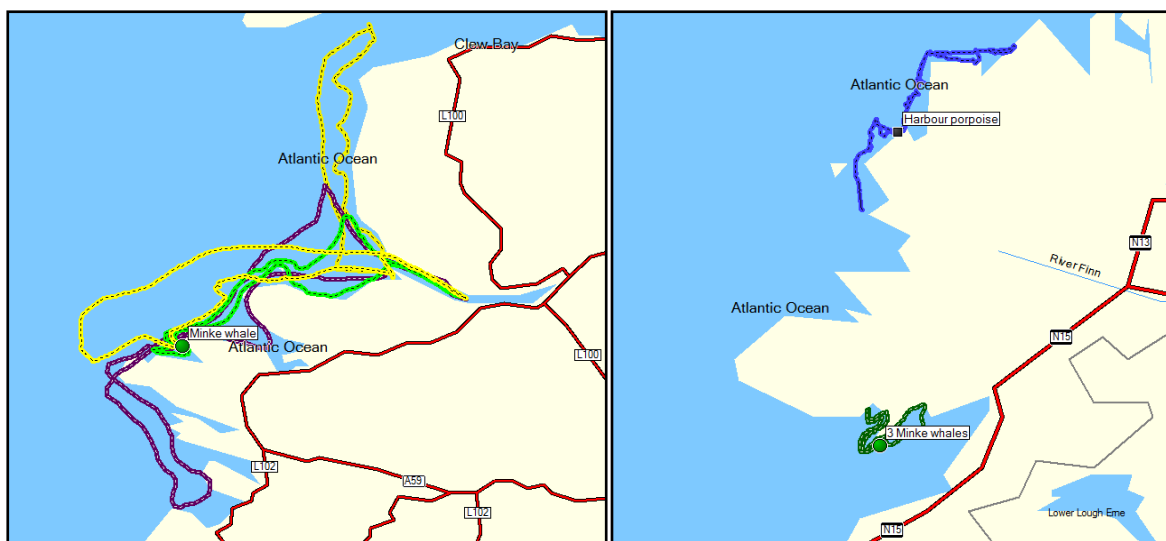


Figure 1. Map showing all survey track lines for Connemara and Donegal in 2012 and location of cetacean sightings

Results

During the surveys in 2012, no bottlenose dolphins were seen. The only cetacean sightings were of a single harbour porpoise (*Phocoena phocoena*) and four minke whales (*Balaenoptera acutostrata*) which were seen very close to shore, on two separate occasions – once off St. John’s point in Donegal Bay (n = 3) and once near Cleggan Bay (Connemara). The three minke whales off St. John’s point were actively feeding (see Appendix 1) in shallow water and in close proximity to inshore fishing boats. None of these individuals were very well marked, and had been in the area for a number of days. The minke whale off Cleggan Bay was not photographed.

Table 1 Survey effort and sightings in 2012

Date	Species (n)	Area	County
25-Jul-12	No sightings	South Connemara	Galway
26-Jul-12	No sightings	North Connemara	Galway
23-Aug-12	Harbour porpoise (1)	North Donegal	Donegal
26-Aug-12	Minke whale (3)	South Donegal	Donegal
22-Sep-12	Minke whale (1)	South Connemara	Galway
23-Sep-12	No sightings	South Connemara	Galway

Sightings

There were only a small number of bottlenose dolphin sightings reported to us this year and we have compiled a list of any sightings known to us over the summer from a number of sources.

From data submitted to the Irish Whale and Dolphin Group (IWDG.ie) there were very few sightings of bottlenose dolphins on the west coast of Ireland over the summer months, with the majority reported from Donegal rather than from Galway or Mayo, especially in June/July. Of the ones reported from Co. Galway, there were a small number of sightings from the mouth of Killary Harbour and around Inishbofin, with the remainder further south. In Donegal, most of the sightings were further north – around Gaothdobhair and Bloody Foreland, although earlier in the year – during May – they were frequently seen around St John’s Point (Graham pers. comm.) and later in August, bottlenose dolphins were seen for a few days around St. John’s Point and further north in Lough Swilly. A figure showing the sighting locations is given in Figure 2, and all sightings from the IWDG are given in Appendix 2.

Additional sightings from other sources in the Connemara area (summarised in Table 2) suggest that while there were some sightings, bottlenose dolphins were largely absent from this area over the summer, or that sighting effort was considerably reduced.

Table 2. Summary of sightings in Connemara area.

Date	Animals	Area	County	Lat	Long	Reported by
13 April 2012	4	Cleggan Bay	Galway	53.560	-10.113	J. Britain
23 April 2012	25-30	Killary Harbour	Galway	53.622	-9.853	Killary Cruises
03 June 2012	?	Inishbofin	Galway	?	?	J. Britain
04 June 2012	?	Slyne Head	Galway	?	?	J. Britain
03 July 2012	?	Killary Harbour	Galway	53.633	-9.895	Killary Cruises
30 August 2012	9	Cleggan Bay	Galway	53.566	-10.138	J. Britain
21 September 2012	?	Cleggan Bay	Galway	?	?	ScubaDive W
28 September 2012	?	Cleggan Bay	Galway	53.566	-10.124	J. Britain
10 October 2012	12	Ballinakill Harbour	Galway	53.573	-10.025	O. O'Cadhla

In Broadhaven Bay, where there are constant effort watches on-going as part of the licencing conditions for the Corrib pipeline, bottlenose dolphins were seen on 8 occasions between June and August, on average twice per month, with group size varying from 1 – 40 (Haberlin, pers comm.).

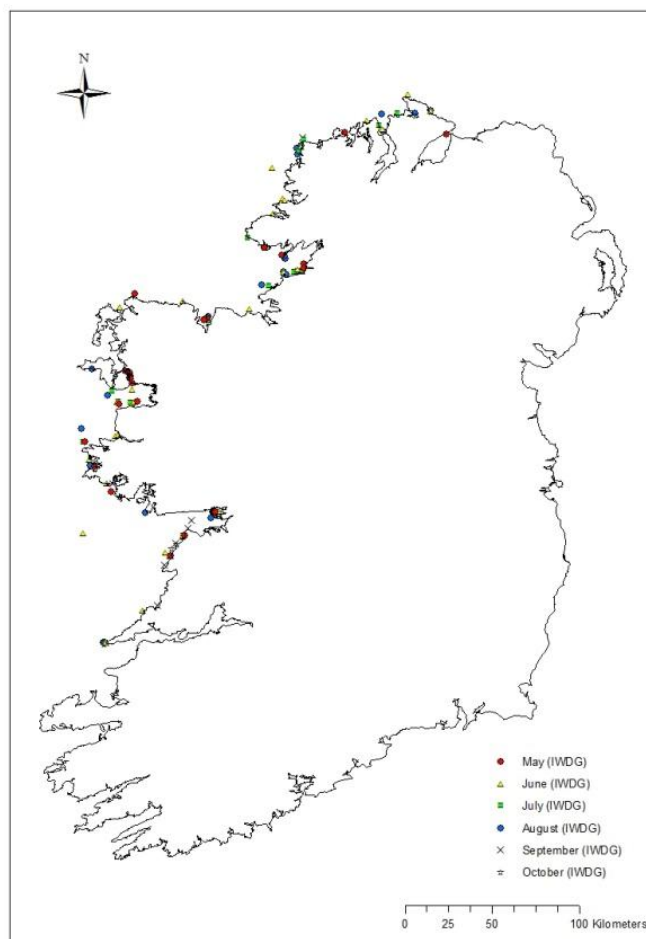


Figure 2. Sightings locations of bottlenose dolphins on the west/north west coast of Ireland only May – October 2012 (data from IWDG website).

Photo-identification

A number of photographs and a video taken opportunistically by members of the public were examined to see if any matches could be made with the existing west coast catalogue. Photographs taken in Cleggan in April and end of August and in Ballinakill harbour in October were used. Although the photo quality was poor in many instances, some individuals from previous encounters were successfully matched with the west coast catalogue, and these are summarised in Table 3. Of the 15 individuals matched, one individual is known to us from 2002, with the rest of the individuals known from 2009 (including one that was previously biopsied) as well as sighted by UCC in Broadhaven Bay (n=3) in 2009 and 2010. In addition, one of the individuals photographed in Cleggan Bay in August was resighted and photographed close to Blacksod in the same year and a further three of the individuals photographed in Ballinakill Harbour in October and Cleggan Bay were previously sighted in Mayo waters in 2009 and 2010 (Oudejans pers comm).

In Blacksod, five dedicated surveys were carried out in late spring and October by M. Oudejans. Photo-identification of bottlenose dolphins from these surveys resulted in 61 individuals being identified, with 30 individuals being matched with the UCC catalogue (2009), and re-sighted 3 or more times. Thirty one individuals were recorded in previous years in Mayo, of which 27 were resighted >3 times in Mayo between 2008-2012 (Oudejans, pers comm.).

Table 3. Summary of the number of photographs examined from Connemara waters in 2012 and matched with the west coast catalogue.

Summary	Photos	Individuals	Matches	No. of previous sightings
Ballinakill harbour – Oct 2012	328	12	10	19
Cleggan Bay – April 2012	5	4	1	1
Cleggan Bay – August 2012	44	9	4	13
	377	25	15	33

Three photo-identification surveys were carried out in Broadhaven Bay by the CMRC team in early June and mid- August 2012 which resulted in 34 individuals being identified. These data are currently being analysed, but preliminary data suggests that of the individuals seen, 14 individuals had previously been seen in Broadhaven, ten of which are known from 2009, with 24 new individuals added to the CMRC catalogue (Haberlin pers comm). Of the individuals identified, five were matched with our west coast catalogue, with three individuals previously seen in Connemara in 2009 and two individuals seen in Mayo in 2009 and 2010.

Discussion

Despite the lack of sightings of bottlenose dolphins during our dedicated surveys, it is apparent from the incidental records that bottlenose dolphins were sighted along the west coast of Ireland during the summer, albeit over a wide range. Sightings were mainly reported from North West regions in a few specific areas on a number of occasions, such as Cleggan Bay, Killary Harbour and Mannin Bay in Galway and Bundoran and St. John's Point in Donegal.

Bottlenose dolphin sightings

However, results from photo-identification show that bottlenose dolphins sighted on the west coast in 2009, when a large photo-identification effort took place (Ingram et al. 2009), are still using specific locations, such as Cleggan Bay, Ballinakill Bay in Connemara as well as Broadhaven Bay and around Blacksod in Mayo and many of these animals are previously known from both Connemara and Mayo, suggesting some site fidelity and fairly large ranging patterns. Some of these animals were also seen on multiple occasions during 2012. Two of the animals photographed in Ballinakill Harbour in October are animals with a skeletal deformity. One of these animals was first recorded in 2002 in Connemara, whereas the other one is known since 2009 when it was considered a calf due to its small size. The relatively high number of animals photographed opportunistically but known from the catalogue suggests that this population is not likely to be large, as suggested by Oudejans et al. (2010) and O'Brien et al. (2009). While the original estimate is likely an underestimate, the re-capture rate suggests that the population will probably be of the same order of magnitude. This high and long-term level of site fidelity (at least 10 years) specifically in northwestern Connemara, also suggests that these areas represent important habitat to these animals. Whether the observed short and long-term site fidelity of these bottlenose dolphins is due to optimal foraging conditions, mating/breeding or other factors is currently not known. The video footage of the animals recorded further north, in Donegal, was not of good enough quality to match with the catalogue, but it would be interesting to know whether these individuals are part of the group known from Connemara/Mayo or a separate group.

No matches have so far been found between the only resident population of bottlenose dolphins in the Shannon Estuary and any of the coastal communities and it is assumed that these do not overlap socially since they are genetically different. Coastal communities of bottlenose dolphins are likely to comprise of semi-resident to resident groups that are seasonally resident in certain locations and transient individuals or groups that may range large distances and/or migrate seasonally.

Weather related effects

Undoubtedly, the weather had a large impact on the low sightings rates for cetaceans this summer, with fewer people out observing on the small number of days where sightings conditions were suitable. Weather also curtailed our fieldwork – we were unable to conduct any fieldwork in June, for example. All of the weather stations in Ireland reported rainfall in June as well above average and the majority as one of the wettest on record, with below average sunshine (Met Éireann 2012). Average rainfall at Mace Head (Connemara) was well above average for June (119mm) and July (108mm) and around average for August (105mm). This combined with stormy weather conditions over the summer restricted sampling opportunities.

Possible influence of algal bloom on low sightings rates

During the months of June, July and August there was also an extensive algal bloom, along the west coast, caused by *Karenia mikimotoi* (Marine Institute website). *K. mikimotoi*, formally known as *Gyrodinium aureolum*, is a naked dinoflagellate that usually blooms offshore and is transported inshore. Although not infrequent, this year, the extent and duration of the bloom was unusual and of a magnitude similar to one that occurred in 2005 (Silke, pers comm., Marine Institute). There is evidence from the literature that this species causes congestion of blood vessels in fish gills, resulting in high mucus secretion, which leads to a decrease in oxygen exchange and osmoregulation problems. It has also been responsible for mortalities of invertebrates, especially as the bloom dies back. This year, on the west coast of Ireland, blooms reached 1.5million cells per litre, resulting in lugworm, oyster and cockle mortality, with likely broadscale ecosystem effects. There were reports of dead fish including turbot, flounder, scorpion fish and shore rockling in Inner Donegal Bay. Other dead species were worm pipefish, lesser weavers, grey gurnard, shanny, sand goby, pollock, sole, plaice, flounder and dab which were washed up on Rossnowlagh and Murvagh beaches (Marine Institute website). The Local Authorities took the decision to close two beaches in Donegal in response to the large numbers of dead fish. Mortalities of marine organisms were also reported from the Sligo and Mayo coastal regions and a shellfish hatchery in Galway Bay reported difficulties in settlement of their shellfish larvae. Local sea anglers reported low fish catches along west and northern coasts and in some areas a complete absence of any fish (Hensey 2012), likely trying to avoid the bloom. The relatively low sighting rates of bottlenose dolphins along the western seaboard may also partially be explained by the extent of the bloom.

Minke whale sightings

The sighting of the three common minke whales actively feeding in close proximity to each other, just off St. John's Point in relatively shallow water is of interest. The minke whale is a cosmopolitan species found in all oceans and in virtually all latitudes, from 65°S to 80°N. In parts of its range it is very abundant, in other parts much less so (Reilly et al. 2008). The recent estimate for minke whales from the SCANS survey is 18 958, with a CV of 0.35 (Hammond et al., in review), although the SCANS survey only covered part of the range of minke whales. There is some data to suggest seasonal movements in parts of the range, but some populations also appear to include long-term resident individuals (Dorsey et al., 1990). Recent genetic work has suggested that minke whales range extensively across the North Atlantic seasonally, but segregate to some extent in at least two (unknown) breeding grounds (Anderwald et al. 2011). The common minke whale is known to occur in both coastal and offshore waters and exploits a variety of prey species (e.g. krill, capelin, herring) in different areas according to availability. Very little is known about the foraging ecology of minke whales at these latitudes. It was not possible to see what the animals were feeding on, but they were feeding in an area where inshore fishermen were actively setting and recovering nets targeting sprat. While there was no interaction between the nets and the whales, we did observe a number of dead shearwaters in the water and large flocks of this species were also observed around the fishing boats at the time. Although photo-identification of minke whales has been attempted for minke whales (Dorsey et al. 1990)the individuals encountered here were poorly marked, making re-identification difficult. Nonetheless, it would be interesting to see whether these individuals were opportunistically visiting or represent more "resident" animals.

Conclusion and contingency

In conclusion, population structure of bottlenose dolphins found in Irish coastal waters is still largely unknown and in order to develop effective management and conservation schemes, further research effort will be required, including accurate abundance estimates that cover larger spatial areas in order to include the sometimes considerable ranging patterns of these animals. This will be the focus of the work for the next two years.

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Appendix 1 Minke whales at St John's Point

