

A1a.5 Marine Reptiles

Although not indigenous to the United Kingdom, sea turtles are the only marine reptiles to be found in UK waters. Of the seven species of marine turtle in the world, five have been recorded in UK waters; the leatherback turtle (*Dermochelys coriacea*) belongs to the family Dermochelyidae while the other four species are all hard-shelled (family Cheloniidae); these are the loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*).

Turtle sightings, strandings and instances of bycatch are recorded opportunistically by various individuals and organisations throughout the UK and Ireland. As part of the UK Cetacean Strandings Investigation Programme (CSIP), these records are compiled in the 'TURTLE' database by Marine Environmental Monitoring (Pierpoint & Penrose 2002), and made public on the National Biodiversity Network Gateway (<http://data.nbn.org.uk/>). Annual reports of records submitted to the 'TURTLE' database have been published annually since 2002 (Penrose 2002, 2003, 2004, 2005; Penrose & Gander 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, see <http://www.strandings.com/Wales.html>). Records from 1960-1999 were summarised by Pierpoint & Penrose (2002). The 'TURTLE' database is the primary source of information to infer distribution, relative abundance and seasonality within UK waters. Further evidence of seasonal movement has been obtained through satellite tagging studies (e.g. Fossette *et al.* 2010).

A1a.5.1 Distribution and abundance

Of the five species recorded in UK waters, the vast majority of records (88%) are of the leatherback turtle (Penrose & Gardner, 2014). This species exhibits physiological and anatomical adaptations unique among reptiles which allow it to conserve heat and function in temperate waters (Frair *et al.* 1972, Paladino 1990); this is the only species of marine reptile to be considered a regular member of the UK marine fauna (Gaywood 1997, Godley 1998). Two other species recorded in the database, loggerhead turtle and Kemp's ridley turtle, are infrequent while records of green and hawksbill turtles are extremely rare; these are all considered vagrants in UK waters (JNCC 2007).

The appearance of leatherback turtles in UK waters is regarded as part of deliberate wide-ranging migration in response to food distribution, notably jellyfish and other gelatinous zooplankton (Houghton *et al.* 2006, Witt *et al.* 2007a, Doyle *et al.* 2008, Fossette *et al.* 2010). Hays *et al.* (2004) monitored the pan-oceanic migration of the leatherback turtle in the Atlantic and reported extensive movements. The nesting beaches of leatherback turtles are in the tropics and sub-tropics (eastern American mainland coast and Caribbean islands). From there, they migrate north following the main currents along the North American coast; many individuals continue northward reaching Nova Scotia where they spend the summer in large numbers but some migrate north-eastward across the Atlantic following the north Atlantic gyre to reach the European shelf and in some cases progress through the Bay of Biscay into UK waters. Low temperature remains a limit to movement and UK waters are likely to represent the northern limit of its range; once winter approaches, leatherback turtles commence their seasonal migration southward. Satellite tags on two turtles caught off the south-west coast of Ireland, showed them moving via Madeira and the Canary Islands towards the Cape Verde Islands and then crossing the Atlantic back towards the Caribbean (Doyle *et al.* 2008).

Records in the TURTLE database occur across the majority of UK and Irish coasts and a clear spatial pattern can be observed; most records are from the west and south coasts of Ireland, south-west England, south and north-west Wales and the Irish Sea. The majority of turtle sightings and strandings are therefore concentrated in Regional Sea Areas 4 and 6 as illustrated in Figure A1a.5.1. For the UK and Ireland as a whole, the majority of leatherback turtle sightings occur from June-October, with a peak in August; strandings peak slightly later in September and October (Pierpoint 2000). The timing of sightings throughout UK waters implies that leatherbacks move into British and Irish waters from the south and west, passing northwards up western coasts and the Irish Sea which may bring them through Regional Seas 7 and 8 during the summer months and into the central North Sea in the autumn.

The presence of cheloniid species (mainly loggerhead turtles) in UK waters is thought to be accidental, resulting from displacement from their normal range by adverse currents. Important nesting beaches for these species are found in the Gulf of Mexico, Caribbean and on the Cape Verde Islands. After hatching, they enter an oceanic juvenile stage and their dispersal becomes associated with the north Atlantic gyre, with the potential for transatlantic movements. After 7-12 years they recruit to shallow coastal tropical habitats where they mature into adults (Bjorndal *et al.* 2000). The majority of cheloniids in the 'TURTLE' database are juveniles and while they have been recorded throughout the year, most are found between November and March, coinciding with severe oceanic storms (Witt *et al.* 2007b). Many of them are found dead, but others are still alive, although lethargic due to low temperatures; some individuals have been rescued and released abroad after specialist care.

A1a.5.2 Evolution of the baseline

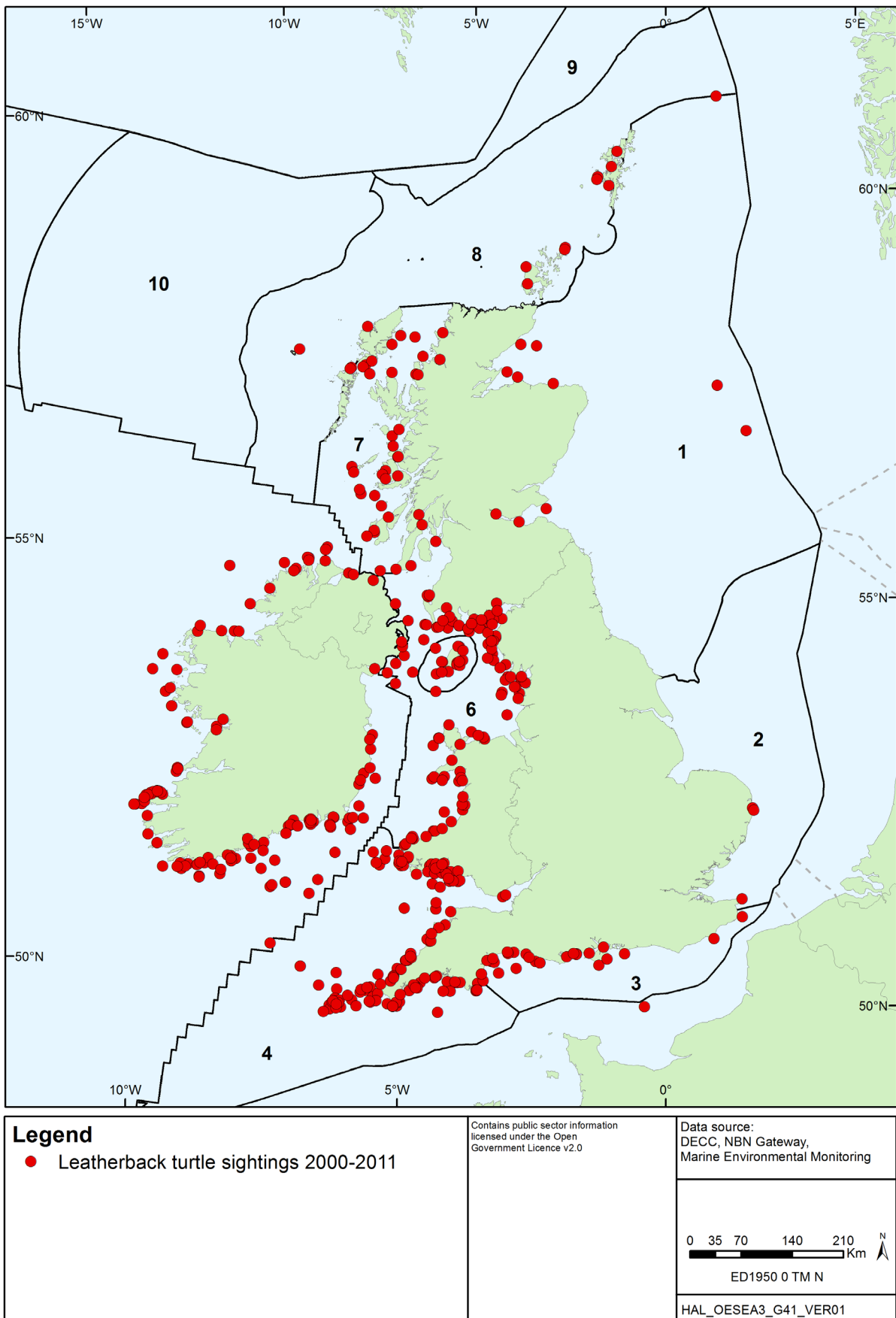
In UK waters, the low number of turtles recorded combined with their widespread distribution makes it extremely difficult to monitor and estimate any population trends; hence turtles are currently not included among the potential MSFD indicators of GES for biodiversity (DEFRA 2012). An international monitoring programme of the whole north-east Atlantic, including the waters off Portugal, Spain, France, Ireland and the UK may provide a sound basis for population estimates and trends to be described (UKMMAS 2010).

The distribution of the leatherback turtle seems to be influenced by sea surface temperature and food abundance. McMahon & Hays (2006) described the position of the 15°C surface isotherm as effectively encapsulating the range of this species. They showed that while inter-annual variation in the average summer position of the 15°C isotherm across the north Atlantic was considerable, there was a general trend of increasing latitude over the period 1985-2002, with a northwards shift of 330km over this period (McMahon & Hays 2006). As there is now wide ranging acceptance that global temperatures are increasing and likely to continue to do so for the foreseeable future, further northward movement of the 15°C surface isotherm is expected.

Food availability is also understood to be an important influence. Houghton *et al.* (2006) linked leatherback sightings to the distribution of jellyfish species such as *Rhizostoma* and any change in the availability and distribution of gelatinous zooplankton could affect turtle distribution. Fluctuations of pelagic cnidarians and ctenophore abundance have been shown to correlate with environmental variables (Purcell *et al.* 2007) and the abundance of the majority of moderate-temperature species studied has been reported to increase in warmer waters. As the oceans continue to warm over the next several decades the abundance of gelatinous species is expected to increase and population distributions shift poleward (Purcell *et al.* 2007).

However, the overall effect of climate change on marine turtles is still poorly understood; while leatherback turtles are expected to expand their range in northern latitudes, impacts of climate change at the nesting sites (loss of nesting habitat through sea-level rise and female-biased sex ratios through increased incubation temperature) may well dominate population trends.

Figure A1a.5.1: Distribution of records of leatherback turtles from 2000-2011



A1a.5.3 Environmental issues

The most significant threats to marine turtles in the Atlantic occur outside UK waters (mainly at their breeding sites); nonetheless, issues of significance in UK waters include entanglement in fishing gear and ingestion of marine litter (UKMMAS 2010).

Interactions between turtles and fisheries are considered the highest cause of mortality during their high-latitude migrations but by-catch studies in the north-east Atlantic are too sporadic to evaluate their impact. In UK waters most records of leatherback by-catch implicate entanglement in ropes, particularly those used to tether marker buoys in pot fisheries for lobster, crab and whelk (Pierpoint 2000). A recent pan-Atlantic analysis of spatial-temporal distribution of leatherback turtles and longline fishing efforts did not identify any area of high susceptibility north of the Canaries (Fossette *et al.* 2014). Marine litter is recognised as one of the most pervasive pollution problems affecting the marine environment (OSPAR 2009) and in particular for leatherback turtles plastic debris and floating plastic bags, which may be mistaken as jellyfish prey, are a hazard (Gregory 2009, Mrosovsky *et al.* 2009). Once ingested, plastic may block a turtle's digestive tract leading to starvation or reduce the animal's desire to feed if the plastic fills the gut to leave the animal sated but without providing nutrition. Some plastics contain harmful organochlorine compounds such as PCBs which, once ingested, can damage reproduction and the animals' ability to resist disease. Plastics can also contain air bubbles which prevent turtles from diving for prey items. In UK, *post-mortem* examinations have commonly revealed presence of plastic debris in the gut but have rarely been identified as the possible cause of death (UKMMAS 2010). Nelms *et al.* (2016) note that there have been few studies of the potential for seismic surveys to cause behavioural changes or physical damage to turtles including through damage to hearing or entanglement in towed seismic survey equipment; this is not considered to be a major issue in UK waters given the relative uncommonness of turtle occurrence.

A1a.5.4 Conservation frameworks

All sea turtles are regarded as globally threatened and legislative measures are in place to protect marine turtles occurring in UK waters as well as to control the illegal trade of individuals and their by-products. All species are listed on Appendix I of the Convention on the International Trade in Endangered Species of Flora and Fauna (CITES) 1975 (now enforced by Council Regulation (EC) No 338/97), Appendix II of the Bern Convention 1979, Appendices I and II of the Bonn Convention 1979, Annex IV of the EC Habitats Directive. The loggerhead turtle is also listed as a priority species on Annex II of the EC Habitats Directive. The leatherback turtle and the loggerhead turtle are on the OSPAR list of threatened and/or declining species.

The Marine Strategy Framework Directive covers all marine biodiversity, including marine turtles; the indicative list of characteristics to be used in the assessment of Good Environmental Status (GES) given in Table 1, Annex III of the Directive makes reference to 'population dynamics, natural and actual range and status of species of marine reptiles in the marine region or sub-region'. However, given the distribution of the species, a marine turtle indicator is not deemed to be relevant to the Celtic Sea and North Sea (OSPAR 2012).

In the UK all five species are included in the grouped Species Action Plan for marine turtles. Various Local Biodiversity Action Plans exist for individual species.

The United Kingdom Turtle Code (<https://www.mcsuk.org/downloads/wildlife/turtlecode.pdf>) has been developed to provide advice for all sea users on how to deal with marine turtle encounters; all sea users are strongly encouraged to report sightings.

The following legislation pertains to all marine turtles in UK waters:

- The *Wildlife and Countryside Act 1981*, as amended
- The *Offshore Marine Conservation (Natural habitats, &c) Regulations (2007)*, as amended
- The *Conservation of Habitats and Species Regulations 2010*
- *Control of Trade in Endangered Species (Enforcement) Regulations (1997)*, as amended
- *Customs and Excise Management Act 1979*

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