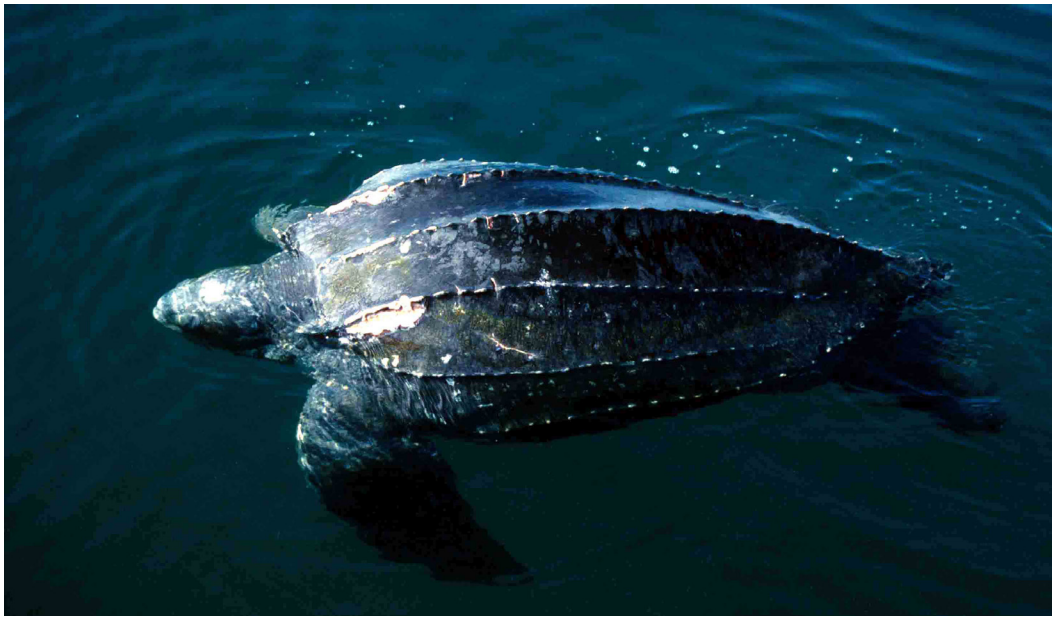
OSPAR COMMISSION

Background Document for Leatherback turtle *Dermochelys coriacea*



Biodiversity Series

2009

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l’Irlande, l’Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d’Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l’Espagne.

Acknowledgement

This report has been prepared by Ms Amelia Curd (France). Thanks are also due for the contributions of Francesca Marubini, Rod Penrose, Tom Doyle, Ferdia Marnell, Corinne Martin, Pierre Morinière, Ricardo Serrao Santos, Jean Lescure.

Photo acknowledgement:

Cover page: Leatherback turtle©PH Evans/Sea Watch Foundation

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Background Document for Leatherback turtle *Dermochelys coriacea*

Executive Summary

This background document on the Leatherback turtle - *Dermochelys coriacea* - has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2003. The original evaluation used to justify the inclusion of *D.coriacea* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2008-2009. Chapter 7 provides proposals for the actions and measures that could be taken to improve the conservation status of the species. In agreeing to the publication of this document, Contracting Parties have indicated the need to further review these proposals. Publication of this background document does not, therefore, imply any formal endorsement of these proposals by the OSPAR Commission. On the basis of the further review of these proposals, OSPAR will continue its work to ensure the protection of *D.coriacea*, where necessary in cooperation with other competent organisations. This background document may be updated to reflect further developments or further information on the status of the species which becomes available.

Récapitulatif

Le présent document de fond sur la tortue luth a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2003. L'évaluation d'origine permettant de justifier l'inclusion de la tortue luth dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2008-2009. Le chapitre 7 fournit des propositions d'actions et de mesures qui pourraient être prises afin d'améliorer l'état de conservation de l'espèce. En se mettant d'accord sur la publication de ce document, les Parties contractantes ont indiqué la nécessité de réviser de nouveau ces propositions. La publication de ce document ne signifie pas, par conséquent que la Commission OSPAR entérine ces propositions de manière formelle. A partir de la nouvelle révision de ces propositions, OSPAR poursuivra ses travaux afin de s'assurer de la protection de la tortue luth, le cas échéant avec la coopération d'autres organisations compétentes. Ce document de fond pourra être actualisé pour tenir compte de nouvelles avancées ou de nouvelles informations qui deviendront disponibles sur l'état de l'espèce.

1. Background Information

Name of species

Dermochelys coriacea Leatherback turtle

2. Original Evaluation against the Texel-Faial selection criteria

List of OSPAR Regions where the species occurs

The species occurs in all OSPAR Regions.

List of OSPAR Regions where the species is under threat and/or in decline

All where it occurs.

Original evaluation against the Texel-Faial criteria for which the feature was included on the Initial OSPAR List

D.coriacea was selected for inclusion on the OSPAR list on the basis of an evaluation of their status according to the Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (the Texel-Faial Criteria) (OSPAR 2003). The nomination for inclusion on the list cited the criteria decline and sensitivity, with information also provided on threat. It has been nominated for all OSPAR Regions. Table 1 provides an update on this evaluation. The main threats to this species in the OSPAR maritime area come from fisheries activity, marine debris and boat collision. Marine pollution in the form of plastic bags and debris offers a real threat to leatherback turtles in the OSPAR maritime area as turtles seemingly cannot discriminate between indigestible plastic debris and their gelatinous prey.

Table 1: Summary assessment of *D.coriacea* against the Texel-Faial criteria.

Criterion	Comments	Evaluation
Global importance	The leatherback is the only marine turtle considered a regular and normal member of North American and European Atlantic waters (Martin, 2003), and hence the OSPAR Maritime Area is within the natural foraging range of this species. Today, the largest populations are in the Atlantic and Caribbean. The major breeding grounds for this species are in the western Atlantic (French Guiana, Guyana, Suriname and to a lesser extent Trinidad), the eastern Atlantic (Gabon and the Congo) and also in the Pacific Ocean. Only a very small number of leatherbacks are thought to nest in the Mediterranean, with an exceptional nesting event having been recorded on the south coast of Sicily in the 19th century (Lescure *et al.*, 1989). However, the species is present in the region throughout the year (Pierpoint 2000).There are no nesting beaches in the OSPAR Maritime Area.	Qualifies
Regional importance	The North Atlantic is considered a stronghold for sub-adult to mature leatherback sea turtles (Doyle *et al.*, 2008) due to food abundance. Two recent reports (Doyle 2008, Eckert 2006) lend support to the suggestion that the Iberian peninsula and the Bay of Biscay is a 'high-use area" within the North-East Atlantic that plays a central role in the feeding ecology of some individuals.	Qualifies
Rarity	A highly mobile species, with a small total population size	Qualifies

Sensitivity	Large marine vertebrates are vulnerable because of their late age at maturity and low reproductive rates, however conflicting views exist on the sensitivity of leatherback turtles. Mathematical modelling of population dynamics suggest that an increase in adult mortality of more than 1% above background levels in a stable population cannot be sustained (Spotila *et al.*, 1996 in OSPAR 2006), yet a study by Pritchard (1996) concludes that the leatherback is a vigorous and dynamic species and able to show quite rapid response to protection.	Insufficient information
Keystone species	Has no controlling influences on communities within the OSPAR region	Not applicable within OSPAR area
Decline	Using data from nesting beaches, the global population of adult female leatherback turtles was estimated to be around 115,000 in the early 1980's and the population as a whole was considered to be endangered (Pritchard, 1982). A more recent estimate gives a figure of around 34,500 (with confidence limits giving lowest and highest estimates between 26,200– 42,900) of which the eastern Atlantic population of nesting females was estimated to be around 4,638 (±763) (Spotila *et al* 1996). These figures point to a possible decline of around 60% in the intervening period. There are no estimates of the likely population size in the OSPAR Maritime Area (OSPAR 2006) The situation in the Pacific appears grave with as few as 2,300 adult females leatherbacks remaining (Crowder 2000; Spotila *et al.* 2000 in Doyle 2007). This alarming decline may be largely attributed to loss or alteration of nesting beaches, egg poaching, and the negative interaction of leatherback turtles with pelagic longline fisheries. Clearly the well-documented decline of Pacific leatherbacks raises serious concerns for the Atlantic population where bycatch rates are thought to be even higher (Lewison *et al*. 2004; Carranza *et al.* 2006).	Potentially threatened

3. Current status of the species

Distribution in OSPAR maritime area

Figure 1 depicts leatherback observations in OSPAR Regions III & IV, recorded via several national sightings schemes (www.strandings.com (UK and Republic of Ireland); www.cornwallwildlifetrust.org.uk (Cornwall & Devon Wildlife Trust, UK; www.aquarium-larochelle.com (France)). The coastal bias probably reflects the 'distribution of observers rather than turtles' (King & Berrow 2008), as it is very probable that large numbers of leatherbacks occur further offshore. There are distinct seasonal peaks in the occurrence of leatherback turtles in northern waters. Around the UK, most turtles are reported between August and October (Gaywood 1997; Godley *et al.* 1998). Using an expanded dataset, Pierpoint & Penrose (1999) report that leatherbacks have been reported from UK and Irish waters in every month, although live sightings peak in August.

Figure 2 illustrates a study by Martin (2003) confirming the strong seasonal patterns of leatherback turtle occurrence in the Bay of Biscay, patterns that were originally identified by Duguy (1997) with records centralised by the La Rochelle aquarium. As in the UK and Irish waters (Godley *et al.*, Pierpoint 2000), live sightings peak in August, with dead strandings tending to peak one or two months later (Figure 3).

The time lag between the peaks of live sightings and dead strandings strongly suggests that dead strandings and live sightings originate from the same population (*i.e.* the dead strandings originate

from turtles visiting and dying in, or quite nearby, the study area). The idea that all records are from the same population are corroborated by the fact that, for any one year, the first record of live sightings always occurs before the record of a dead stranding. Hence, the time lag between the occurrences of live sightings and dead strandings was likely to be due that dead (or dying) turtles drift for an indeterminate period before being washed up on shore and having a chance of being reported (Godley *et al*., 1998). 95% of UK sightings are made between June and October (Pierpoint, 2000). The time lapse in peak sightings indicates that leatherbacks move into British and Irish waters from the south and west, and pass northwards up western coasts and the Irish Sea.

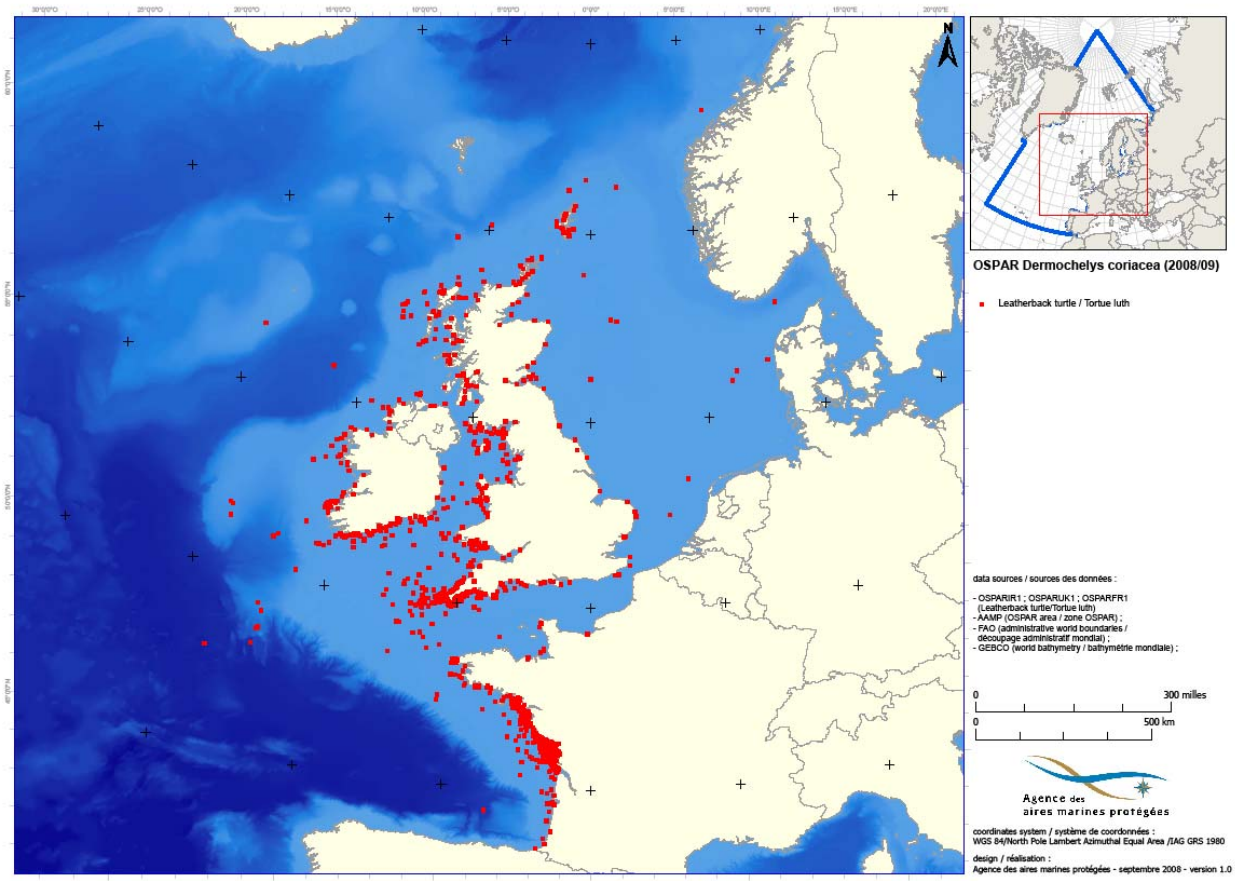

Figure 1: Leatherback turtle sightings data made available across the OSPAR maritime area. Data sources: La Rochelle Aquarium (FR), 'TURTLE' database (UK & RoI), Cornwall & Devon Wildlife Trusts (UK)

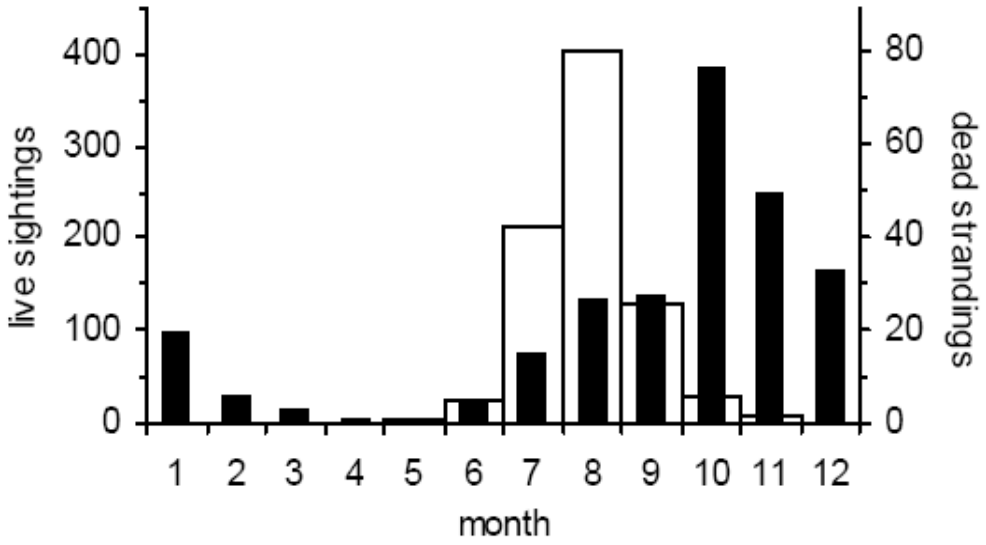

Figure 2: (Martin, 2003): the patterns of occurrence (cumulated monthly records, 1979-2000) for live sightings (open bars and primary y-axis) and dead strandings (solid bars and secondary y-axis) in France.

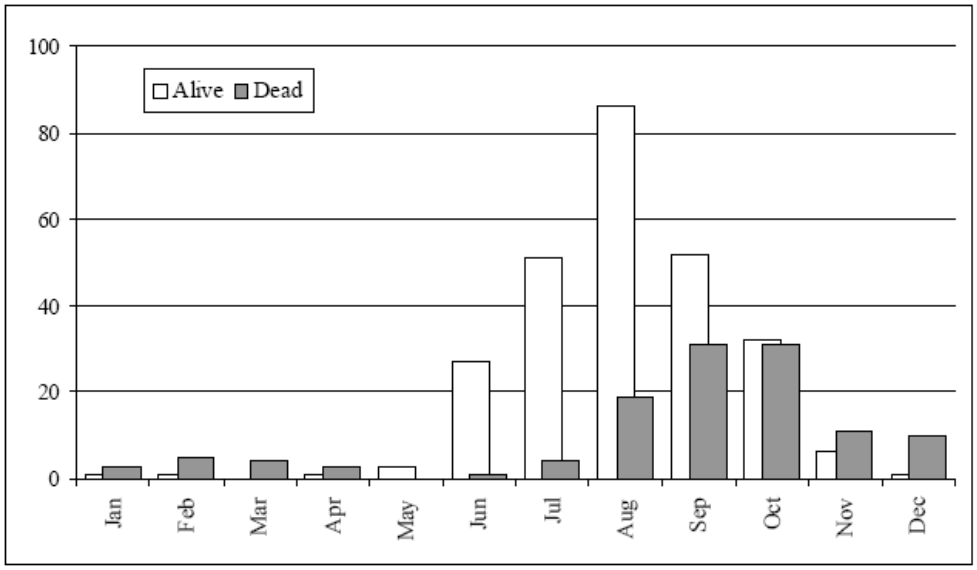

Figure 3: (Pierpoint, 2000) Total number of leatherback sightings and strandings in each month in the UK and Republic of Ireland.

Leatherbacks have an atypical migration as they rarely breed every year. Instead, after departing a nesting beach female leatherbacks generally shuttle between temperate foraging grounds and less productive tropical over-wintering grounds for a number of years, before returning to their natal nesting ground. This atypical migration is associated with the low energy density (Doyle *et al.* 2007) and northerly distribution of their gelatinous zooplankton prey *i.e.* their food is of such poor quality and located long distances from their breeding grounds that they require two or more years to build up enough fat deposits to fuel reproduction and associated migrations back to the tropics.

Causes of mortality for leatherback turtles in the Bay of Biscay include interactions with fisheries (nets, ropes and trawls) and ingestions of floating waste such as plastic bags (Duguy *et al*. 1998). With regard to the latter, Leatherback turtles are thought to ingest plastic bags because they mistake them for jellyfish. Indeed, the Leatherback turtle has a highly specialised diet: in the North Atlantic, it feeds almost exclusively on surface-dwelling medusae (jellyfish), although also consuming related animals such as siphonophores, salps and large pyrosomas (Davenport 1998), which may be found at great depths.

Population (current/trends/future prospects)

Population estimates for the Atlantic, based on nesting females in 1995, lie somewhere between 26 000 and 43 000 female leatherbacks (Spotila *et al.* 1996; Dutton *et al.* 1999), with very little known about the male population as they do not come ashore at any stage.

The continental shelf-break, including the Porcupine Bank and Porcupine Bight and the Rockall Bank and Trough, is spatially coincident with appreciable aggregation of gelatinous organisms and as such represents habitats that require boat-based or aerial investigation of leatherback distribution. The occurrence of previously undescribed gelatinous organism rich habitats within jurisdictional waters of European Union member states highlights the necessity to enumerate the presence of foraging leatherbacks (Witt *et al*, 2007)

Prey fields indicate that the central North Atlantic supports several appreciable aggregations of gelatinous organisms. It is likely that these aggregations reflect the dynamic nature of the North Atlantic gyre. This region supports the separation of eddies that can enhance localised productivity (divergent eddies) or aggregate prey (convergent eddies). Leatherback habitat utilisation from satellite tracking (Ferraroli *et al.* 2004, Hays *et al.* 2004) suggests movements are most likely directed to regions that show seasonally persistent densities of prey over decadal timescales. Identifying these regions as likely foraging grounds provides important direction for conservation efforts, particularly as they exist within areas where potential conflicting fishing effort is considerable (Lewison *et al*. 2004).

Analysis of these first European tracks (Doyle, 2007) has demonstrated the individual differences in space utilisation by leatherback turtles in the NEA. For example, Houghton *et al.* (2006) revealed that distinct coastal ‘jellyfish hotspots’ in the Irish Sea provide important foraging habitat for leatherbacks in coastal waters, whereas satellite tracking revealed foraging behaviour in more open-water habitats associated with mesoscale features such as those found in the Bay of Biscay region, (Figure 4 from Doyle *et al*. 2008). An alternative approach to determine the importance of the NEA as a foraging ground for leatherback sea turtles was carried out by Witt *et al*. (2007a). They used the CPR (Continuous Plankton Recorder) Data to map the gelatinous zooplankton distribution in the NEA. They identified the European continental shelf-break (particularly the Rockall Area and Porcupine Bank and Porcupine Bight) as probable foraging grounds for leatherback turtles based on the abundance of gelatinous zooplankton in these areas (Witt *et al.* 2007a). Overlying this general trend of epipelagic diving, leatherbacks at the northern range limit also tend to perform shallower dives and for shorter periods (Eckert 2006; Hays *et al*. 2006) which may reflect the continuous near surface distribution of gelatinous prey at such latitudes (Hays *et al.* 2006).

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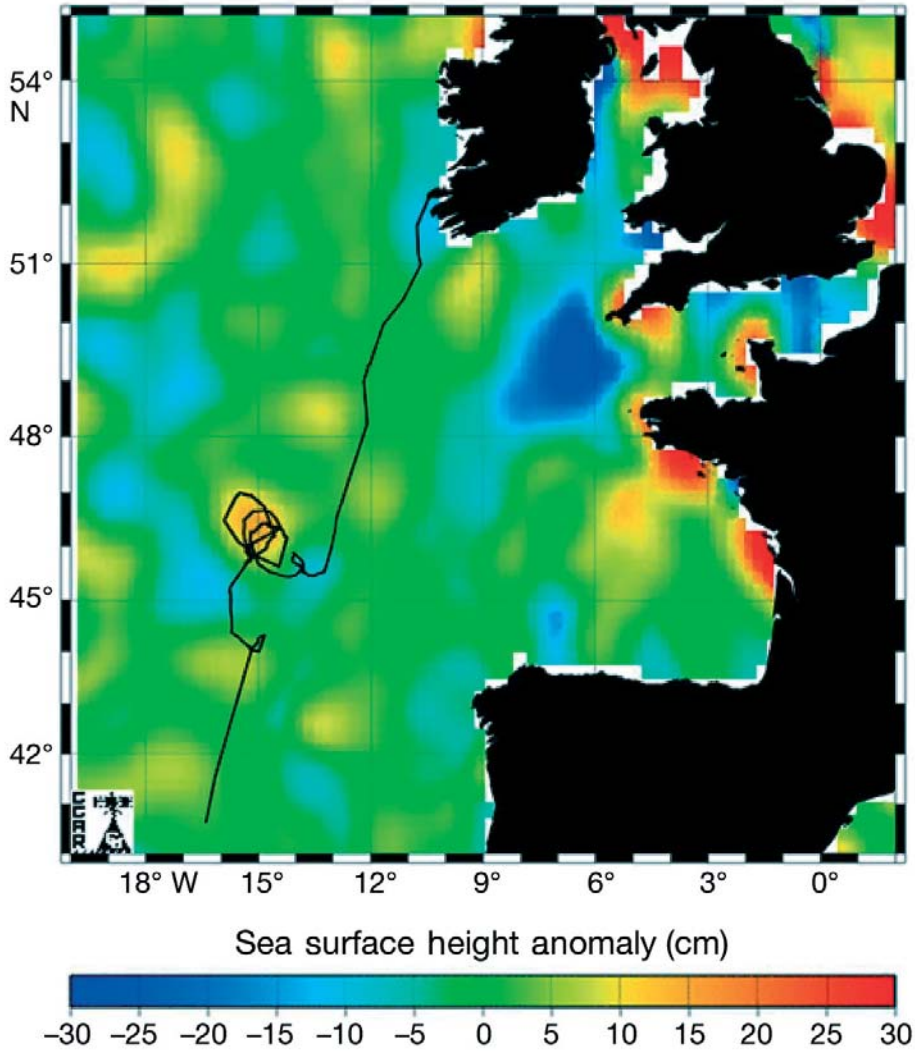

Figure 4: *Dermochelys coriacea.* The track of turtle T2 overlaid on a sea surface height anomaly image from 4 September 2006. T2 resided for 66 d in an anticyclonic mesoscale feature (yellow area), with the turtle looping around in the same direction (clockwise) (Doyle *et al.,* 2008).

Condition (current/trends/future prospects)

In contrast to loggerhead turtles, leatherback turtles appear to be most abundant during the summer when gelatinous prey is plentiful; this pattern most likely indicates active habitat selection by these large, endothermic marine turtles (Davenport 1998, Witt *et al*., 2007a). There has been no observed decline of nesting populations in the Atlantic to date, and even in some cases there has been a dramatic increase that is probably due to an aggressive programme of beach protection and egg relocation (Dutton *et al.* 2005). Nevertheless, the international nature of this problem means that the species' survival will depend on cross border collaborations focused not only on the tropical nesting beaches, but also on the more temperate feeding grounds that lie thousands of kilometres away (Hays *et al.*, 2004 in Doyle 2007).

Leatherbacks are the only species of marine turtle to have developed adaptations to life in cold water, and have been recorded at 71°N in the Atlantic (Pierpoint, 2000). However, McMahon & Hays (2006)

have shown that usually leatherback northerly distribution limit can be encapsulated by the position of the 15°C isotherm. Importantly, the position of the 15°C isotherm has moved northwards by 330 km over the past 20 years (McMahon & Hays 2006), suggesting that the leatherback bioclimatic envelope has expanded. As the position of the 15°C isotherm will vary between years, the suitability of OSPAR waters for foraging leatherbacks will vary, with good and bad years in terms of abundance. Considering recent warming trends there may be an overriding trend towards an increase in leatherback abundance (Kintisch 2006), with a concomitant increase in interactions with fisheries.

Limitations in knowledge

Efforts to model populations of the leatherback sea turtle *Dermochelys coriacea* and design appropriate conservation measures for this endangered species have been hindered by a lack of information on in-water (vs. nesting) population characteristics (James *et al.,* 2007).

It is important to recognise the limitations of the data available on by-catch in OSPAR waters. The majority of both turtle sightings and strandings records are reported haphazardly via a number of informal networks. Annual marine turtle sightings reported each year vary considerably. This is due in part to the efficiency of reporting networks, but the influence of biological factors (*e.g.* prey density) on their abundance is not yet well understood (Pierpoint, 2000).

A lack of standardisation in tagging protocols across leatherback nesting beaches, coupled with continued exclusive use of non-permanent marking techniques (*i.e.* flipper tags) in some areas prohibits universal recognition of previously tagged turtles. This has created serious obstacles to clarifying key life history parameters that influence population demographics (James *et al.,* 2007). As leatherback turtles do not nest anywhere in the North-East Atlantic, tracking individuals from Europe requires capture and attachment of satellite transmitter at sea, which is difficult to perform (Doyle *et al*., 2008)

4. Evaluation of threats and impacts

A summary of the key activities which can cause impacts to *D.coriacea* is given in Table 2. In some parts of the world leatherback turtles are exploited, both as adult turtles and for their eggs. The other main threats are from habitat damage to nesting beaches, incidental capture and entanglement in fishing gear, ingestion of persistent marine debris and marine pollution (Lutcavage *et al.*, 1997).

Anthropogenic threats include: incidental capture in fishing equipment; beach development/nesting habitat destruction; disorientation of hatchlings by beachfront lighting; directed take; nest destruction by beach vehicles; dredging; ingestion of plastics/marine debris: boat collision; oil spills. Within the OSPAR maritime area, the main threats to this species come from fisheries activity and marine litter.

Table 2. Summary of key threats and impacts to *D. coriacea*

Cause of threat	Comment	Scale of threat
Fishing: fixed and mobile netting, pelagic trawling, potting/creeling, entanglement in discarded fishing gear	There are records of leatherbacks captured in driftnets, trawls, set gill nets, purse seines, long line fisheries and lines of pot fishing gear (e.g. Pierpoint, 2000; Doyle, 2007).	High

Cause of threat	Comment	Scale of threat
Waste: litter and debris	The ingestion of plastic bags, presumably mistaken for jellyfish, can also be fatal and has been reported from post-mortem examinations on stranded turtles (e.g. Duron & Duron 1980; Berrow & Rogan, 1995).	High
Pollution: oil/tar/chemicals	Pollution can have serious impacts on both sea turtles and the food they eat. New research suggests that a disease now killing many sea turtles (fibropapillomas) may be linked to pollution in the oceans and in nearshore waters. When pollution kills aquatic plant and animal life, it also takes away the food sea turtles eat. Oil spills, urban runoff of chemicals, fertilizers and petroleum all contribute to water pollution.	Medium
Uses: shipping Recreation: boating/yachting/water sports	There is also a possibility that some turtle mortality is caused by collisions with vessels (Haelters *et al*., 2001). In areas where recreational boating and ship traffic is intense, propeller and collision injuries are not uncommon.	Low
Egg collection from tropical nesting beaches	A high-scale threat, but outside OSPAR area	Low

A small but significant threat to leatherbacks in OSPAR coastal waters is from fixed fisheries. Figures 5 and 6 give a breakdown by fishing gear type for incidental capture records for leatherback turtles recorded since 1980 in the United Kingdom and Republic of Ireland (Pierpoint, 2000) and France (La Rochelle Aquarium, unpublished data) respectively. Both charts indicate uncannily similar trends. Hence, the most significant known by-catch of leatherback turtles during the last twenty-eight years, that can be attributed to specific fisheries or fishing methods, has been recorded in inshore pot fisheries and in pelagic drift nets, the latter of which have been banned since 2002.

Leatherbacks that become entangled in fixed gear have a high risk of mortality because turtles entangled at depth or at the surface during low tide will almost certainly drown (King & Berrow 2008). It should be noted that, although entanglement in buoy ropes in pot fisheries is the most common method of capture recorded in the OSPAR region, it is likely to be due to the proximity of this fixed fishery to the coast, as often the opportunity exists for entangled leatherbacks to be reported. Leatherback/offshore fishing gear interactions are vastly under-reported.

Globally, one of the biggest threats to leatherbacks is the interactions with pelagic longline fisheries for tunas (*Thunnus* spp), swordfish (*Xiphias gladius*) and blue shark (*Prionace glauca*) (Lewison *et al.* 2004; Carranza *et al*. 2006). These fisheries generally use a monofilament polyamide longline, that can be up to 80 kilometres long, with ~ 1300 hooks baited with squid and/or mackerel per set, at a depth of 40 – 80 m (Carranza *et al.* 2006). In OSPAR Region V Japanese long-liners fish for blue-fin tuna from August to November. Their fishing effort is sporadic (largely depending on where the fish are) and at times they concentrate their effort as far south as the Azores. Very little data exists in terms of the number of leatherbacks caught but considering the numbers individuals by-caught in other long-lining vessels (*e.g.* Carranza *et al*. (2006) documented 10 individual leatherbacks caught in one set off the coast of Guinea, West Africa), the number may be substantial. Further monitoring or obtainment of by-catch data of these vessels is required. In addition to longline fisheries, leatherbacks

are also prone to entanglement in buoy ropes used both in pot-based fisheries for shellfish and molluscs, and some net fisheries (Doyle, 2007).

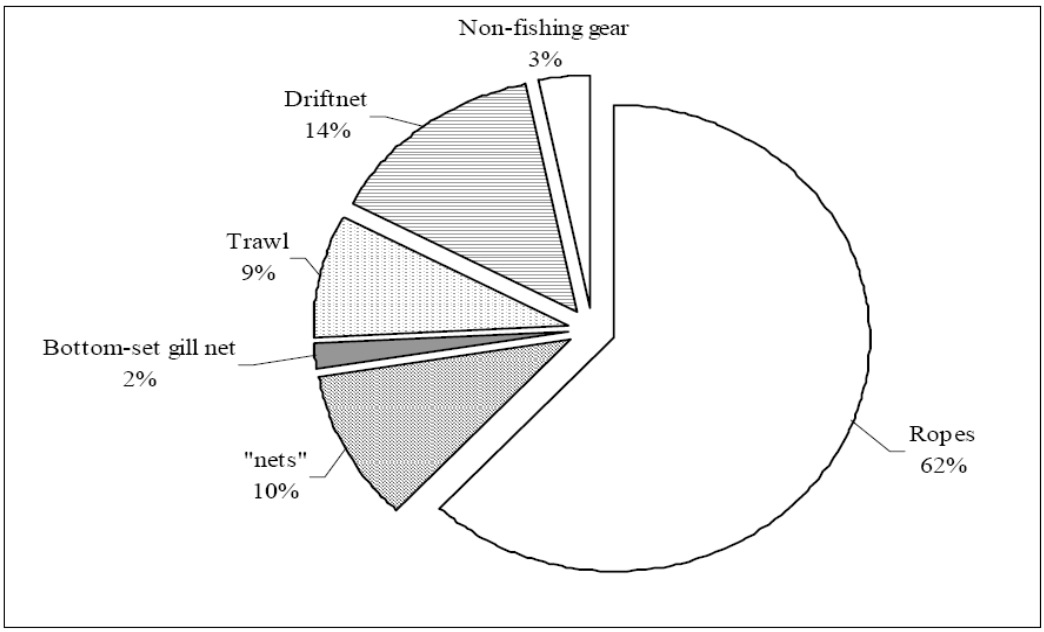

Figure 5: Pierpoint (2000) UK and RofI by-catch records 1980-2000 for which a gear type was specified (n=56).

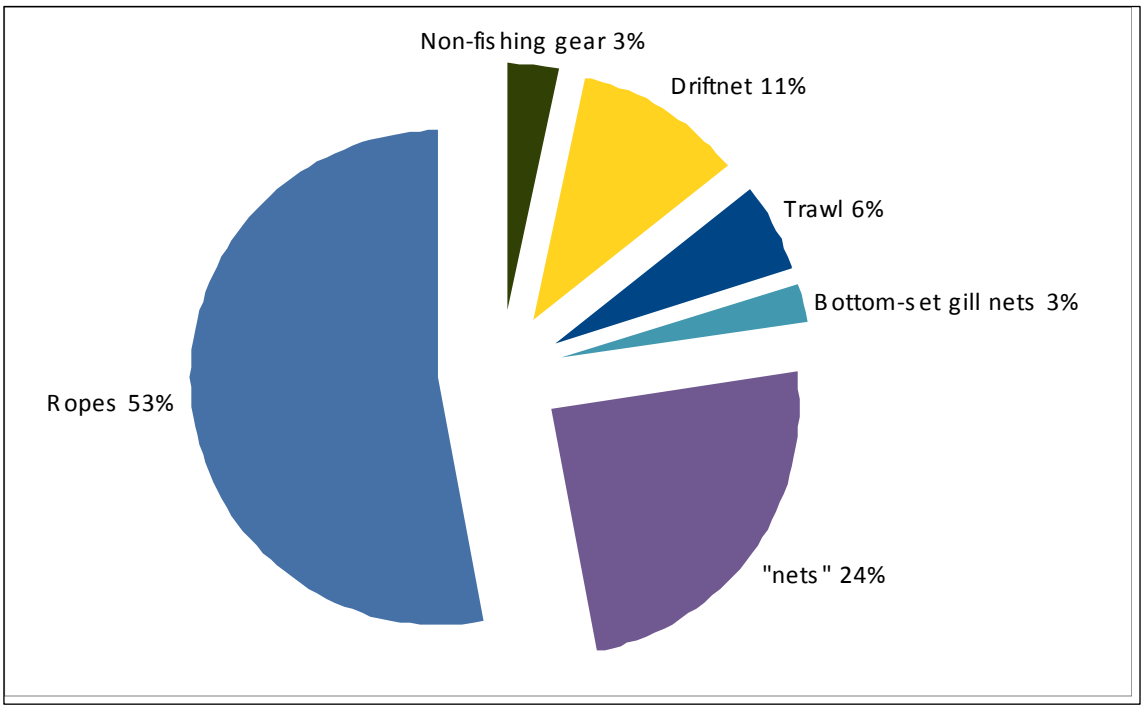

Figure 6: La Rochelle aquarium, unpublished data. French by-catch records 1980-2007 for which a gear type was specified (n=119).

By-catch from the Azorean swordfish longline fishery is mainly sharks (primarily the blue shark *Prionace glauca*), but also includes loggerhead sea turtles (*Caretta caretta*) and occasionally leatherback turtles (*Dermochelys coriacea)*, that are either hooked or entangled in the lines (Ferreira *et al.* 2001).

5. Existing Management measures

When a species is listed as critically endangered in the IUCN Red List, it is facing an extremely high risk of extinction in the wild in the immediate future. The leatherback turtle is listed as "CR A1abd", meaning that there has been an "observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations" in its population.

(http://www.iucnredlist.org/info/categories_criteria1994#categories).

The Irish Sea Leatherback Project was established in April 2003 as a joint venture between the University of Wales Swansea and the University College Cork. Funded by the European Regional Development Fund's (ERDF) INTERREG IIIA initiative, key elements of the project included aerial surveys of the Irish Sea, satellite tracking of leatherback turtles, shoreline jellyfish surveys, schools workshops and public seminars. Additional background information is available from: http://www.turtle.ie

In the OSPAR Regions III and IV a major development within the static net fisheries was the development and subsequent banning of a driftnet fishery for albacore tuna *Thunnus alalunga*. This fishery straddled the wider Atlantic region. This fishery developed in the early 1990s and at its peak involved around 120 Irish and French vessels working 5 – 10 km of gear in line with the UN resolution 44/225 of 22 December 1989, which called for a moratorium on the use of large-scale driftnets to protect cetacean species. The number of animals captured by the French tuna driftnet fleet in 1993 was estimated at 100 turtles (Gougon *et al.* 1993), most of which were leatherbacks. Following protracted negotiations this fishery was closed in 2002 on the basis of reported marine mammal by-catches. Following these measures, Irish and French fishers converted to other forms of fishing, including the use of pair pelagic trawls. Research trials with this method showed that bycatch of marine mammals and reptiles was as high as in the driftnet fisheries, although in later years this by-catch has reduced considerably. Anecdotally this has been put down to the fact that fishers have tended to drop the headline of these trawls to well below the surface to target bigger tuna (ICES 2008b).

OSPAR provides a framework for regional collaboration which is essential for the effective conservation of far-ranging species such as cetaceans and turtles. Regional collaboration in the collecting and sharing of research data has the potential to guide meaningful management actions and to assist in the determination of conservation priorities.

The French CNRS (Centre National de la Recherche Scientifique) together with the University College Cork wish to start up an "Interreg IVB" where aerial surveys are used to locate the leatherbacks' food,

jellyfish swarms. The jellyfish will then be equipped with electronic tags with a view to understanding their vertical distribution and increasingly major trophic role in marine systems.

6. Conclusion on overall status

The fact that nesting populations of leatherback turtles in the Pacific Ocean have declined over 95% in the last 20 years (Crowder 2000; Spotila *et al.,* 2000) reinforces the global importance of North Atlantic foraging areas. The discovery of narrow migration corridors used by the leatherbacks in the Pacific Ocean raised the possibility of protecting the turtles by restricting fishing in these key areas. Ferraroli *et al.,* (2004) used satellite tracking to show that there is no equivalent of these corridors in the North Atlantic Ocean: the vast distances that separate their nesting and feeding grounds combined with highly individual and unpredictable migration routes mean that leatherback turtles disperse actively over the whole area. However, they were able to identify a few 'hot spots' where leatherbacks meet fisheries and where conservation efforts should be focused. The few hot spots where turtles are likely to encounter coastal or pelagic fishing fleets are very different and are widely scattered across the Atlantic basin, but the Iberian peninsula and the Bay of Biscay have been identified as high-use areas (Doyle *et al.,* 2008; Eckert *et al.,* 2006). These findings highlight the pressing need to develop locally adapted, but basin-wide and internationally coordinated, conservation strategies for preserving the last large population of leatherback turtles.

In order for Member States to comply with the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora), it must ensure the favourable conservation status of all Annex IV species (which includes leatherbacks). Before this can happen, a better understanding of leatherback numbers, distribution patterns and feeding ecology is required (Doyle, 2007). The basin-wide distributions of both pelagic longline effort and sea turtles suggest that effective marine turtle protection will require coordinated international action and long-term government funding of research programmes. Experimental fisheries have identified some gear modifications and fishing practices that reduce sea turtle bycatch, but multinational efforts are needed immediately to continue to develop and implement appropriate conservation measures.

All those labouring on behalf of marine turtle conservation should be encouraged to integrate their localised efforts with the efforts of colleagues working with the same populations of turtles in countries hundreds or even thousands of kilometres distant.Only in this way will field methodologies be consistent and sound, but that resources wisely expended at the local and national levels will contribute to the survival of sea turtles throughout their ranges.

7. Action to be taken by OSPAR

Action/measures that OSPAR could take, subject to OSPAR agreement

As set out in Article 4 of Annex V of the Convention, OSPAR has agreed that no programme or measure concerning a question relating to the management of fisheries shall be adopted under this Annex. However where the Commission considers that action is desirable in relation to such a question, it shall draw that question to the attention of the authority or international body competent for that question. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them.

The leatherback turtle's pan-oceanic movements and shallow diving are doubly disadvantageous, in that they both increase their interaction with longline fisheries. It is therefore crucial that new methodology and fishery management procedures be applied to reduce leatherback turtle by-catch (Hays *et al.,* 2004). In order to facilitate the implementation of international conservation measures, a

greater understanding of the relative importance of the OSPAR maritime zone to marine turtles is needed. The establishment of a common, regularly updated and readily accessible database is a first step towards achieving this.

It is proposed that OSPAR should recommend that relevant Contracting Parties take into account the need for the protection of *Dermochelys coriacea* in the development and application of fisheries policies and plans with a view to:

a. incorporating leatherback turtles into existing systems of stranding response that are already in place for cetaceans (EC n°812/2004);

b. routinely recording the information provided by fishermen on fisheries inspection visits;

c. encouraging voluntary reporting of turtle bycatch;

d. encouraging localised scientific efforts to pool their findings.

OSPAR should require that Contracting Parties report back to the OSPAR Commission on the implementation of the above recommendations so that the development of the necessary measures can be evaluated. As a first step Contracting Parties should make an assessment of the effectiveness of the regulations they already have in place for the protection of *Dermochelys coriacea*, consider how those regulations might be made more effective through improved monitoring, control and surveillance and report the results to the OSPAR Commission.

To complement these actions, the OSPAR Commission should:

a. communicate to the EC and other relevant fishing authorities the need for increased transparency in non-commercial by-catch statistics;

b. work with the EC to clarify conservation objectives in relation to fishing regulations;

c. emphasise to relevant scientific funding bodies the following research needs with respect to *Dermochelys coriacea:*

   (i) further tracking of individuals using satellite telemetry will help address key questions regarding site fidelity to the North-East Atlantic (return migrations), foraging behaviour, residence times, surface behaviour, and behavioural plasticity of the species.

   (ii) further monitoring in pelagic fisheries. Dedicated observers on ships of opportunity (ShOPs) in conjunction with targeted aerial surveys and concerted ‘coastal observatories’ may provide an important tool for assessing leatherback abundance.

Table 3: Summary of the key priority actions and measures which could be taken for Leatherback turtle (*Dermochelys coriacea*). Where relevant, the OSPAR Commission should draw the need for action in relation to questions of fisheries management to the attention of the competent authorities. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them.

Key threats	Climate change Incidental capture in fishing gear Marine debris
Other responsible authorities	EC, UNCLOS, CITES, NEAFC, ICCAT, NASCO, FAO, fishery authorities of non-EU countries
Already protected? **Measures adequate?**	Habitats & Species Directive Appendix IV Bern Convention Appendix II (Mediterranean only) CMS (Bonn Convention) Appendices I & II CITES Appendix I IUCN Red List CR (Critically Endangered) A1abd EU LIFE/Interreg projects
Recommended OSPAR Actions and measures	**By the OSPAR Commission** • Work with Contracting Parties and the European Commission to clarify conservation objectives particularly in relation to measures to regulate effects of fishing that compromise conservation objectives (ICES, 2008) • Encourage Contracting Parties that are also EU Member States to make use of EC n°812/2004 to place observers aboard fishing vessels who monitor the bycatch of all non-commercial species, and include leatherback turtles in the reporting] • Support a regional sightings database • Ensuring policy coordination across agencies/authorities • Work in partnership with RFMOs **By the Contracting Parties** • Encourage voluntary reporting of turtle bycatch • Include leatherback turtles into existing systems of stranding response for cetaceans (or create an efficient and above all ongoing marine turtle strandings system) **By the responsible authorities to whom the OSPAR Commission can make its concerns known** • Recommending mitigation measures (i.e reduced daylight soak time for longline gear) to appropriate fishing authorities • Record information provided by fishermen on routine fisheries inspection visits

Brief Summary of proposed monitoring system

It is strongly recommended that observer programmes be continued to monitor sea turtle by-catch rates, as capture rates may vary among years and among fishing boats.

Article 5(3) of the European Union Council Regulation EC n°812/2004, of 26.4.2004 laying down measures concerning incidental catches of cetaceans in fisheries and amending Regulation (EC) No 88/98, reads as follows:

> "Independent observations of fishing activities are essential to provide reliable estimates of the incidental catch of cetaceans. It is therefore necessary for monitoring schemes with independent on-board observers to be set up and for the designation of the fisheries where such monitoring should be given priority to be coordinated. In order to provide representative data on the fisheries concerned, the Member States should design and implement appropriate monitoring programmes for vessels flying their flag engaged in these fisheries. For small-sized fishing vessels less than 15 m overall length, which sometimes are unable to allow an additional person permanently on board as an observer, data on incidental catches of cetaceans should be collected through scientific studies or pilot projects. Common monitoring and reporting tasks also need to be set.
>
> The task of observers is to monitor incidental catches of cetaceans and to collect the data necessary to extrapolate the by-catch observed to the whole fishery concerned. In particular, the observers shall:
>
> (a) monitor the fishing operations of the vessels concerned and record the appropriate data on fishing effort (gear characteristics, location and timing of beginning and end of effective fishing operation)
>
> (b) monitor incidental catches of cetaceans.
>
> **Observers may also carry out such other observations, as may be determined by Member States, for the purposes of contributing to the scientific understanding of the catch composition of the vessels concerned and the biological status of fishery stocks.**"

This article is considered by researchers as being a key piece of EU environmental legislation, which can be used as a basis with which to justify the presence of observers onboard shipping vessels who officially monitor all by-catch of marine mammals, reptiles and birds.

Annex 1: Overview of data and information provided by Contracting Parties

Contracting Party	Feature occurs in CP's Maritime Area	Contribution made to the assessment (e.g. data/information provided)	National reports References or weblinks
Belgium	Y	Y	Haelters J., Kerckhof F. And Jauniaux T., 2001. Third Leatherback stranding in Belgium. *Marine Turtle Newsletter* **93**:14.
Denmark			
France	Y	Y	
Germany			
Iceland			
Ireland	Y	Y	Doyle, T. K. (2007) Leatherback Sea Turtles (Dermochelys coriacea) in Irish waters. *Irish Wildlife Manuals,* No. **32**. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. http://www.npws.ie/en/PublicationsLiterature/HabitatsDirectivereport07/Species/
Netherlands			
Norway			
Portugal	Y (Azores)	Y	
Spain	Y		
Sweden			
UK	Y	Y	Pierpoint, C;, 2000.Bycatch of marine turtles in UKand Irish waters. JNCC Report No 310. JNCC, Peterborough. http://www.jncc.gov.uk/page-2330 http://www.jncc.gov.uk/pdf/Article17/FCS2007-S1223-Final.pdf

The Leatherback turtle was nominated for inclusion in the OSPAR List in 2001 by United Kingdom. Contact person: Mark Tasker, Joint Nature Conservation Committee, Monkstone House, Peterborough, PE1 1UA, UK.

Summaries of country-specific information provided

Britain; In addition to European and international agreements, legislative coverage for leatherback turtles is provided by the Conservation Regulations 1994 (Schedule II) and the Wildlife and Countryside Act 1981, as amended (Schedule 5).

The “TURTLE” database is a collation of records from numerous published and unpublished sources. It was created under English Nature’s Species Recovery Programme with support from Scottish Natural Heritage and the Countryside Council for Wales, under a contract managed by the Joint Nature Conservation Committee. Pierpoint (2000) noted that, in general, leatherback turtles occurred later in Scottish waters (August-October) than further south (July-September), with turtles probably moving into British and Irish waters from the south and west, before moving northwards, possibly towards Sweden or Norway.

Ireland: Leatherback turtles are protected under the Irish Wildlife Acts (1976 & 2000).Distinct coastal 'jellyfish hotspots' in the Irish Sea may be important foraging areas (Houghton *et al.*, 2006). The following is an extract from Tom Doyle's 2007 review entitled “Leatherbacks in Irish waters”:

In their recent review of marine turtle records in Irish waters, King & Berrow (2008) documented 868 sightings/strandings of leatherback turtles. This dataset represents the second largest leatherback sightings/strandings dataset in Europe, after France (N =1176, see Witt et al. 2007a). As such, a considerable responsibility of ensuring their protection within European waters may lie with Ireland. However, caution must be stressed when attempting to elucidate any patterns from this dataset, as there are many inherent biases. For example, most turtles were sighted within 12 nautical miles (~ 22 km) of the coastline, with a strong bias towards three counties: Cork (N = 378), Kerry (N = 113), and Donegal (N = 109) (King & Berrow 2008).

Another important consideration is that ‘many of the leathery turtle records reported were observed by fishermen and most [of these] were of turtles entangled in fishing gear’ (King & Berrow 2008).Subsequently, the large numbers observed in counties Cork, Kerry and Donegal may reflect the large fishing effort in these areas. A fourth bias may stem from the actual sourcing of records, i.e. the vast majority of leatherback records were actively sought by Gabriel King who approached fishing communities around Ireland. Indeed, many peaks in sightings reported are evident: 1984-1985, 1990, 1993, most of which can be attributed to an increase in recording effort by King rather than actual peaks in the abundance of turtles in Irish coastal waters. Nevertheless, the high number of leatherback sightings reported by King & Berrow (2008) and others, documents the importance of Irish neritic waters for foraging and transient individuals, from which some general statements can be drawn. Essentially, sightings of leatherbacks can occur anywhere in Irish coastal waters, but are more likely to occur in higher numbers off the south and west coasts of Ireland because of their facing aspects (Witt *et al*. 2007a). Underlying this general pattern (and accounting for various biases e.g. fishing effort, coastal population, and boating activity) there is a greater probability of occurrence in areas where jellyfish regularly occur in high concentrations e.g. off Sauce Creek (Brandon Head) (pers ob) and Rosslare Harbour (see Houghton *et al*. 2006b) for the importance of jellyfish hotspots).

In terms of Irish oceanic waters, a recent study has suggested that the European continental shelf edge (particularly the Rockall Area and Porcupine Bank and Porcupine Bight) may potentially support appreciable densities of foraging leatherbacks because of the high abundance of gelatinous zooplankton located there (Witt *et al.* 2007a).

France: Research on marine turtles in the French territory has primarily been focused on the nesting populations of leatherback turtles in French Guyana.

Thanks to the sheltered waters and nutrient influx that occur each summer on the Pertuis Charentais coast of France (North Bay of Biscay), adult-sized leatherback turtles congregate in significant numbers to feed on jellyfish.

Norway: The seasonal patterns recorded in the UK & Irish waters and Norway is remarkably similar to the patterns in the Bay of Biscay (with incidences of live sightings peaking in August for both areas, Pierpoint 2000)

Annex 2: Description of the proposed monitoring and assessment strategy

Rationale for the proposed monitoring

- Further tracking of individuals using satellite telemetry will help address key questions regarding site fidelity to the northeast Atlantic (return migrations), foraging behaviour, residence times, surface behaviour, and behavioural plasticity of the species (Doyle, 2007).
- Genetic studies should be carried out in order to confirm the hypothesis of Atlantic uniformity. One priority area of study concerns seasonal movements of adult females and exchanges with the western Atlantic (Fretey, 2001).

Use of existing monitoring programmes

Union Council Regulation EC n°812/2004 is a proposed legislative tool with which to place observers onboard national fishing fleets.

Synergies with monitoring of other species or habitats.

Dedicated observers on ships of opportunity (ShOps) in conjunction with targeted aerial surveys and concerted 'coastal observatories' may provide an important tool for assessing leatherback abundance, distribution and seasonality. This increased monitoring would also encompass several other megafaunal species on the OSPAR list; in temperate waters the strongest coastal monitoring synergies lie with the basking shark (*Cethorinus maximus*), but observers aboard ShOps could record sightings data for all cetaceans, reptiles, birds and shark species observed or by-caught. This combination of methodologies will allow for a more robust assessment of leatherback abundance, data that is vital for ensuring favourable conservation status. Furthermore, in line with current policies and government agendas leatherback abundance estimates may provide a very useful indicator of climate change (Doyle, 2007).

A number of ship-based observation methodologies, usually devised for cetaceans but applicable to marine turtles, already exist. Techniques/approaches, percentage of fishing effort observed, monitoring locations, timing and frequency are very much dependent on the activities of national fishing fleets. Given the wide variety in fishing fleet size, gears, timing, frequency and size of area fished, it was not felt that a detailed description of the recommended monitoring and assessment strategy would be useful at this stage of the assessment.

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