



**OSPAR
COMMISSION**

*Protecting and conserving the
North-East Atlantic and its resources*

An overview of anthropogenic impacts on Loggerhead (*Caretta caretta*) and Leatherback (*Dermochelys coriacea*) turtles; measures and strategies for prevention in the OSPAR area - Scoping study



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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. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, 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, la Suisse et l'Union européenne.

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Executive summary

This scoping study compiles available information on anthropogenic pressures impacting Loggerhead turtle (*Caretta caretta*) and Leatherback turtle (*Dermochelys coriacea*) as well as monitoring and conservation measures that have been implemented in the OSPAR maritime area. The scoping study indicates that incidental bycatch of marine turtles poses the biggest threat to the species followed by impacts of litter through entanglement and ingestion. The report finally identifies options and possibilities for future action in OSPAR to protect Loggerhead turtle and Leatherback turtle.

The scoping study has been completed to create a knowledge base for OSPAR implementing the collective action to “develop relevant measures for preventing and reducing impact on turtles of entanglement in and ingestion of marine litter - in particular plastic bags, pollution and collision”. The collective action has been agreed in the OSPAR Recommendation on the protection of Loggerhead turtle (Recommendation 2013/07) and Leatherback turtle (Recommendation 2013/06). Creating this scoping study was the first step in taking forward work under the Roadmap for the implementation of collective actions within the Recommendations for the protection and conservation of OSPAR listed Species and Habitats.

Récapitulatif

Cette étude exploratoire rassemble les informations disponibles sur les pressions anthropiques ayant un impact sur la tortue caouanne (*Caretta caretta*) et la tortue luth (*Dermochelys coreacea*) ainsi que les mesures de surveillance et de conservation qui ont été mise en œuvre dans la zone maritime OSPAR. L'étude indique que les prises accidentelles de tortues marines constituent la plus grande menace pour l'espèce, suivie par les impacts des déchets par enchevêtrement et ingestion. Le rapport identifie enfin les options et les possibilités d'action future dans le cadre d'OSPAR pour protéger la tortue caouanne et la tortue luth.

La présente étude exploratoire a été élaborée pour créer une base de connaissances qui servira de fondement pour la mise en œuvre par OSPAR de l'action collective visant à développer « les mesures pertinentes de prévention et de réduction de l'impact, sur les tortues, de l'enchevêtrement dans les, et l'ingestion des, déchets marins, il s'agit en particulier des sacs en plastique, de la pollution et des collisions ». Cette action collective a été convenue dans la Recommandation OSPAR pour la protection de la tortue caouanne (Recommandation OSPAR 2013/07) et de la tortue luth (Recommandation OSPAR 2013/06). L'élaboration de cette étude constitue la première étape pour faire avancer les travaux dans le cadre de la Feuille de route pour la mise en œuvre d'actions collectives dans le cadre des recommandations pour la protection et conservation des espèces et habitats figurant sur la Liste OSPAR.

Introduction

The Loggerhead turtle (*Caretta caretta*) and the Leatherback turtle (*Dermochelys coriacea*) are listed in the OSPAR List of threatened and/or declining species. *D. coriacea* occurs in all OSPAR Regions, while *C. caretta* mainly occurs in OSPAR Region IV and V (OSPAR, 2009a, 2015).

A Recommendation has been agreed for both species, to strengthen their protection, to improve their status and to ensure that the populations are effectively conserved in the designated Regions of the OSPAR maritime area (OSPAR, 2013a, 2013b). One of the collective actions recommended is “develop and/or refine relevant measures and strategies for preventing and reducing impacts on turtles entanglement and ingestion of marine litter (plastic bags especially), pollution, collision and bycatch”.

In order to help the implementation of this action, the following report presents the compilation of the available information on anthropogenic pressures impacting sea turtles and monitoring/conservation measures implemented for sea turtles in the OSPAR area, followed by the identification of possibilities for further coordination and sharing experiences and initiatives for the conservation of the 2 species.

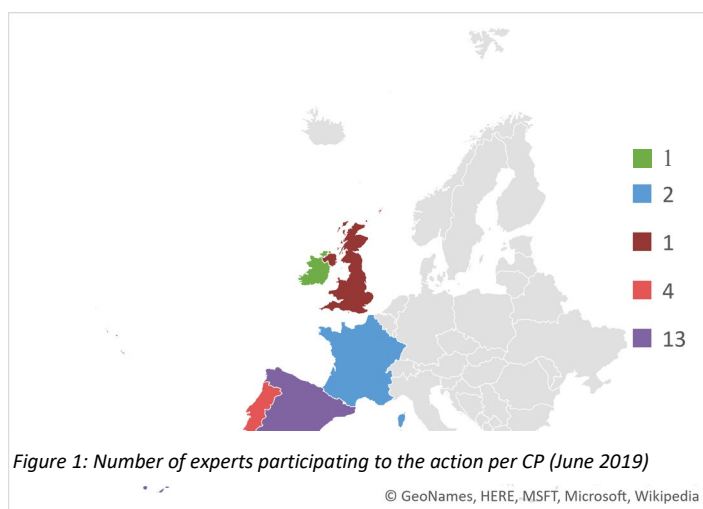
The main difficulty in the field of sea-turtles conservation in the North-East Atlantic (passing and foraging areas only, absence of reproduction sites) is the lack of information of the population size and their distribution range which is generally extrapolated from the number of turtles that are reported stranded or bycaught.

Methods

An overview of existing measures in the OSPAR area was established thanks to a questionnaire that has been circulated to 31 sea turtle experts covering several specialities, who were nominated by participating Contracting Parties.

The questionnaire was built in two main parts: i) current context (which examines impacts and existing mitigation measures) then ii) proposals for further measures (see Appendix 1: Questionnaire sent to identified experts on May 28, 2019).

In the first part, experts were asked to assess the level of impact of the five main pressures identified as the main threats to sea turtles conservation, i.e. bycatch, litter (entanglement), litter (ingestion), collision



and contaminants. Experts were then asked to specify which types of measures are implemented at their national and local scale, classified in 5 categories: awareness raising for general public, awareness raising for professional, MPAs designation, legislation and legal protection, fishing gear adaptations, completed by good practices and rescue.

Of the 31 invitations to participate in the survey, 21 responses were received (see Figure 1 and Appendix 2: List of experts who answered the survey). Belgium, Netherlands and Germany declined the solicitation because of the limited data they have on marine turtles in their waters.

Compared to the distribution of the two sea turtle species, Regions III, IV, V and part of Region II are covered by the participating experts, but not Region I.

Overview of identified impacts

The main threats to the Loggerhead turtle (*Caretta caretta*) and the Leatherback turtle (*Dermochelys coriacea*) identified in the OSPAR maritime area come from bycatch and interactions with debris, considered as the most important anthropogenic mortality factors (Angel et al., 2014; Báez et al., 2006; Barreiros and Barcelos, 2001; Carr, 1987; Claro et al., 2016; Claro and Hubert, 2011; Duguy et al., 1998; Gilman and Huang, 2017; Nicolau et al., 2016b, 2016a; OSPAR, 2015, 2010, 2009b, 2009a; OSPAR Commission, 2008; Pierpoint, 2000).

Through the questionnaire, experts were asked to assess the intensity of impact for each identified pressure. The Figure 2 shows the results of the assessment from the most impacting to the least impacting.

Bycatch has been identified as the most impacting pressure, especially in Spain and Portugal where it has been assessed as very impacting by 11 experts, and moderately impacting by 7 experts in France, Portugal, Spain, and United Kingdom.

Litter is also classified as an important pressure, with both entanglement and ingestion described as “very impacting” or “moderately impacting” by 65% of the experts.

Impacts from collisions and from contaminants are either noted as “little impact” or “impact unknown”/“don’t know”. This could indicate a lack of knowledge on these issues, despite the growing interest for those.

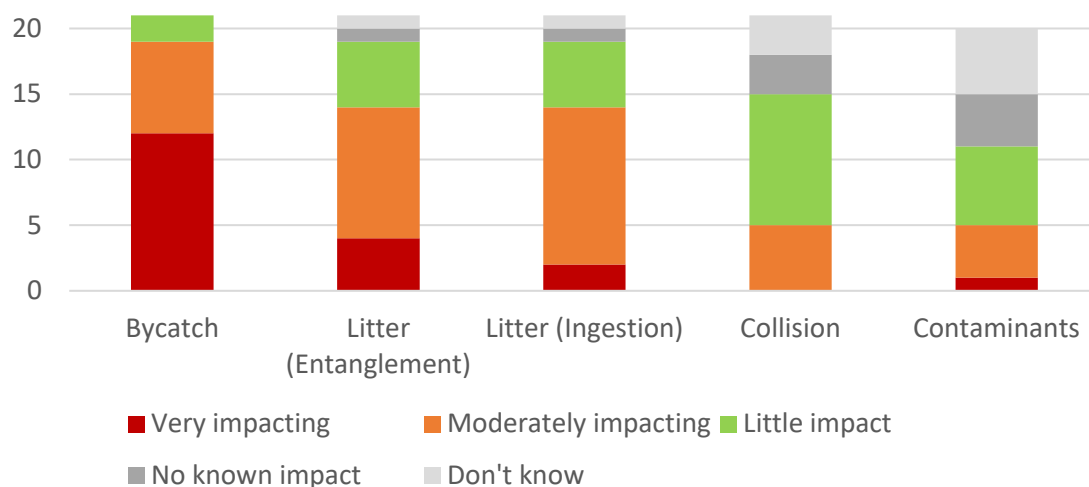


Figure 2: Assessment of the level of impact of anthropogenic pressures on sea turtles according to the present survey

Implemented measures at the national scale

This part presents a summary of the already implemented measures by Contracting Parties in the OSPAR area. Most reported measures are implemented in several CPs, either locally or nationally. The Figure 3 shows how these measures have been classified, with a distinction between local and national ones.

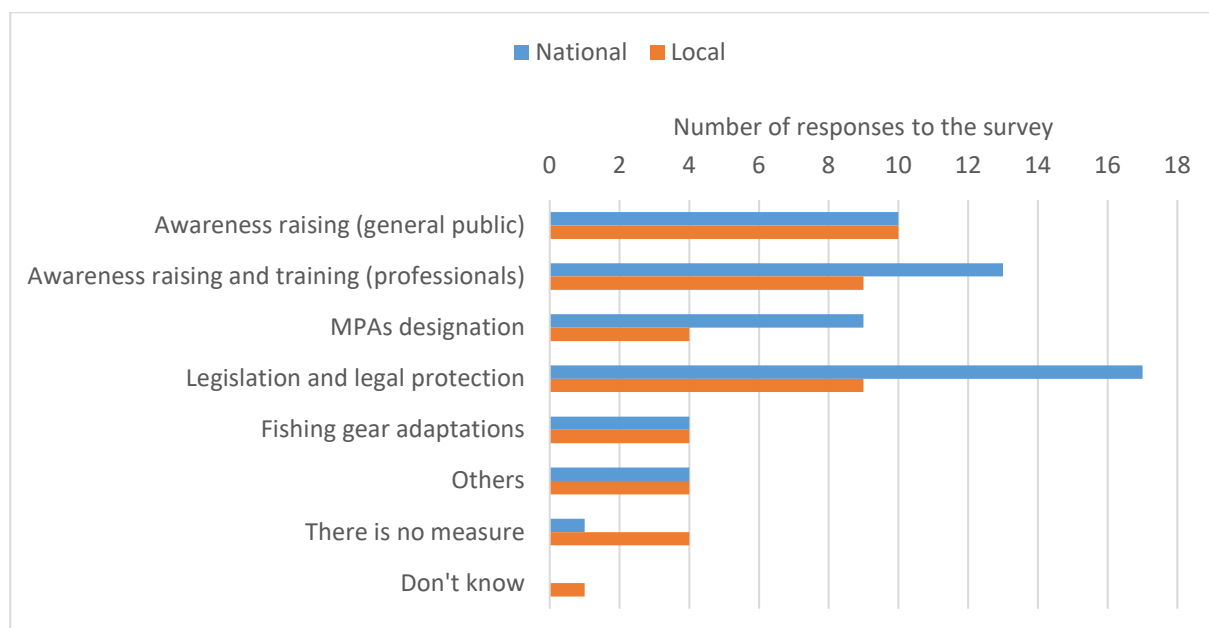


Figure 3: Number of responses in each category for national or local measures implemented by CP in OSPAR area for the conservation of sea turtles according to the present survey

Experts were asked if the effectiveness of the different implemented measures in their waters had been assessed. The majority of respondents answered 'no' or that the study was underway (Figure 4) since this kind of assessment requires an important amount of data for several years to have accurate estimations of turtles' abundance, survival rates and temporal or status trends.

Detailed comments were only provided for bycatch mitigation measures (see II.1).

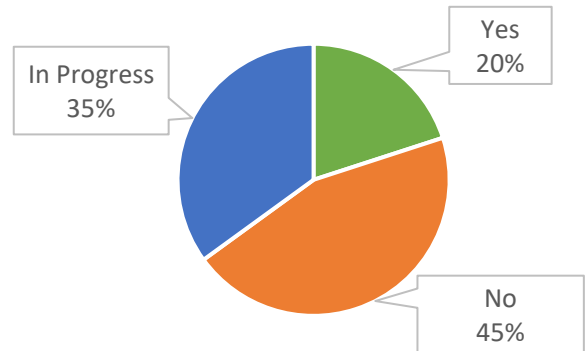


Figure 4: Proportion of responses to the question "has the effectiveness of these measures been assessed?" (June 2019)

Impacts and targeted measures

This part presents a synthesis of available information on anthropogenic pressures impacting sea turtles and specific initiatives or measures implemented either by Contracting Parties in the OSPAR area or by other fora. For each type of pressures and impact, possibilities for further coordinated actions to improve the conservation of the 2 species are proposed. Cross-cutting measures and initiatives that aim to prevent or reduce the impact of several pressures are detailed in the next part.

Bycatch

Bycatch, the unintended capture of non-target species by fishery, is a major anthropogenic threat facing marine ecosystems at a global scale (Gray and Diaz, 2017). If the species caught as "bycatch" are endangered and/or protected, like in the case of sea turtles, even low overall levels of bycatch may be of concern (Gray and Diaz, 2017). Angel *et al.* (2014) assessed that Loggerhead and Leatherback turtles potentially encounter the most longline fishing effort (~300 million and >650 million hooks/a, respectively) in the ICCAT area

(International Commission for the Conservation of Atlantic Tunas). Between 1990 and 2008, Wallace *et al.* (2010) estimated that around 85 000 sea turtles were caught worldwide by gillnet, longline and trawl fisheries, although this likely underestimates the true total by at least two orders of magnitude (Fossette *et al.*, 2014). According to the experts and the literature, sea turtles are susceptible to incidental capture in a wide range of fisheries and fishing gears in the OSPAR area like in Mediterranean, including: lobster/crab pots and creel ; fish traps' ropes; drift, gill and trammel net; bottom trawling; longline (especially surface and drifting longline); Almadraba nets (a southern Spanish traditional form of tuna fishing with a netting fence ; and Drifting Fish Aggregating Device (dFAD) (Báez *et al.*, 2019, 2006; Blasi *et al.*, 2016; Caddell, 2010; Camiñas *et al.*, 2006; Claro *et al.*, 2016; Domènech *et al.*, 2015; Fahlman *et al.*, 2017; Gilman and Huang, 2017; Martin and Crawford, 2015; Pierpoint, 2000). In the latter case of FADs, rudimentary and illegal Fish Aggregating Devices (FADs), made up of plastic bottles and buoys tied to plastic lines and netting contribute to bycatch.

Another serious impact is induced by wrong post-bycatch interventions that can lead to post-release mortality of turtles (Fahlman *et al.*, 2017), especially comatose turtles which were identified as dead whereas proper reanimation practices could have saved them (Claro *et al.*, 2016). Research in the decompression sickness of turtles indicates that many living (and apparently healthy) turtles bycaught and released from the fishing boats to the sea are dying in the next hours (García-Párraga *et al.*, 2014). Finally, some stranded loggerheads with excised front flippers are observed, likely having been injured and removed from fishing gear after bycatch (MacLeod, *pers. comm.*, 2019).

A Working Group on Bycatch of Protected Species (WGBYC) within ICES (International Council for the Exploration of the Sea) collates since 2007 information on bycatch monitoring for protected species, including mammals, birds, turtles, and rare fish. WGBYC has a technical focus on improvements to monitoring and mitigation methodology: it reviews EU Member States' actions under Regulation 812/2004 (which lays down obligations for Member States on bycatch monitoring of cetaceans and bycatch mitigation) and provides advice to ICES Advisory committee detailing to what extent the obligations of 812/2004 are being met and on how the monitoring of protected species bycatch can be improved. The WG also looks at relevant bycatch mitigation measures and helps coordinate relevant experimental work. According to the 2019 report, very little data on sea turtle bycatch are reported in North-East Atlantic (ICES, 2019).

In 2019, the European Parliament adopted the Regulation 2019/1241 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures. This Regulation lays down technical measures that shall in particular contribute to ensure that incidental catches of sensitive marine species, including those listed under Directives 92/43/EEC and 2009/147/EC, that are a result of fishing, are minimised and where possible eliminated so that they do not represent a threat to the conservation status of these species. Common technical measures that are set out include provisions on prohibited fishing gear and methods; general restrictions on gear and conditions for their use; protection of sensitive species and their habitats; catches of marine mammals, seabirds and marine reptiles; protection of vulnerable marine ecosystems; minimum conservation reference sizes; measures to reduce discarding.

For tuna fisheries, several recommendations and resolutions have been adopted by ICCAT for sea turtles: collection and declaration of bycatch data (species, gears); avoid encircling, release turtles; tools on board of

longliners for handling, liberate and release turtles; training (Coelho et al., 2013; ICCAT, 2011, 2010a, 2010b, 2005).

Awareness raising and training (professionals)

Several countries in the OSPAR area have put in place awareness raising and training measures with fishermen since they are the main stakeholders offshore and encounter sea turtles year-round. These initiatives can aim to collect data on turtle observation and/or to train fishermen for a more effective rescue (reanimation) and release of bycaught individuals in order to increase their survival chances.

Professionals training on procedures for on-board handling, hook-removal and release techniques of captured animals can help reducing post-release mortality (Claro et al., 2016; Parga, 2012).

Every CP surveyed reported standardized protocols in case of turtle sightings or bycaught animals. Ireland and United Kingdom cooperated to develop a guide of good practice, the “Marine Turtle Code” which provides advices for sea users on how to deal with marine turtle encounters. It is endorsed by several organisations and circulated to fishing ports (<https://www.mcsuk.org/downloads/wildlife/turtlecode.pdf>). In France, guidelines have been edited, in coordination with the national fisheries committee and the Fisheries Department of the Ministry of Agriculture and Food, to the attention of Atlantic fishermen and present the best practices in case of bycatch of sea turtles, in order to increase their chances of survival (<http://gtmf.mnhn.fr/wp-content/uploads/sites/13/2016/05/fiches-24032014-HD.pdf>) (Figure 5).

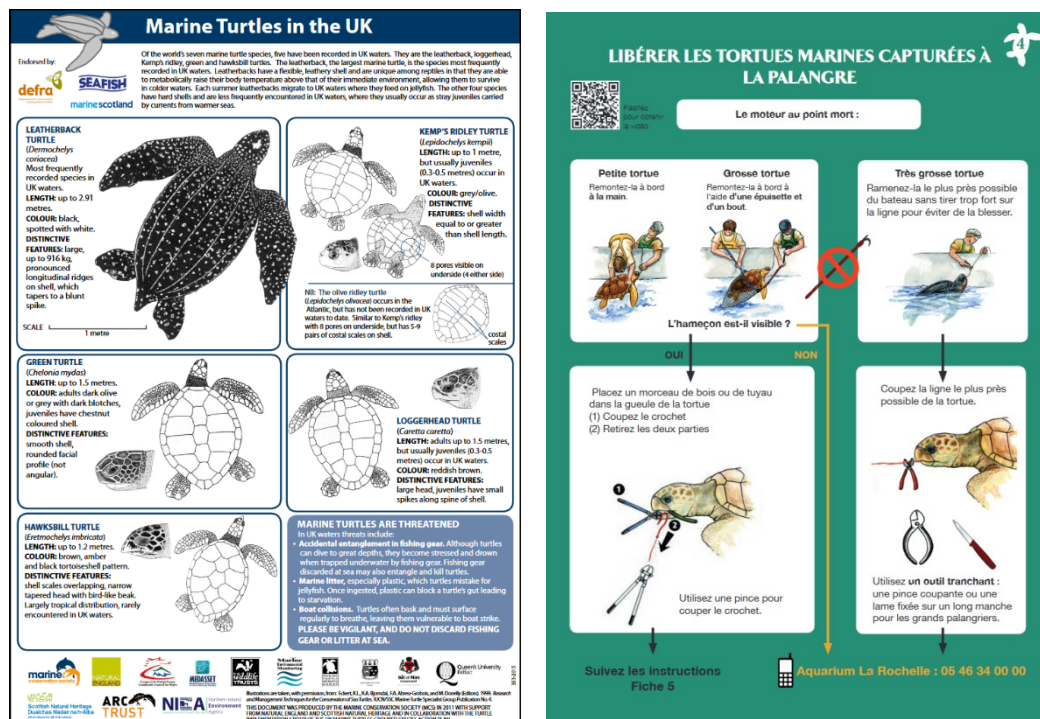


Figure 5: Extract of the guidelines of best practices in case of sea turtle bycatch, in UK (left) and in France (right)

In Spain and Portugal, training courses on how to handle captured turtles or on bycatch reduction techniques are regularly organized. In Spain, capacity development workshops are organized for institutions, fishermen, researchers, recovery centres, mariners, yachtsmen and recreational fishermen. Local public services like the police or beach services are involved too. These collective actions take place at different scales, it can be very local or with the support of regional governments. For example, Fundación Lonxanet¹ offers training sessions aiming to manage vulnerable and protected species, including sea turtles, as well as the Universitat Politècnica de València (through a day dedicated to the environment: “Hablemos del medio ambiente: la gestión en la industria”). Training for the management and release of longlines and nets is also provided.

Experts also raise the need of increased number of fisheries observers, so that every bycaught turtle is counted and reported, especially in artisanal coastal fisheries and in surface longline targeting swordfish and tuna species. Moreover, trained observers could increase chances of survival of bycaught individuals, by helping fishermen to release the animal. The deployment of observers in some artisanal fleets is difficult due to the limited size of the vessels. In this case, close collaboration with artisanal fishermen through interviews

¹ Fundación Lonxanet, para la pesca sostenible (“for sustainable fishing”). See more at <http://www.fundacionlonxanet.org>

to report bycatch rates and training to enable them to bring the bycaught animals to rehabilitation centres should be encouraged

Possible further coordinated actions recommended by experts:

- Develop an international network for sighting data collection (wild and bycaught individuals) with standardized protocols, notably for the monitoring of Descriptor 1 (Biodiversity) of the MSFD
- Increase awareness raising efforts for fishermen to increase chances of sea turtle survival, by providing training (and refresher training) on how to liberate, handle, reanimate bycaught turtles and bring injured animals to rehabilitation centres if required
- Share guidelines for fishermen designed by each CP and design complementary medias in the whole OSPAR area
- Provide fishermen with equipment to handle the captured animals correctly (depending on the type of fishing gear and target species) and cooperate with relevant competent organisations to make this equipment mandatory on board.
- Promote adaptation or withdrawal of Fish Aggregating Devices
- Encourage the deployment of observers aboard fishing vessels, particularly the surface longline fleet targeting tuna and swordfish, and encourage collaboration with artisanal fishermen to report bycatch through interviews.
- Encourage knowledge acquisition on interaction of turtles with leisure fisheries.
- Facilitate the participation of OSPAR experts in the Subcommittee on ecosystems of ICCAT for the analysis of bycatch and mitigation measures of non-target species as marine turtles (Coelho et al., 2013).

Fishing gear adaptations

Due to the observed impact of fisheries to these species, fishing gear adaptations have been tested to try to avoid or decrease sea turtles bycatch, such as circle hooks, modification of bait, of fishing depth and of soak-time (Gilman et al., 2006; Gilman and Huang, 2017; Watson et al., 2005).

However, gear or fishing adaptations might not be effective for all fisheries because numerous parameters can affect the effectiveness of such adaptations such as the size/stage and species of turtles, their abundance at fishing grounds, the location of fishing grounds, and the size and species of targeted fish. It may be necessary to conduct trials over several seasons and according to the specificity of the fleet, to assess the effectiveness and commercial viability.

Spain already promoted the setting of deeper longlines (Báez *et al.*, 2006) and is also implementing change of baits and hooks for surface longlining. Spain is also currently testing lightsticks in gillnets (Mangel *et al.*, 2018; Martin and Crawford, 2015). Along the Pacific coast, in Mexico, Wang *et al.* (2010) tested nets

illuminated by chemical lightsticks. This method significantly reduced mean green turtle catch rates by 60% while having no significant impact on targeted catch and catch value. Longlines cutlines have also been used successfully (Alnitak, *pers. comm.*, 2019) for releasing and increasing the chances of survival of sea turtles.

Experts from Spain and Portugal indicate that **spatial and temporal closures of fisheries** could also be used as management tools, and are already regionally implemented by the surface longline fleets and some bottom trawl fleets in Spain. They could be implemented to a larger scale, along with other technical gear adaptations and could produce great effect in the bycatch ratio (Báez *et al.*, 2019 – see II.1.3.1.2).

Another proposal from Spain is to make nets more visible to the turtles through **LEDs** placed on floatlines that could reduce the capture in small-scale bottom-set gillnet fishery (Ortiz *et al.*, 2016).

Turtle Excluder Device (TED) is a device fitted to a net or a modification that allows turtles to escape immediately after capture in the net. TEDs were originally designed to exclude the capture of turtles or other large animals in shrimp nets. The positive impact of adoption of the TED in critical areas and seasons has already been confirmed Lucchetti *et al.* (2016). In tropical waters, they are 97 percent effective at excluding turtles (Eayrs, 2007). TEDs are mandatory for use in European Union (EU) waters of the West Atlantic and Indian Ocean for the capture by trawl of tropical shrimp² since June 20th 2019. The next step could be getting TEDs applied to tropical shrimp trawl fisheries outside EU waters for fisheries that export to the EU.

Despite the fact that the Spanish experts pointed the difficulty to assess the effectiveness of fishing gear adaptations, some conclusions were drawn as some observations and monitoring on the field arise (Marco, *pers. comm.*, 2019):

- Monitoring by observers (IEO) indicate a significant reduction of turtle mortality by surface longlines bycatch;
- Recent data on bycatch by trawling and small-scale fisheries and research in the decompression sickness of turtles indicate that many living (and apparently healthy) turtles bycaught and then released from the fishing boats to the sea are dying in the next hours (García-Párraga *et al.*, 2014);

² Regulation (EU) 2019/... of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures

- The positive effect of TEDs is difficult to demonstrate to fishermen due to the need to be experimented to use this kind of device in an effective and optimized way.

Possible further coordinated actions recommended by experts:

- Define key common studies/monitoring (rate of survival after release, decompression sickness etc.) which should be implemented for improving the understanding of circumstances and deleterious effects of bycatch in high-risk métiers to help understand where mitigation is required and how
- Define tests and common methods for studying fishing gear modifications (flexible TED, nets illumination with LED...) and fisheries strategies
- Cooperate with relevant competent organisations to promote fishing gear adaptations and modification of fishing strategies that have been proven effective (for example, promote the use of TEDs for imported products in EU, promote the use of TEDs in EU's waters where interactions between trawl fisheries and turtles have been reported, promote the implementation of circle hooks and the test of different baits, promote the change of depth for longlining, etc.)
- Increase surveillance for bycatch in illegal pelagic driftnets

Marine litter (ingestion and entanglement)

Macro debris represent an important pressure for sea turtles which may be impacted through ingestion or entanglement (Duncan *et al.*, 2017; Kühn *et al.*, 2015; Nelms *et al.*, 2016; Werner *et al.*, 2016). The impact may be severe in case of ingestion of large items or quantities, cause intestinal or gastric occlusions or perforation that can lead to death. In case of entanglement, turtles may suffer severe injuries or even die by drowning, when they are no more able to move.

Two types of macro-debris are of particular threat for sea turtles: plastic debris (see OSPAR Commission, 2015 for definition) which is mainly ingested and ghost nets (fishing nets that have been abandoned, lost, or discarded; or ALDFG at sea by fishermen) which often entangle turtles (Duncan *et al.*, 2017).

At the global scale, ghost nets have been estimated to account for 640,000 tons of gear lost, or 10% of the total weight of marine debris floating in our oceans (Macfadyen *et al.*, 2009). Given that survey effort for ALDFG is often poor or sporadic in many areas around the world, this 10% is therefore likely to be a gross underestimate of the true amount. In Mediterranean waters, Consoli *et al.* (2019) calculated that 77.9% of the total litter item were derelict fishing gear in a new marine protected area.

Ghost nets are highlighted in Stelfox *et al.* (2016) as being one of the major types of ALDFG affecting sea turtles especially juveniles. Leatherback turtles probably have a higher risk of encountering floating ALDFG, as they inhabit the open ocean for more of their life cycle compared to Loggerhead (Stelfox *et al.*, 2016).

In OSPAR area, entanglement has been reported in Loggerhead and Leatherback turtles in UK, France and Macaronesia since 1998 (Barreiros and Raykov, 2014; Calabuig Miranda and Liria Loza, 2007; Alves, Liria-Loza, Santos & RTMAE CESTM, *pers. comm. In Claro et al.*, 2018; Claro and Hubert, 2011; Deaville *et al.*, 2014; Dellinger, 2007; Duguy *et al.*, 1998; Fariñas-Bermejo *et al.*, 2016; Nicolau *et al.*, 2016a). While Dellinger (2007) described the entanglement in ghost fishing gears as one of the mortality causes of juvenile Loggerheads in the Madeira Islands waters, in the Canary Islands, one of the most important debris causing turtle entanglement in the Canarian waters are the plastic mesh bags and shade cloth used in agriculture (raffia sacks) (Liria-Loza, *pers. comm. In Claro et al.*, 2018). Furthermore, the prevalence of entanglement in Loggerheads increased from 45.7% to 50, 8% between 1998 to 2014 (N = 945) (Calabuig Miranda and Liria Loza, 2007; Calabuig, 2012; Fariñas-Bermejo *et al.*, 2016; Orós *et al.*, 2016) in the Canary Islands. Despite it is not within the OSPAR area, it should be noted that severe effects of entanglement like amputation may affect the reproductive output of turtle rookeries by incapacitating the females to dig their nest (Sánchez-Sierra Campillo, 2017). This can have important implications for recruitment dynamics population that may be part of sea turtle important Regional Management Units included in OSPAR area (Vandeperre *et al.*, 2019).

In OSPAR area, the prevalence of ingestion of debris by sea turtles is lower than in Mediterranean and the ingested debris quantities are generally low (Darmon *et al.*, 2018) and rarely generate mortality.

However, the quantity of litter ingested by sentinel organisms has been found to reflect both the spatial and temporal trends in litter in the environment and the harm caused on wildlife and natural habitats (see for example Fossi *et al.*, 2018). Due to their biological characteristics (large distribution, use of different marine compartments) and their propensity to ingest debris, sea turtles are considered as a relevant indicator species for litter presence (Darmon *et al.*, 2018). Collecting data for the monitoring of litter ingestion in sea turtles will provide an important knowledge for reinforcing measures related to the conservation of sea turtles (OSPAR, 2013a, 2013b). However, it should be kept in mind, that most numerical estimations of the impacts of marine litter on turtles are based on post-mortem examination of dead individuals, which necessarily underestimated the total number of affected individuals. Furthermore, the monitoring of entanglement by debris, which prevalence is high in certain parts of OSPAR area as well as the identification of sources of the debris responsible for this interaction, needs further development.

To reduce marine plastic litter, the European Union has voted the banishment of single-use plastic products in 2021.

Awareness raising

The impact of the use of single use plastics, which represents a danger for sea turtles (*e.g.* Leatherback turtles can mistake plastic bags with its jellyfish prey), should be communicated to the general audience. Meanwhile, according to Spain, there is a need for programs to clean beaches, coasts, and sea from plastics, ghost nets, and other debris.

Indicator development

A European project was designed in 2017 in order to support the development of impact indicators of marine debris on biota: INDICIT (“Implementation of the indicator of marine litter on sea turtles and biota in Regional Sea Conventions and Marine Strategy Framework Directive Areas”) which overarching aim is to develop a set of standardized tools for monitoring the impacts of litter on marine fauna as bio-indicators in order to support the implementation of EU’s Marine Strategy Framework Directive (MSFD) and other international environmental policies aiming at protecting the marine environment, especially the Barcelona and the OSPAR Regional Sea Conventions. This project, which is starting its second phase, is ensured by a consortium composed of biologists from 8 countries (France, Greece, Italy, Portugal, Spain, United Kingdom, Tunisia and Turkey) in interaction with experts from other international programs. The project developed and disseminated a standard protocol for data collection on ingestion, and training sessions have been organized to better use this harmonized procedure. More than 72 stakeholders, mostly rescue centres, stranding networks, research or veterinarian laboratories, are currently using the protocol in MSFD, OSPAR and Barcelona convention areas, when examining stranded or accidentally caught sea turtles and measuring the quantity and types of ingested litter (Darmon *et al.*, 2018). The INDICIT consortium also supported the preparation of the CEMP guidelines for the OSPAR candidate indicator “Litter ingestion by sea turtles”.

The development of an **indicator “Litter ingested by sea turtles”** was proposed by France and retained as a candidate indicator for measuring impact on biota by OSPAR in 2016 (OSPAR - EIHA 16/5/13, 2016). This indicator “Litter ingestion by sea turtles” was proposed based on the Loggerhead species *Caretta caretta* but could be applicable to the Leatherback species *Dermochelys coriacea*, that is more frequently observed in OSPAR Region III than the Loggerhead. The indicator is homologous and standardized for data collection with that adopted by EU in the framework of the “Litter” Descriptor (D10) of the MSFD (D10.2.1, now named D10C3). In the framework of the Coordinated Environmental Monitoring Programme (CEMP), guidelines for Monitoring and assessment of marine litter ingested by sea turtles have been prepared by France. The candidate indicator “Litter ingested by sea turtles” was promoted to a common indicator for Region IV and France committed to produce an indicator assessment by 2021. Strategies for the determination of thresholds for litter ingestion by sea turtles have been discussed during a dedicated workshop organised by the TG ML in Berlin (May 2019) and two scenarios were presented at the annual meeting of this European group. The CEMP document on the sea turtles candidate indicator, presented at EIHA, will be finalised in 2020 to take into consideration additional information such as 1) the organisation of the database for ingested litter (in relation with Dali/Ifremer and ODIMS/OSPAR) and 2) the strategy to define the threshold values.

Regarding entanglement, while some stakeholders already collected data about entanglement, they were all proposed to use a preliminary standard protocol for monitoring this interaction in the perspective of tests by INDICIT European project consortium (Darmon *et al.*, 2018) in support to EU indicator of impact on biota D10C4 “entanglement and other effects”. In June 2019, a new protocol prepared by the experts of the MSFD Technical Group on Marine Litter (TGML) was submitted for inclusion in the revised European guidance, and is currently under validation.

Regarding the data banking, the European project CleanAtlantic is currently completing a database for marine debris data, which integrates the data for the common indicator D10C3 “ingestion of marine debris” and may integrate D10C4 data in the future.

Regional Action Plan

The OSPAR objective with regard to marine litter is “to substantially reduce marine litter in the OSPAR maritime area to levels where properties and quantities do not cause harm to the marine environment” by 2020. In order to achieve this objective, the North East Atlantic Environment Strategy also commits to “develop appropriate programmes and measures to reduce amounts of litter in the marine environment and to stop litter entering the marine environment, both from sea-based and land-based sources”. OSPAR 2014 agreed a **Regional Action Plan (RAP) for Marine Litter** for the period 2014-2021. It contains 55 collective and national actions which aim to address both land based and sea based sources, as well as education and outreach and removal actions (OSPAR Commission, 2015). The RAP actions concern in particular the reduction of single use plastic items, the improvement of port reception facilities, the reduction of waste from the fishing industry and abandoned and lost fishing gear, the redesign of harmful products and the removal of litter from the marine environment (fishing for litter).

The monitoring of sea turtle interactions (ingestion, entanglement) with debris by OSPAR CP, thanks to the CEMP, should provide in the future valuable data for assessing the effectiveness of the OSPAR RAP in terms of decrease of impact on marine biota.

Possible further coordinated actions recommended by experts:

- Develop standardized data collection protocols and improve monitoring to identify and understand the main sources of entanglement in the Eastern Atlantic and to develop adequate strategies and management plans;
- In the framework of the revision of the RAP-ML, support and develop programs and measures to reduce the quantity of litter reaching the marine environment such as:
 - beach and costal clean-ups, including the cleaning of (illegal) dumping sites located near the sea,
 - the passive retrieving of litter at sea (with operations such as fishing for litter) that could be developed or replicated to other users of the sea;
 - the prevention, localisation and retrieval of ghost nets;
 - the prevention and retrieval of litter in waste and rain water networks and along infrastructures (along railways, roads, rivers etc) before they reach the sea;
 - citizens and local authorities awareness raising to prevent on-land littering, improve waste collection and reduce the quantity of litter reaching the waste and rain water networks;
 - promote alternatives to geotextiles in urban or landscaping projects or promote their proper retrieval so that they do not fragment into microplastics in the environment;
 - promote objects and wraps that are reusable and recyclable to prevent the production of litter and reach a circular economy;
 - prevent the discharge of plastic items into the environment during festive or commemorative events (eg: ballons, ducks, etc)
- Support and improve stranding networks and recovery centres facilities and logistics means to ensure an adequate control and data collection of all impacted individuals, as well as the conservation of important individuals for the population dynamics.

Other pressures

Contaminants

It is known that sea turtles have an important capacity of bioaccumulation with a toxic threshold higher than that known for vertebrates according to the contaminant considered and the species (Cortés-Gómez *et al.*, 2017; Nicolau *et al.*, 2017), but little is known about the consequences of contaminants on their survival and/or fitness. One of the few documented impacts of contaminants on turtles concerns the Olive Ridley turtles' *arribadas* (synchronized, large-scale nesting of some species of sea turtle) where the majority of dead turtles found on the beach has higher cadmium levels than the survivors (Girondot, pers. comm., 2019).

Collisions

Collisions are often lethal for marine turtles and therefore, they count among the most significant impacts. However, it is difficult to count the number of collided sea turtles, which depends on the finding of carcasses, mostly from stranding. These strikes may occur with pleasure crafts or fishing vessels, most often because of the boat propellers which leave visible and recognizable traces on the animals. The main issue is to locate the area where collision take place, which could help managers to identify high risk areas and formulate measures such as controlling the speed of boats. More knowledge is needed about the factors which could be of importance for mitigating the risk of collision (noise, size, season...). Ongoing studies aim to predict mortality location for turtle likely to have stranded due to a vessel strike (Santos *et al.*, 2018a, 2018b).

Possible further coordinated actions recommended by experts:

- Develop a common indicator on turtles' contamination
- Improve stranding networks and recovery centres facilities and logistics means to ensure systematic collection and preservation of tissue samples in the perspective of contaminant analysis

Development of such studies in the North-East Atlantic would help the identification of high-risk areas.

Cross-cutting measures

Awareness raising (general public)

Campaigns for awareness raising among the general public has been reported by every CP surveyed. These campaigns can be related to sea turtles directly or indirectly, *i.e.* by raising awareness about plastic waste.

Those campaigns are sometimes completed by participatory/citizen science programs (*e.g.* "Devenez observateur de l'Atlantique" carried by Aquarium La Rochelle in France, which encourages people to record

sightings of sea turtles; or Alnitak association in Spain). In France, Spain and Portugal, several associations, care centres or aquariums promote education in schools and provide teachers with training tools. Care and rescue centres are the main stakeholders implementing animations, activities and events (*e.g.* when a healed turtle is released in the wild), spreading flyers and information, and sharing news on media and social networks.

Press reports are regularly broadcasted, and some aquariums propose guided tours to take the opportunity to raise public awareness about the issues faced by sea turtles. Spain also developed itinerant exhibitions

Possible further coordinated actions recommended by experts:

- Promote all awareness raising initiatives in the OSPAR area by publishing advertisement and deliverables on a dedicated page on the OSPAR website

with the same purpose.

Rescue and rehabilitation centres

In the OSPAR area, several rescue centres from France, Portugal and Spain care and rehabilitate injured or sick sea turtles in coordination with – or coordinate stranding networks in different provinces/regions (*e.g.* one rescue centre per island in Canaries). Improvement of rehabilitation centres is cited as a necessary and very effective measure for sea turtle conservation since they contribute to i) increase the number of alerts (stranding, bycatch thanks to awareness raising); ii) increase the chances of survival of individuals (rescue of bycaught or stranded sea turtles, training professional to guidelines for reanimation and releasing); iii) improving knowledge (collecting data on populations and interactions with anthropogenic pressures, releasing turtles with Argos or GPS tags for spatial monitoring etc.).

Creating a network of rescue centres and stranding networks using common protocols, sharing information, at a national level at least and even at a regional level ideally, is also highly recommended. Cure and rehabilitation constitute a curative measure of high priority in complement to preventive measures especially because they may save adult individuals which are essential for the population dynamics. Furthermore, these centres play a key role in the monitoring of anthropogenic pressures on sea turtles and awareness raising. Consequently, the CP experts underlined that the rescue centres should be financially supported and associated to all initiatives regarding indicator implementation or awareness campaign dissemination.

The reporting of the pathologies observed and the effectiveness of rescue centres (proportion of successfully rescued turtles per biological stage and anthropogenic pressure) by each CP is an important tool for managers in order to assess and/or orientate the management measures.

Possible further coordinated actions recommended by experts:

- Promote and support the development of an international coordinated stranding network and network of rehabilitation centres

MPAs

All types of Marine Protected Areas are susceptible to be visited by sea turtle during their migration or as foraging or development sites. Besides marine parks or reserves, and fisheries managed areas, EU Member states designated Natura 2000 sites for the implantation of the Habitats Directive.

While Loggerhead and Leatherback turtles appear on the list of species for which some MPAs were designated, no specific management measures ever focus on these species. This is mainly due to the low numbers of turtles present in the NE Atlantic area, so targeting mitigation measures is often not a priority.

As sea turtles are migratory species, limited protected areas may not constitute an effective protective measure on their own, but building a network of protected zones by which sea turtles may migrate could be of interest. A coherent and sufficient network of MPAs linked to each other by corridors could help the conservation of these species, like the MPA network designed in the framework of Intemaes in Spain.

In Spain, some key areas (for both loggerhead and leatherback turtles but also for green turtle) that are different from corridors have been identified within the Atlantic waters. This is the case, for instance, of the Gulf of Cadiz (OSPAR Region IV) in which there must be an important interaction of sea turtles with fisheries (according to the stranding network). In these areas (some of them currently protected as SCI or SAC under the Habitat Directive) effective measures aimed at addressing threats related to fisheries or leisure activities are necessary. Canary Islands are currently defining such measures.

Possible further coordinated actions recommended by experts:

- Build a MPAs network in OSPAR area
- Promote the adoption of conservation measures targeting sea turtles in MPAs
- Identify functionality as sea turtle habitats and connectivity
- Develop aerial counting campaigns as long as tagging campaigns to improve the knowledge of sea turtles' populations distribution and migratory paths

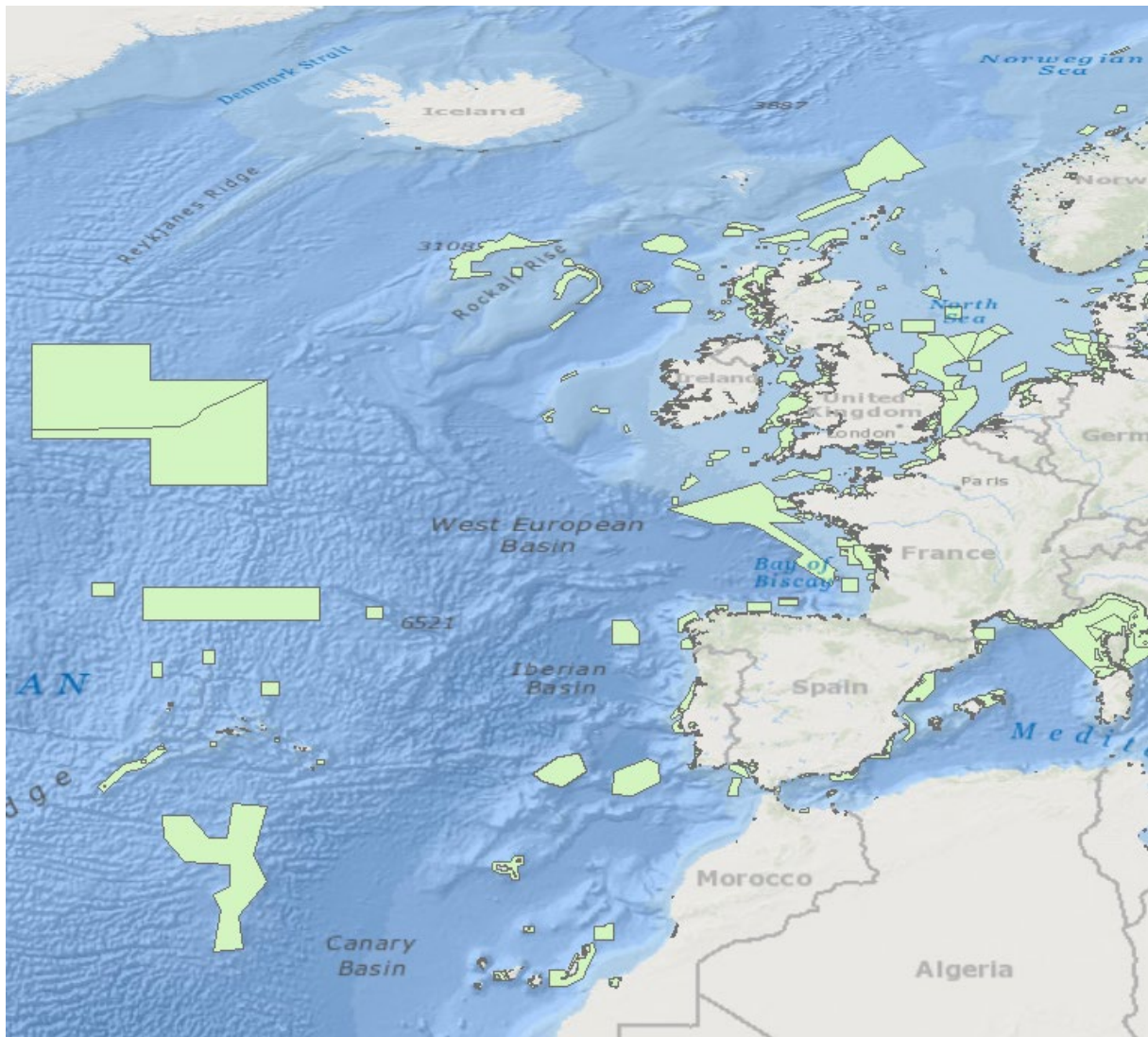


Figure 6: MPAs in the OSPAR area after <https://www.protectedplanet.net/marine> (updated by © UNEP-WCMC and IUCN, 2019)

Legislation and legal protection

Besides the Habitat Directive and the Marine Strategy Framework Directive implemented by all EU Member States, some Contracting Parties have put national regulation into force to protect sea turtles: France, Portugal and Spain have national decrees for the protection of sea turtles (Respectively the Ministerial Order of October 14, 2005 (FR); the decree-laws 140/99 and 49/2005 (POR); Royal Decree 139/2011 of February 4, 2011 and law 42/2007 on Natural Heritage and Biodiversity (SP)).

In Spain, regional governments can play a part in species protection as well; each regional Government relevant for sea turtles protection has passed legislation on it. These decrees allow to deliver special authorizations, generally restricted to interventions based on a scientific program.

In the United Kingdom, both species are listed in the “Schedule 4 - Animals the Sale etc. of Which is Restricted” from the Wildlife & Countryside Act (1981) and the Conservation of Offshore Habitats and Species Reg. 2017 (national law transposition of the Habitats and Wild Birds Directives).

The actual level of protection prescribed by laws seems sufficient, but governance plans and field capacities to ensure law enforcement were cited as needed by several experts.

Possible further coordinated actions recommended by experts:

- Cooperate with relevant competent organisations to develop management plans appropriate to sea turtle's conservation and to improve field capacities to ensure law enforcement

What else could be undertaken in the future

Improvement of knowledge	Stranding networks and care centres	Action towards professional fishermen	Habitat protection	Reducing pollution	Public education & awareness raising	Regulations
<ul style="list-style-type: none"> Identify the main sources of entanglement/mortality Improve knowledge on sea turtle life cycle: seasonal aggregations, decisive conditions (e.g. sea water temperature); especially in areas of intensive fisheries Monitoring of ghost gears/nets Improving understanding of bycatch through better monitoring of high risk metiers 	<ul style="list-style-type: none"> Develop close collaboration with fishermen Provide training for fishermen on how to handle and bring bycaught turtles to rehabilitation centers Improve facilities and logistics means for networks and care centres, to ensure an adequate control and data collection 	<ul style="list-style-type: none"> Develop tests for fishing gear modifications (reducing bycatch using flexible TED, nets illumination...) and strategies Surveillance for bycatch in illegal pelagic driftnets Increase awareness raising and training efforts for fishermen for increasing chances of sea turtle survival 	<ul style="list-style-type: none"> Extend existing protected areas List areas of special use by turtles and exclude fishing activity from those 	<ul style="list-style-type: none"> Reduce the use of some types of plastic (especially single use) Identify sources of debris entangling turtles Develop programs to clean beaches, coasts, and sea of plastics, ghost nets, etc. 	<ul style="list-style-type: none"> Continue and develop awareness campaigns and public education Develop targeted awareness campaigns for tourists and tourism boat operators 	<ul style="list-style-type: none"> Regulation of boat approachment Eradication of drift nets Restricting single use of plastics. Spatial and temporal closures of fisheries Replacement of ropes by pots devices Make mandatory deeper longlining

Figure 7: Proposed measures to prevent and mitigate anthropogenic impacts on sea turtles – according to sea turtle OSPAR experts interviewed in June 2019.

Management of mobile species like sea turtles requires regional management and cooperation among contracting parties.

In order to prevent anthropogenic impacts, **knowledge acquisition plans** are required. Experts recommend notably reinforcement of conservation plans, and exclusion of fishing activity from areas of special use by turtles. This would require more knowledge about the dynamical and seasonal use of specific areas by sea turtles. This would also allow in-depth thinking for spatial or temporal (seasonal) fisheries closure if a specific area of concern is detected by modelling the overlap between fisheries and habitat use. Basic research is needed to identify the causes of mortality (and disease) and risk factors: seasonal aggregation, decisive conditions (for example sea water temperature, *i.e.* during cold months sea turtles seem to be more prone to be caught by trawlers maybe because they breathe less frequently and spend more time at the bottom floor). It could lead to a different management system, like dynamic marine protected areas/dynamic spatial management of fisheries (areas that can be closed for fisheries, or where fishermen are contacted in order to reduce bycatch).

Experts also recommend the setup of **meetings and technical workshops** between European scientists, stakeholders and fisheries representatives about:

- **Bycatch monitoring:** in order to identify bycatch hotspots and assess mitigation measures. Attendees could work on the feasibility of establishing spatial and temporal closure of fisheries in the OSPAR area and on the regulation of use of potentially impacting fishing gears (surface longlines, trawlers, trammel nets, fishing trap, etc.), focusing on main risk factors (depth, hooks, baits, temperature of water).
- **Rehabilitation of animals:** work on common protocols for training sessions for fishermen.
- Share stranding data collection to have better regional knowledge on historic and evolution of sea turtles' stranding in OSPAR area;
- Share common protocol and data collection about population genetic structure.

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Appendices

Appendix 1: Questionnaire sent to identified experts on May 28, 2019

Context

1. In which country do you work? *
2. Do you work at a national or local scale (specify)?
3. What is your field of expertise in sea turtles? *
 - ☐ Research
 - ☐ Marine environment management (excluding MPA)
 - ☐ Marine Protected Areas
 - ☐ Field officer
 - ☐ Policy
 - ☐ Other

4. Which anthropogenic pressures are impacting sea turtles in your area of interest?

	Very impacting	Moderately impacting	Little impact	No known impact
Bycatch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Litter (Entanglement)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Litter (Ingestion)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collision	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contaminants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bad status of benthic habitats	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For bycatch, specify the type of fishing gears involved in it:

Other, specify:

5. Which management/mitigation measures are implemented at your national scale (specify)? *
 - ☐ Awareness raising (general public)
 - ☐ Awareness raising and training (professionals)
 - ☐ MPAs designation
 - ☐ Legislation and legal protection
 - ☐ Fishing gear adaptations
 - ☐ Others
6. Which management/mitigation measures are implemented at your local scale (specify)? *
 - ☐ Awareness raising (general public)

- ☐ Awareness raising and training (professionals)
- ☐ MPAs designation
- ☐ Legislation and legal protection
- ☐ Fishing gear adaptations
- ☐ Others

7. References: Can you provide any paper (peer-reviewed publications or grey literature) about mitigation measures implemented in your area of interest?

8. Do you have an idea of the cost of these measures' implementation? *

- ☐ Yes
- ☐ No

Give an order of magnitude and specify the currency:

9. Does the effectiveness of these measures have been assessed? *

- ☐ Yes
- ☐ No
- ☐ In progress

Details:

What we can do

10. Which complementary measures would you recommend for better mitigating the impact of anthropogenic activities on sea turtles in your area of interest/country?

11. Which other preventive conservation measures or curative measures would you like to be considered and implemented? E.g. care center, benthic habitats protection...

12. Are you involved in regional/international initiatives regarding the mitigation of impact that could concern sea turtles? *

- ☐ Yes
- ☐ No

13. Which measures could be promoted at the collective level in the OSPAR region?

14. Can you provide grey literature (syntheses, internal reports), or provide any scientific paper that could be of interest that you did not mention yet? *

- ☐ Yes, I will send you as soon as possible
- ☐ No, I have no idea/I can't

15. Any advice or additional useful reference:

Keep contact

Your complete name *

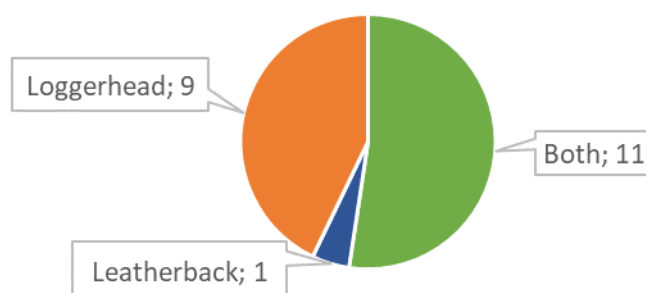
Your email address *

Your phone number (in case we need more information about your answers)

Organization *

Appendix 2: List of experts who answered the survey

Both Leatherback and Loggerhead turtles experts are represented: more than half (11) of experts work on both species, 1 is specialized on Leatherback turtle and 8 are specialized on Loggerhead turtle.



Proportion of experts by species (June 2019)

<i>CP</i>	<i>Name</i>	<i>Organization</i>
UK	Kelly McLeod	Joint Nature Conservation Committee (JNCC)
IRELAND	Ferdia Marnell	National Parks & Wildlife Service
FRANCE	Françoise Claro	Muséum National d'Histoire Naturelle
	Florence Dell'Amico	CESTM - Aquarium La Rochelle
SPAIN	Adolfo Marco	EBD-CSIC
	Alfredo López	CEMMA
	Alvaro García de los Rios y los Huertos	Centro de Estudio y Conservación de Animales Marinos (CECAM)
	Ana Liria	Universidad de Las Palmas de Gran Canaria (ULPGC)
	Carlos Carreras	Universitat de Barcelona
	Eduardo Belda	Universitat Politècnica de València
	Jesús Tomás	Universidad de Valencia (UVEG)
	Jose Carlos Baez	Instituto Español de Oceanografía (IEO)
	Jose Luis Crespo	Oceanogràfic de Valencia - Fundacion Oceanografic
	Juan Antonio Camiñas	Asociación Herpetológica Española (AHE)
	Luis Cardona	Universitat de Barcelona
	Mariluz Parga	SUBMON
	Ricardo Sagarminaga	ALNITAK - SAVE THE MED FOUNDATION
	Frederic Vandeperre	IMAR
PORTUGAL	Catarina Eira	(ECOMARE Rescue Centre) - Universidade de Aveiro
	Élio Vicente	Zoomarine Albufeira
	Thomas Dellinger	University of Madeira

Appendix 3: Implemented measures, responses per CP

Awareness raising (general public)

Campaigns for awareness raising among the general public take place in every country surveyed. These campaigns are related to sea turtles directly but also indirectly, by raising awareness about plastic waste.

CP	IMPLEMENTED MEASURES
FRANCE	<ul style="list-style-type: none"> - Awareness raising campaigns (including for litter and marine debris) - Citizen science - Scholar education - Care centres (animations...) - Creation of documents, activities... By studying/care centre for sea turtles of Aquarium La Rochelle
IRELAND	-
PORTUGAL	<ul style="list-style-type: none"> - Classes for teachers - Working with journalists - Publishing books - Guided tours
SPAIN	<ul style="list-style-type: none"> - Awareness campaigns by rescue centres - Awareness campaigns by researchers - Awareness campaigns by national and regional governments - Campaigns by NGO, Biodiversity Foundation; Ministry; Regional environmental administrations; National and Regional Fisheries bodies, etc. - Mass media and social networks - Citizen science activities - School projects - NGO projects - Itinerant exhibitions - Public awareness through local aquarium visitors (1.5 million visitors/year) as well as specific target collectives (school...)
UK	-

Awareness raising and training (professionals)

Close relations with fishermen are required to implement training courses and other efficient measures.

CP	IMPLEMENTED MEASURES
FRANCE	- Guidelines for Atlantic fishermen
IRELAND	- Turtle code developed (with UK) and circulated to fishing ports
PORTUGAL	- Classes and training opportunities
SPAIN	<ul style="list-style-type: none"> - There have been some training courses on how to handle captured turtles; also on bycatch reduction techniques. - Capacity development workshops for institutions, fishermen, researchers, recovery centres, mariners, yachtsmen and sport fishermen - Defining common protocols - Network assessment - Fishermen local communities - Local public services (police, beach services...) - Local campaigns to reduce bycatch, or at least to report bycatch and take bycaught animals to rescue centres - El Campus de Gandia de la Universitat Politècnica de València tiene el placer de invitarle a asistir a la Jornada 'Hablemos del medio ambiente : la gestión en la industria' [...] - Regional governments - Fundación Lonxanet offer training aiming to manage vulnerable and protected species - Several trainings have been conducted though for few fishermen - Standardization protocols - Awareness campaigns to fishermen - Training for the management and release of longlines and nets - Training course has been conducted by INDICIT projects in all the Canary Islands to standardize data collection on sea turtles
UK	- Turtle code developed (with Ireland) and circulated to fishing ports

MPAs designation

CP	IMPLEMENTED MEASURES
FRANCE	- Creation of Natural Marine Parks
IRELAND	-
PORTUGAL	-
SPAIN	<ul style="list-style-type: none"> - MPAs to protect marine biodiversity in general (not only focused on sea turtles) - Intermare Natura 2000 network completion - National Park of Cabrera extended 90000 hectares - Whale corridor SPAMI - In the last years, several MPAs have been declared - By authorities (Environmental ministry and regional governments) - Implementation of MPA (connectivity) and efficacy assessment - R.D.1629/2011, 14th of November, adopting a MPA/SAC in El Cachucho - The Loggerhead is one of the species used to designate MPAs. Nonetheless, most of the MPA lack of specific measures of protection
UK	-

Legislation and legal protection

CP	IMPLEMENTED MEASURES
FRANCE	- Arrêté ministériel du 14 octobre 2005
IRELAND	-
PORTUGAL	- Decreto-Lei 140/99, Decreto-Lei 49/2005
SPAIN	<ul style="list-style-type: none"> - Marine turtles are protected by national and regional law - By authorities (Environmental ministry and regional governments) - https://www.boe.es/eli/es/rd/2011/11/14/1629 - https://www.boe.es/buscar/pdf/2011/BOE-A-2011-3582-consolidado.pdf - Included in the national list of Threatened species and consequently legally protected - Inclusion of the national marine protected species with recommendations - Reconfiguration of shipping TSS under IMO, marine litter legal framework - Restricted authorizations - The level of protection in the laws is sufficient. A national strategy for the conservation of sea turtles is in progress - Transposition of European directives to statal legislation, implementation of strategies - Transposition of European directives to regional legislation - National legislation adapted to UE Directive
UK	<ul style="list-style-type: none"> - Wildlife & Countryside Act (1981) (Leatherback) - Habitats Directive - The Conservation of Offshore Habitats and Species Reg. 2017

Fishing gear adaptations

CP	IMPLEMENTED MEASURES
FRANCE	-
IRELAND	- Drifts nets are now banned
PORTUGAL	-
SPAIN	<ul style="list-style-type: none"> - Surface longlining change of bait and depth (by fishermen) - Lights in gillnets (trials) - For surface longline, fishermen are increasingly setting the lines deeper, significantly reducing turtle bycatch - Turtle Excluder Devices (only tests, not implemented) - Using modify hooks - Changing fishing strategy day/night approach - A ministerial order passed that includes some mitigation measures to reduce seabirds and sea turtles bycatch aimed to surface longliners (https://www.boe.es/buscar/doc.php?id=BOE-A-2014-4514) - Light sticks
UK	-

Others

CP	IMPLEMENTED MEASURES
FRANCE	- Rescue and rehabilitation centres
IRELAND	-
PORTUGAL	- Rehabilitation
SPAIN	<ul style="list-style-type: none"> - Recovery of injured turtles - Recovery Centers and/or Stranding networks are present in almost all Autonomous Communities in of Spain (One per island in Canaries) - Recovery of stranded turtles and turtles bycaught in longliners and bottom trawlers - Surveys and net vigilance
UK	



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**OSPAR's vision is of a clean, healthy and biologically diverse
North-East Atlantic used sustainably**

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