

OSPAR request on scientific knowledge on selected elasmobranch species to update the assessments for the OSPAR List of Threatened and/or Declining Species and Habitats

Advice summary

ICES provides information for ten single species and one species complex on whether each of the species continues to justify inclusion in the OSPAR List of Threatened and/or Declining Species and Habitats as compared to the previous assessment:

- For the white skate and angel shark, the available information is limited and thus it was not possible to ascertain an improvement in the status of the species, which are considered to be depleted. Therefore, both species continue to justify inclusion.
- Data were limited for the deep-water species gulper shark, leafscale gulper shark, and Portuguese dogfish. Target fisheries have stopped. However, until recent surveys provide information that the species status has improved, all three species continue to justify inclusion.
- For basking shark, there is no new information to determine the status of the species and thus it continues to justify inclusion.
- In the common skate complex the common blue skate appears to be slowly improving, but the flapper skate may be more vulnerable to overfishing. Given the revised taxonomy, it is recommended that both species be considered separately and, if accepted, listed separately. Therefore, the common skate complex and the two species individually continue to justify inclusion.
- For porbeagle and spurdog, there appears to be improvements in the population status, but this is as yet not fully quantified. Therefore, both species continue to justify inclusion.
- Thornback and spotted rays have increased in abundance in the areas where they previously had declined. Thus, it is considered that both species no longer justify inclusion on the criterion of decline.

Summarizing the human activities and pressures ICES notes that:

- a) the most relevant human activities that have an effect on the status of the species continue to be mortality from directed fisheries and bycatch mortality, including discarding;
- b) regarding changes in human activities and pressures that are threats to the species, fishing effort has decreased in the last ten years given the management measures adopted;
- c) regarding measures applied to human activities affecting the status of the species including fisheries, there are additional regulations and treaties in place compared to the previous assessment. These include EU catch and/or gear limits; bycatch mitigation measures; data collection requirements to improve species-specific data; the EU list of prohibited species; the EU Finning Regulation; regulation of international trade through CITES; and conservation through the Convention on Migratory Species (CMS).

Request

The main purpose in proposing the request to ICES is to generate a scientific knowledge basis that can be used by OSPAR as ICES information/advice, to enable OSPAR to prepare new status assessments for Angel shark (*Squatina squatina*), Common skate complex (Blue skate (*Dipturus flossada*)¹ and Flapper skate (*Dipturus intermedia*)²), Spotted ray (*Raja montagui*), Thornback ray (*Raja clavata*) and White skate (*Rostroraja alba*) as well as Basking shark (*Cetorhinus maximus*), Porbeagle (*Lamna nasus*) and Spurdog (*Squalus acanthias*). Three deep-water sharks gulper shark (*Centrophorus granulosus*), leafscale gulper shark (*Centrophorus squamosus*) and Portuguese dogfish (*Centroscymnus coelolepis*), were added to the request.

Deliverables should include, if possible, information about recent changes in species distribution, including seasonal aspects and habitat, changes in abundance or relative abundance, etc., based on best available knowledge and conform, as far as possible, with the data elements and format of the OSPAR Guidance on the Development of Status Assessments for the

¹ This species is now known as *Dipturus batis* and is referred to as such throughout the document.

² This species is now known as *Dipturus intermedius* and is referred to as such throughout the document.

OSPAR List of Threatened and/or Declining Species and Habitats. The advice should also address the following aspects: a) the most relevant human activities that have an effect on the status of the species; b) changes in human activities and pressures that are threats to the species; c) current measures with regard to human activities affecting the status of the species, including fisheries.

Elaboration on the advice

The advice contains the scientific knowledge needed according to the Guidance on the Development of Status Assessments for the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2019-05 – OSPAR, 2019a) for carrying out the OSPAR Status Assessments.

The advice on human activities and current management measures is based on information on international, EU, regional, and national legislation, as well as information from scientific literature. An overview of the current main management measures is presented in the Basis for the advice section and further details can be found in the report of the Workshop to review and update OSPAR status assessments for stocks of listed shark, skates and rays in support of OSPAR (WKSTATUS – ICES, 2020a).

In this section, the conclusions (Table 1) and an overview of threats and impacts and measures to address key pressures (Table 2) are presented per species or species complex.

Table 1 Summary of the information by species for OSPAR Status Assessments.

Species	Conclusions
<p>Angel shark <i>Squatina squatina</i></p>	<p>Angel shark is a prohibited species according to EU fishing regulations. This should reduce fishing mortality in commercial fisheries, depending on spatial overlap between fisheries and angel shark populations and discard survival, but fishing mortality is unquantified. Full species protection (to minimize potential mortality from recreational fisheries) does not apply across its OSPAR range.</p> <p>Angel sharks display limited mixing and may form discrete stocks. Whilst angel shark may occur in some designated marine protected areas (MPAs), the potential role of existing MPAs in affording protection to their populations has not been evaluated. There are ongoing efforts to better protect angel sharks in some remaining areas, including Wales (OSPAR Region III) and Canary Islands (outside the OSPAR Area).</p> <p>Angel shark was listed in Appendices I and II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) in 2017. Contracting parties to CMS “shall endeavour to provide immediate protection” for species in Appendix I. Angel shark is listed as Critically Endangered by the IUCN. Angel shark was listed on Schedule 5 the United Kingdom’s Wildlife and Countryside Act (WCA) in 2008, for which Section 9 of the Act makes it an offence to intentionally kill, injure, or take this species.</p> <p>Angel shark is still a rare species over its biogeographical range, including OSPAR regions II–III–IV. It is a very sensitive species that has declined severely in the OSPAR Area and adjacent waters (e.g. Mediterranean Sea). This decline occurred during the 20th century, with angel shark lost from large parts of the OSPAR Area from the 1960s to the 1990s. Their low productivity and limited movements means that any perceptible improvement in status would only occur over a decadal time-frame. This is still the case in the current assessment and, whilst there is no evidence of further deterioration, there is no sign of improving status.</p> <p>In conclusion, available information on angel shark continues to justify its inclusion in the OSPAR List.</p>

Species	Conclusions
<p>Basking shark <i>Cetorhinus maximus</i></p>	<p>There is no evidence to suggest that the current status of the basking shark has changed as compared to the previous assessment. Although management and conservation measures have been developed, the current population status is still unknown. Moreover, international coordination of measures is still needed.</p> <p>ICES (2019a, 2019b, 2019c) concludes that:</p> <ul style="list-style-type: none"> • When the precautionary approach is applied, there should be zero catches in each of the years 2020–2023. • The species may be found in all ICES areas, and thus the total allowable catch (TAC) area should correspond to the entire ICES area. • Proper quantification of bycatch and discarding both in weight and numbers of this species in the entire ICES area is required. • Where national legislation prohibits landing of bycaught basking sharks, measures should be put in place to ensure that incidental catches are recorded in weight and numbers, and carcasses or biological material are made available for research. <p>In conclusion, available information on basking shark continues to justify its inclusion in the OSPAR List.</p>
<p>Common skate complex <i>Dipturus batis</i></p>	<p>What was regarded as a single species (common skate <i>Dipturus batis</i>) over much of the 20th century has been shown to be a complex of two species (Iglésias <i>et al.</i>, 2010), which are now termed common blue skate <i>Dipturus batis</i>³ and flapper skate <i>D. intermedius</i>⁴ (Last <i>et al.</i>, 2016). Earlier data ascribed to <i>D. batis</i> refers to the species complex. The larger-bodied <i>D. intermedius</i> may be the more vulnerable to overfishing.</p> <p>The common skate complex is considered ‘Critically Endangered’ globally by the IUCN, with both species considered Critically Endangered in European waters. Whilst there have been positive signs in the stocks of both species in parts of OSPAR regions II–III, in terms of increasing catch rates, both species are still infrequent or absent from some former parts of their geographic range. Both species of the common skate complex are on the prohibited species list according to EU fishing regulations.</p> <p>Given the revised taxonomy, it is recommended that both species be considered separately and, if accepted, listed separately. Whilst there have been a number of scientific studies on these species since the OSPAR listing, especially in OSPAR Region III, further studies on stock delineation, habitat use, and discarding could inform future management options.</p> <p>In conclusion, available information on the common skate complex continues to justify its inclusion in the OSPAR List.</p>
<p>Gulper shark <i>Centrophorus granulosus</i></p>	<p>Fishing pressure, identified as the only threat to the gulper shark in the last OSPAR assessment, has declined. Several fisheries regulations in the Northeast Atlantic have been adopted within and beyond EU waters. However, abundance and biomass index estimates are lacking and the data derived from discard sampling are not adequate to estimate the quantities caught. Therefore, available data are insufficient to evaluate the current status of the population, but the species is known to exhibit life-history traits that make the recovery process slow.</p> <p>Among the possible bycatch mitigation measures for this species in deep-water fisheries, the development of gear-based technical measures for improving selectivity such as electromagnetic exclusion devices, acoustic or light-based deterrents should be considered. In addition, spatio-temporal management could also be considered to minimize bycatch (e.g. avoidance of some fishing grounds or times of the year where there is spatial overlap between the target species of the fisheries and deep-water shark species) (ICES, 2020b). However, the information available is not adequate to frame such measures at present.</p> <p>In conclusion, available information on gulper shark continues to justify its inclusion in the OSPAR List.</p>

³ In the request from OSPAR this species is referred to as *Dipturus flossada*.

⁴ In the request from OSPAR this species is referred to as *Dipturus intermedia*.

Species	Conclusions
<p>Leafscale gulper shark <i>Centrophorus squamosus</i></p>	<p>All the pressures identified in the last OSPAR assessment of the leafscale gulper shark have declined. Several fisheries regulations in the Northeast Atlantic have been adopted within and beyond EU waters. However, abundance and biomass index estimates are highly variable and uncertain, and the data derived from discard sampling are not adequate to provide robust estimates of the quantities caught (ICES, 2019d). Therefore, it is not possible to evaluate the current status of the species, but the species is known to exhibit life-history traits that make the recovery process slow.</p> <p>Among the possible bycatch mitigation measures for this species in deep-water fisheries, the development of gear-based technical measures for improving selectivity such as electromagnetic exclusion devices, acoustic or light-based deterrents should be considered. In addition, spatio-temporal management could be also be considered to minimize bycatch (e.g. avoidance of some fishing grounds or times of the year where there is spatial overlap between the target species of the fisheries and deep-water shark species) (ICES, 2020b). However, the information available is not adequate to frame such measures at present.</p> <p>In conclusion, available information on leafscale gulper shark continues to justify its inclusion in the OSPAR List.</p>
<p>Porbeagle <i>Lamna nasus</i></p>	<p>Porbeagle is a prohibited species according to EU fishing regulations. The moderate intrinsic population growth rate qualified the porbeagle to be on the OSPAR List in 2008, since this rate allows only a slow recovery from depletion. This sensitivity to overexploitation remains unchanged. ICES latest assessment in 2019 considers that the stock status is unknown.</p> <p>The decline in landings from 1950s to the early 2000s, assumed to relate to population size, qualified porbeagle for the OSPAR listing in 2008. However, this assessment did not evaluate changes in Scandinavian fishing effort over the time-series, especially from 1950 to 1970. Furthermore, recent dedicated surveys (2018–2019) and an exploratory assessment provide converging evidence of increase in the stock biomass since 2010. Hence, a benchmarked assessment is required to better evaluate current stock status.</p> <p>Nevertheless, the porbeagle in the OSPAR regions appears to be a species that is less threatened than estimated in 2008, because the fishing mortality has been reduced by the fishing limitations which have been implemented since 2010. Despite that, the lack of stock size estimate as well as its moderate intrinsic population growth rate implies that the continued inclusion of the species in the OSPAR List of Threatened and/or Declining Species and Habitats is justified.</p> <p>In conclusion, available information on porbeagle continues to justify its inclusion in the OSPAR List.</p>
<p>Portuguese dogfish <i>Centroscymnus coelolepis</i></p>	<p>All the pressures identified in the last assessment of the Portuguese dogfish have declined. Several fisheries regulations in the Northeast Atlantic have been adopted within and beyond EU waters. However, abundance and biomass index estimates are highly variable and uncertain, and the data derived from discard sampling is not adequate to provide robust estimates of the quantities caught (ICES, 2019e). Therefore, available data are insufficient to evaluate the current status of the species, which is known to exhibit life-history traits that make the recovery process slow.</p> <p>Among the possible bycatch mitigation measures for this species in deep-water fisheries, the development of gear-based technical measures for improving selectivity such as electromagnetic exclusion devices, acoustic or light-based deterrents should be considered. In addition, spatio-temporal management could be also be considered to minimize bycatch (e.g. avoidance of some fishing grounds or times of the year where the spatial overlap between the target species of the fisheries and deep-water shark species) (ICES, 2020b). However, the information available is not adequate to frame such measures at present.</p> <p>In conclusion, available information on Portuguese dogfish continues to justify its inclusion in the OSPAR List.</p>

Species	Conclusions
<p>Spotted ray <i>Raja montagui</i></p>	<p>The ICES stock-size indicators show an increasing trend in all OSPAR regions where the species is assessed, with OSPAR Region II showing a more pronounced increase as compared to other areas.</p> <p>Whilst the abundance in OSPAR Region II may still be low in Belgian waters, compared to historical data, spotted ray is more abundant further north. According to the increase in the stock size indicator in OSPAR Region II over the past decade, the species does not justify consideration as a declining species. The IUCN assessment for spotted ray is “Least Concern” (Nieto <i>et al.</i>, 2015). Whilst there have been improvements to our biological understanding, knowledge of their life-cycle and population structure is incomplete.</p> <p>The requirement for species-specific reporting of landings has improved the management of skates and rays. In the coming years attention should be given to the species-specific differences in susceptibility to fishing pressure, and a species-specific approach to management could be considered.</p> <p>In conclusion, available information on spotted ray does not continue to justify its inclusion in the OSPAR List.</p>
<p>Spurdog <i>Squalus acanthias</i></p>	<p>There are some signals that the status of the Northeast Atlantic population is improving, and the stock is estimated to be around 24% of the virgin biomass. Recruitment appears to have improved over the past ten years. Spurdog is a prohibited species in EU and Norwegian waters (with the exception of bycatch for approved avoidance programmes). The current IUCN listing for European waters is endangered (Nieto <i>et al.</i>, 2015).</p> <p>The stock has been scheduled for an ICES benchmark assessment in 2021. The current assessment model is considered suitable for the assessment; however, additional surveys need to be included for it to cover the entire spatial component of the stock. It is also necessary to investigate the quality of available discard data to include in the assessment and to explore updated information on growth parameters and estimates of natural mortality. The estimation of reference points (e.g. B_{lim}, F_{lim}) should be explored.</p> <p>Little progress has been made with designating marine protected areas for aggregations and nursery grounds. The research carried out in Loch Etive (Thorburn <i>et al.</i>, 2015; 2018), which showed a high level of site association for female spurdog, may inform future work.</p> <p>While there are indications that the stock is improving, the uncertainty of the status of the stock relative to B_{lim}, and the life history and behaviour of the species continue to justify its inclusion in the OSPAR List.</p>
<p>Thornback ray <i>Raja clavata</i></p>	<p>Based on ICES assessment, the biomass indices of thornback ray are increasing in OSPAR regions II and III, either stable (Subarea 8) or increasing (Division 9.a) in OSPAR Region IV, whilst catch rates around the Azores (OSPAR Region V) are stable at a low level.</p> <p>An analysis made by IFREMER in 2018 of the Texel–Faial criteria for this species led to the conclusion that the species no longer qualified for the criterion “Decline”. The current assessment confirms this conclusion. However, further understanding of the life-cycle and population structure as recommended by OSPAR is still required. Understanding how to increase avoidance, selectivity, and survival should be further researched and measures to address these issues should be developed.</p> <p>The requirement for species-specific reporting of landings has improved the management of skates and rays. In the coming years attention should be given to the species-specific differences in susceptibility to fishing pressure, and a species-specific approach to management could be considered.</p> <p>In conclusion, available information on thornback ray does not continue to justify its inclusion in the OSPAR List.</p>
<p>White skate <i>Rostroraja alba</i></p>	<p>The most recent ICES advice (ICES, 2019f) described the stock development over time as follows: “This species has disappeared from most areas of former habitat in the Northeast Atlantic. There are very few recent, authenticated records of white skate in this area; these isolated records are from the English Channel, western Irish waters, and Portuguese waters. According to historical literature it appears to have occurred more frequently in previous decades. ICES therefore considers this stock to be depleted.” No improvement in the status of this stock has been observed since the last OSPAR assessment (OSPAR, 2010a).</p> <p>In conclusion, available information on white skate continues to justify its inclusion in the OSPAR List.</p>

Table 2 Summaries of threats and impacts and measures that address key pressures per species for the OSPAR Status Assessments.

Species	Assessment
Angel shark <i>Squatina squatina</i>	<p>Threats and impacts. Threats to angel shark identified in the 2010 OSPAR assessment were excessive mortality (with all life stages of this low productivity stock susceptible to capture in fisheries), habitat damage, and prey availability. Fishing mortality (including recreational fisheries) is the main pressure. The prohibited listing should reduce mortality in commercial fisheries to a degree, depending on discard survival, which is variable. Recreational fisheries may result in additional mortality in areas where the species is not fully protected. The potential impact of habitat deterioration is undocumented, whilst prey availability is likely of limited impact, given that it may predate on a wide range of demersal fish.</p> <p>Measures that address key pressures. In 2008, ICES advised that angel shark should receive the highest protection possible. It has since been listed as a prohibited species in EU fishery regulations, thus minimizing mortality from commercial fisheries. EU Regulation 2015/812 (EU, 2015a) requires all angel shark discards to be recorded. Some nations (e.g. UK) have protected angel shark under national legislation, thus affording protection from other activities (e.g. recreational fishing). Angel shark may have received indirect protection through the designation of MPAs in parts of their coastal range, although this has not been evaluated. Whilst protective measures are in place, the low productivity and high site fidelity of angel shark means that population recovery and recolonization of former habitat would only be expected to occur over a decadal time-frame.</p>
Basking shark <i>Cetorhinus maximus</i>	<p>Threat and impacts. Fins and livers were historically in demand and highly valued on the market (ICES, 2019a). The biomass, and revenue, of fins being landed in Norway decreased between 2005 and 2008 (ICES, 2019c). There is currently no targeted fishery for basking sharks in the NEA. The main threat is accidental bycatch in setnets, trawls, and through entanglement in pot lines. Surface feeding activity and vertical movement increase interactions with boat traffic, wildlife tourism, and fishing activities, both industrial and recreational (ICES, 2019a). Coastal development, pollution, and bottom fishing affect coastal water quality and food sources of this filter-feeding species (e.g. Beaugrand <i>et al.</i>, 2002). Research supports the hypothesis that behavioural responses at small scales are linked by broad-scale responses to climate changes (Sims, 2008).</p> <p>Measures that address key pressures. There are international measures that address fisheries (EU Prohibited species list), finning (EU Finning Regulation), trade (CITES listing), and conservation (CMS), as well as national measures in Norway, the Isle of Man, and the UK, e.g. a designated site for basking sharks which has been established in waters off the west coast of Scotland (STECF, 2019). Basking shark is listed as a prohibited species for EU vessels in all waters, and it is forbidden for EU vessels to fish for, retain on board, tranship, land, store, sell, display, or offer to sell this species.</p>
Common skate complex <i>Dipturus batis</i>	<p>Threats and impacts. Fishing pressure is considered the most important threat to the populations of both species. It has been prohibited to land both species from EU waters since 2009, which should reduce mortality. Both species are a bycatch in bottom trawl and setnet fisheries and discard survival, though likely to occur, has not been quantified. ICES noted an increase in reported landings of long-nosed skate since the prohibition on landing “common skate-complex”, which may reflect some misreporting. The impacts of other fisheries (e.g. deep-water and recreational fisheries) have not been evaluated. Other OSPAR-listed threats are habitat damage and prey availability, which are still considered as minor and potential, respectively. Common skate predate on a wide variety of demersal fish and crustaceans, suggesting prey availability may not be limiting.</p> <p>Measures that address key pressures. EU fishing regulations have listed <i>Dipturus batis</i> and <i>D. intermedius</i> as prohibited species in EU waters since 2009, which should reduce fishing mortality. Both species should be promptly released unharmed by fishers, and they cannot be landed. Regulation (EU) 2015/812 (EU, 2015a) requires that all discards of common skate in EU waters are recorded by commercial fishers. Catch rates of species in the complex have increased in scientific trawl surveys since the prohibition, suggesting the measure has benefitted the populations. The Loch Sunart to the Sound of Jura Marine Conservation Order (UK Legislation, 2016) lists “common skate” as the designation feature of this MPA, which should reduce fishing mortality and maintain habitat in an important area for the species.</p>

Species	Assessment
<p>Gulper shark <i>Centrophorus granulosus</i></p>	<p>Threats and impacts. There was a target longline fishery that started in 1983 in the north of Portugal, but this fishery stopped in 2006 (ICES, 2006). Currently, the species is an occasional accessory species in deep-water fisheries, but landings are prohibited (exception for deep-water longlines where a small bycatch is allowed). Fishing effort has strongly decreased in the last 15 years, given the EU management measures adopted to reduce the impact of deep-water fisheries on deep-water species, including sharks.</p> <p>Measures that address key pressures. In the EU, a zero TAC for a list of deep-water sharks, including gulper shark was adopted in 2010. Since 2017, a limited TAC for deep-water sharks has been allowed for “<i>by-catches in longline fishery targeting black scabbardfish</i>”, with no directed fisheries permitted. Given the potential negative impact on deep-water species, gillnets, entangling nets, and trammelnets were banned for fisheries at depths >600 m from 2007 onwards. In order to mitigate the potential damaging impacts of bottom trawling, fishing with bottom trawls was permitted only at depths ≤ 800 m after 2016. In the NEAFC Regulatory Area, the species is designated as Category 2, which means that directed fisheries are not authorized and that bycatches should be minimized.</p>
<p>Leafscale gulper shark <i>Centrophorus squamosus</i></p>	<p>Threats and impacts. This is a bycatch species in deep-water fisheries, but landings are prohibited since 2010 (with the exception of a limited bycatch in the deep-water longline fisheries targeting black scabbardfish). Fishing pressure has strongly decreased in the last 15 years, given the EU management measures adopted, such as Regulation (EU) 2016/2336 (EU, 2016), which prohibits the use of static nets or bottom trawling at depths ≥600 m and ≥800 m, respectively. Ghost fishing is no longer considered a major threat to Portuguese dogfish given the regulations in place that prohibit the use of static nets at depths greater than 600 m. However, although it is unlikely that lost nets keep fishing over decades, it is unknown for how long lost nets could have an impact on deep-water shark populations.</p> <p>Measures that address key pressures. In the EU, a zero TAC for a list of deep-water sharks, including leafscale gulper shark, was adopted in 2010. Since 2015, the leafscale gulper shark has been included on the EU prohibited species list for Union waters of Division 2.a and Subarea 4, and in all waters of subareas 1 and 14 (EU Regulation 2015/105; EU, 2015b). In some other areas, there is a limited TAC for deep-water sharks that are a bycatch in longline fisheries targeting black scabbardfish. Given the potential negative impact on deep-water species, gillnets, entangling nets, and trammelnets were banned for fisheries at depths >600 m from 2007 onwards. In order to mitigate the potential damaging impacts of bottom trawling, fishing with bottom trawls was permitted only at depths ≤ 800 m after 2016. In the NEAFC Regulatory Area, the species is designated as Category 2, which means that directed fisheries are not authorized and that bycatches should be minimized.</p>
<p>Porbeagle <i>Lamna nasus</i></p>	<p>Threats and impacts. The measures taken in the past ten years (see below) mean that the threat of mortality due to directed fishery and bycatch has been greatly reduced. The species is highly valued by recreational fishers, and although many practice catch-and-release, post-release mortality is unquantified.</p> <p>Measures that address key pressures. In 2010, the TAC was reduced to zero, and EU vessels were prohibited from landing porbeagle from international waters. It has been prohibited for EU vessels to land porbeagle from all waters, and non-EU vessels to land porbeagle in the EU, since 2015. This species has been listed in Appendix II of CMS since 2008, and in Appendix II of CITES since 2014 (ICES, 2019g). OSPAR identified a number of management measures for the Commission and Contracting parties for cooperation with ICES and ICCAT (OSPAR, 2010b).</p>

Species	Assessment
<p>Portuguese dogfish <i>Centroscymnus coelolepis</i></p>	<p>Threats and impacts. This species is a bycatch species in deep-water fisheries, but landings have been prohibited since 2010 (except for a limited bycatch TAC in the deep-water longline fisheries targeting black scabbardfish). Fishing effort has strongly decreased in the last 15 years, given the EU management measures adopted. Ghost fishing is no longer considered a major threat to Portuguese dogfish given the regulations in place that prohibit the use of static nets at depths greater than 600 m. However, although being unlikely that lost nets keep fishing over decades, it is unknown for how long lost nets could have an impact on deep-water shark populations.</p> <p>Measures that address key pressures. In the EU, a zero TAC for a list of deep-water sharks, including Portuguese dogfish, was adopted in 2010. In Union waters of Division 2.a and Subarea 4 and in all waters of subareas 1 and 14, this species has been included in the EU prohibited species list. Given the potential negative impact on deep-water species, gillnets, entangling nets, and trammelnets were banned for fisheries at depths >600 m. In order to mitigate the potential damaging impacts of bottom trawling, fishing with bottom trawls was permitted only at depths ≤ 800 m. In the NEAFC Regulatory Area, the species is designated as Category 2, which means that directed fisheries are not authorized and that bycatches should be minimized (NEAFC, 2016).</p>
<p>Spotted ray <i>Raja montagui</i></p>	<p>Threats and impacts. The main key threat identified in the last assessment was “fisheries mortality (primarily bycatch in commercial fisheries)”. Habitat damage (e.g. mobile fishing gears, pollution, eutrophication) was considered but not evaluated (OSPAR, 2010c).</p> <p>Current impacts from fisheries have been reduced by the introduction of a Group-TAC for all skates and rays and a decrease in fishing effort, a decrease shown in the Northeast Atlantic from the beginning of the 21st century (e.g. Gascuel <i>et al.</i>, 2016; Couce <i>et al.</i>, 2020; ICES, 2020c). This overall decline in fishing pressure has likely had a positive effect on spotted ray populations.</p> <p>Measures that address key pressures. For EU waters, fishing pressure on spotted ray is currently regulated through a Group-TAC which includes all skate and ray species (except those listed as prohibited). The Group-TAC was introduced in 1999 in the North Sea (Division 3.a and Subarea 4) and in 2009 in the eastern English Channel (Division 7.d) and other areas. Recent studies suggest variable at-vessel mortality and discard survival, depending on several factors (e.g. gear type, soaking time, fish size) (Ellis <i>et al.</i>, 2018; Schram and Molenaar, 2018; Serra-Pereira and Figueiredo, 2019). This bycaught small-bodied species may be less susceptible to fishing pressure than the large-bodied skates (e.g. Silva <i>et al.</i>, 2012), though further studies on discard survival are required.</p>
<p>Spurdog <i>Squalus acanthias</i></p>	<p>Threats and impacts. Since 2011, target fisheries have been prohibited in EU and Norwegian waters. Bycatch still takes place, primarily in mixed demersal and gillnet fisheries. Any future exploitation should be regulated under an appropriate management plan. Discard survival rates are unknown but are likely variable.</p> <p>Habitat damage from mobile fishing gears or pollution is likely to occur. The potential impacts on spurdog are associated with habitat loss and degradation. Coastal development, pollution, dredging, and bottom trawling affect coastal or benthic habitat on which spurdog or their prey rely (ASMFC, 2002; Fordham <i>et al.</i>, 2016).</p> <p>Measures that address key pressures. Management measures for spurdog have only been restrictive across the stock area since 2009, and harvest rates have been below the MSY level since 2005 (ICES, 2019c).</p> <p>In 2009, a maximum landing length (100 cm) was introduced in EU waters, which was intended to deter many of the fisheries targeting mature female spurdog. The TAC was reduced by 90% in 2010, and set to zero from 2011. Hence, there have been no targeted fisheries in EU waters since the last OSPAR assessment. In Norwegian waters, there has been a minimum landing size of 70 cm (introduced in 1964) and no directed fishing since 2011.</p>

Species	Assessment
Thornback ray <i>Raja clavata</i>	<p>Threats and impacts. The rationale for including this species on the OSPAR list was because it had been depleted by fisheries in most of Region II, where the area of distribution had contracted significantly. There were lesser declines in other parts of the OSPAR Area. Current impacts from fisheries have been reduced by the introduction of a Group-TAC for all skates and rays and a decrease in fishing effort, a decrease shown in the Northeast Atlantic from the beginning of the 21st century (e.g. Gascuel <i>et al.</i>, 2016; Couce <i>et al.</i>, 2020; ICES, 2020c). This overall decline in fishing pressure has likely had a positive effect on the thornback ray populations.</p> <p>Measures that address key pressures. For EU waters, fishing pressure on thornback ray is currently regulated through a Group-TAC which includes all skate and ray species (except those listed as prohibited). The Group-TAC was introduced in 1999 in the North Sea (Division 3.a and Subarea 4) and in 2009 in the eastern English Channel (Division 7.d) and other areas.</p> <p>Studies on survivability in different métiers show that thornback ray has a survivability of > 50% in the pulse-trawl fishery (Schram and Molenaar, 2018) and > 90% in gillnets (Enever <i>et al.</i>, 2009; Catchpole <i>et al.</i>, 2017). Further studies on discard survival are required.</p>
White skate <i>Rostroraja alba</i>	<p>Threats and impacts. The size of this large benthic skate renders it particularly susceptible to capture by fishing gears, which in combination with its life-history parameters and population demography allow little capacity for it to withstand exploitation by fisheries. This species is likely to be caught as bycatch in multispecies trawl fisheries which operate on much of the continental shelf and upper slope, coinciding with this species habitat (Dulvy <i>et al.</i>, 2006). While it is prohibited to retain this species, it may not be reliably identified and discard survival is unknown. While habitat degradation and prey availability may have an effect on populations, such impacts are considered minor in comparison to that caused by fishing mortality.</p> <p>Measures that address key pressures. White skate has been listed as a prohibited species since 2010 (EU, 2019) for EU waters in ICES subareas 6–10. There is an EU requirement that all discards of white skate in these subareas be recorded by commercial fishing vessels (EU, 2015a). ICES previously advised that it be retained on the prohibited species list.</p> <p>The species is listed as Critically Endangered on the IUCN Red List (Gibson <i>et al.</i>, 2008; Nieto <i>et al.</i>, 2015) and it is protected in the UK’s Wildlife and Countryside Act.</p>

Basis of the advice

Background

Under its convention, the OSPAR Commission needs to maintain a list of Threatened and/or declining species and habitats (the OSPAR List) to guide the setting of priorities for its further work on the conservation and protection of marine biodiversity. The main purpose of the request to ICES was to generate the scientific knowledge that could be used by OSPAR to prepare new status assessments for a number of elasmobranch species in the OSPAR List.

WKSTATUS was formed by ICES to address the request from OSPAR to provide the scientific knowledge basis to prepare the OSPAR Quality Status Report 2023 (QSR2023).

Many of the actions and measures described in this advice concern fisheries. As set out in Article 4 of Annex V of the OSPAR Convention⁵, “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 work and report are based on the Guidance on the Development of Status Assessments for the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2019a) and the Guideline document Criteria for the

⁵ https://www.ospar.org/site/assets/files/1169/pages_from_ospar_convention_a5.pdf

Identification of Species and Habitats in need of Protection and their Method of Application (The Texel–Faial Criteria [T–F]) (OSPAR Agreement 2019-03 – OSPAR, 2019b). Draft assessments per species or species complex were prepared prior to the meeting and were discussed and updated by the WKSTATUS participants, taking into account recent changes in species distribution, including seasonal aspects and habitats, changes in abundance, or relative abundance. Furthermore, the scientific evidence was examined on the basis of the relevant T–F criteria for the identification of species in need of protection. For all species the previous assessment from 2009 or 2010 served as the baseline from which the observed changes were assessed.

The Request states specifically that: *The Status assessments should include, where available, information on the most relevant human activities that have an effect on the status of the species, changes in human activities and pressures that are threats to the species and the current measures with regard to human activities affecting the status of the species, including fisheries.* In order to do this, the key priority actions and measures which had been identified in the previous assessment were updated with the most recent information. This information is presented in a table per species or species complex.

Results and discussion

The scientific knowledge requested for each species and species complex is summarized in the Elaboration on the advice species section above. In addition, the detailed information has been compiled in the report (ICES, 2020a). This report is arranged in such a way that for each of the species there are tables for: (1) status assessment using the template used by OSPAR for the formulation of the assessment; (2) overview of Texel–Faial criteria; and (3) an update of priority actions and measures. Information that could not be included in these tables is given as background information / audit trail for each species in Annex 2 of the report (ICES, 2020a).

In addition to the management measures described in Table 2, a summary of additional management measures or treaties that apply to many of the species is given below.

EU list of prohibited species. All of the species, except the spotted ray and gulper shark, are included on the list of prohibited species for one or more of the ICES areas in Article 14 of the *Council Regulation (EU) 2019/124 for the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters*⁶. This means that it shall be prohibited for Union fishing vessels to fish for, to retain on board, to transship, or to land these species. Commenting on the utility of the prohibited species list, the ICES Working Group on Elasmobranch Fishes (WGEF) states that *"The list of prohibited species on the TACs and quotas regulations (e.g. CEC, 2016a⁷) is an appropriate measure for trying to protect the marine fish of highest conservation importance, particularly those species that are also listed on CITES and various other conservation conventions. Additionally, there should be sufficient concern over the population status and/or impacts of exploitation that warrants such a long-term conservation strategy over the whole management area. There are some species that would fall into this category. For example, white skate and basking shark are both listed on CITES and some European nations have given legal protection to these species. Angel shark has also been given legal protection in UK."*

EU Finning Regulation. The practice of shark finning was forbidden in EU waters for all vessels fishing there and in all waters for vessels operating under the flag of an EU Member State in 2007. To close loopholes in the legislation and to facilitate monitoring and control of the ban, it was been reinforced in 2013 by a strict "fins-naturally-attached" policy (FNAP) through Regulation (EU) No 605/2013 (EU, 2013; STECF, 2019).

Regulation of trade through CITES. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)^{8,9} regulates international trade in endangered species through a licensing system based on non-detriment findings (NDFs), in which the scientific evidence is presented to prove that trade does not impact on the wild population. Basking shark and porbeagle are both listed in Appendix II of CITES.

⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0124&from=EN>

⁷ <http://data.europa.eu/eli/reg/2016/72/oj>

⁸ <https://www.cites.org/>

⁹ http://ec.europa.eu/environment/cites/legislation_en.htm

Convention of migratory species CMS. As an environmental treaty of the United Nations, the Convention on Migratory Species (CMS)¹⁰ provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. Angel shark is listed in Appendices I and II of CMS, porbeagle and spurdog are both listed in Appendix II of CMS.

Methods

The Guidance on the Development of Status Assessments for the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2019-05 – OSPAR, 2019a) offers a clear template for the formulation of the assessment as shown below and ICES used this template to update the information for each species and species complex (Table 3).

Table 3 Template for the formulation of the OSPAR assessment for each individual species according to the Guidance on the Development of Status Assessments for the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2019-05 – OSPAR, 2019a).

Content	Guidance
Sheet reference	BDC2020/species
Area assessed	OSPAR regions I, II, III, IV, V
Title	Species: 2020 status assessment
Key message 50 words	Headline trend; brief description of assessment outcome; summarize in table
Background information 100 words max	Concise non-technical, non-scientific introduction; year added to list; key criteria; anthropogenic pressures; last assessment
Geographical range and distribution 100 words + map	Information on range and any current changes in range or distribution and future prospects; indicate period Indicate how range is assessed
Population / abundance 100 words	Trends: direction and magnitude of trends; time period
Condition 100 words	Age/size structure, productivity
Threats and impacts 100 words	Key threats (from OSPAR listing) and outlook
Measures that address key pressures 100 words	ID key conservation measures through OSPAR or others; effectivity; summarized information on status of OSPAR measures
Conclusion (incl. management considerations) 250 words	Summary of status; if justified to remain on list; confidence in above statements; comments on management
Knowledge gaps 100 words	Brief: sufficiency of data; expert judgement; what is needed
References	
Method used	Main source of information (list)
Confidence	Collation of data and information that cannot be included in the assessment to be tabulated separately

The Texel–Faial Criteria are used to underpin the listing of species. The Guideline document Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (the Texel–Faial Criteria) (OSPAR Agreement 2019-3 – OSPAR, 2019b) provides a template for assessing the criteria. The information on each of these criteria and the justification to qualify or not was updated with the most recent scientific information, which in some cases led to new insights in distribution, abundance, or biological characteristics.

The information on recent changes in species distribution, including seasonal aspects and habitat, changes in abundance, or relative abundance used in the assessments for each species is derived from a mix of OSPAR data assessment and assessments from third parties. These included ICES stock assessments, ICES expert group reports, the IUCN Red List, and the scientific literature. In some cases, such as for the angel shark and white skate, there was insufficient or no data available. For other species such as spotted and thornback rays and spurdog, stock assessments had been carried out. The other species relied on a limited amount of data. In all cases expert judgement was also applied.

¹⁰ <https://www.cms.int/>

Because much of the information available utilizes ICES subareas and divisions, which do not overlap or correspond exactly with the OSPAR regions, the following classification was used in combining the information.

Table 4 OSPAR regions and the corresponding ICES statistical areas.

OSPAR regions	ICES statistical areas
I: Arctic waters	1.a, 1.b, 2.a1, 2.a2, 2.b1, 2.b2, 5.a1, 5.a2, 5.b1a, 5.b1b, 5.b2, 12.a3, 12.a4, 14.a, 14.b2
II: Greater North Sea	3.a, 4.a, 4.b, 4.c, 7.d, 7.e (part)
III: Celtic Seas	6.a, 6.b2, 7.b, 7.c2, 7.e (part), 7.f, 7.g, 7.h, 7.j1, 7.j2, 7.k2
IV: Bay of Biscay and Iberian Coast	8.a, 8.b, 8.c, 8.d1, 8.d2, 9.a
V: Wider Atlantic	6.b1, 7.c1, 7.k, 8.e1, 9.b1, 9.b2, 10.a1, 10.a2, 10.b, 12.a1, 12.a3, 12.b, 12.c, 14.b1

Sources and references

ASMFC. 2008. Interstate Fishery Management Plan for Atlantic Coastal Sharks. Fishery Management Report No. 46 of the Atlantic States Marine Fisheries Commission. 172 pp. Accessed 15 September 2020 at <http://www.asafc.org/uploads/file/interstateFMPforAtlanticCoastalSharks.pdf>.

Beaugrand, G., Reid, P. C., Ibanez, F., Lindley, J. A., and Edwards, M. 2002. Reorganisation of North Atlantic Marine Copepod Biodiversity and Climate. *Science*, 296: 1692–1694. <https://doi.org/10.1126/science.1071329>.

Catchpole, T., Wright, S., Bendall, V., Hetherington, S., Randall, P., Ross, E., Santos, A. R., Ellis, J., Depestele, J., and Neville, S. 2017. Ray Discard Survival: Enhancing evidence of the discard survival of ray species. *CEFAS Report*: 1–70.

Couce, E., Schratzberger, M., and Engelhard, G. H. 2020. Reconstructing three decades of total international trawling effort in the North Sea. *Earth System Science Data*, 12: 373–386. <https://doi.org/10.5194/essd-12-373-2020>.

Dulvy, N. K., Pasolini, P., Notarbartolo di Sciara, G., Serena, F., Tinti, F., Ungaro, N., Mancusi, C., and Ellis, J. E. 2006. *Rostroraja alba*. *The IUCN Red List of Threatened Species* 2006: e.T61408A12473706. <https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T61408A12473706.en>

Ellis, J. R., Burt, G. J., Grilli, G., McCully Phillips, S. R., Catchpole, T. L., and Maxwell, D. L. 2018. At-vessel mortality of skates (Rajidae) taken in coastal fisheries and evidence of longer-term survival. *Journal of Fish Biology*, 92: 1702–1719. <https://doi.org/10.1111/jfb.13597>.

Enever, R., Catchpole, T. L., Ellis, J. R., and Grant, A. 2009. The survival of skates (Rajidae) caught by demersal trawlers fishing in UK waters. *Fisheries Research*, 97: 72–76. <https://doi.org/10.1016/j.fishres.2009.01.001>.

EU. 2013. Regulation (EU) No 605/2013 of the European Parliament and of the Council of 12 June 2013 amending Council Regulation (EC) No 1185/2003 on the removal of fins of sharks on board vessels. *Official Journal of the European Union*, L 181: 1–3. <http://data.europa.eu/eli/reg/2013/605/oj>.

EU. 2015a. Regulation (EU) 2015/812 of the European Parliament and of the Council of 20 May 2015 amending Council Regulations (EC) No 850/98, (EC) No 2187/2005, (EC) No 1967/2006, (EC) No 1098/2007, (EC) No 254/2002, (EC) No 2347/2002 and (EC) No 1224/2009, and Regulations (EU) No 1379/2013 and (EU) No 1380/2013 of the European Parliament and of the Council, as regards the landing obligation, and repealing Council Regulation (EC) No 1434/98. *Official Journal of the European Union*, L 133: 1–20. <http://data.europa.eu/eli/reg/2015/812/oj>.

EU. 2015b. Regulation (EU) 2015/104 of the European Parliament and of the Council of 19 January 2015 fixing for 2015 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union vessels, in certain non-Union waters, amending Regulation (EU) No 43/2014 and repealing Regulation (EU) No 779/2014. *Official Journal of the European Union*, L 22: 1–163. <http://data.europa.eu/eli/reg/2015/104/oj>.

EU. 2016. Regulation (EU) 2016/2336 of the European Parliament and of the Council of 14 December 2016 establishing specific conditions for fishing for deep-sea stocks in the north-east Atlantic and provisions for fishing in international waters of the north-east Atlantic and repealing Council Regulation (EC) No 2347/2002. *Official Journal of the European Union*, L 354: 1–19. <http://data.europa.eu/eli/reg/2016/2336/oj>.

Fordham, S., Fowler, S. L., Coelho, R. P., Goldman, K., and Francis, M. P. 2016. *Squalus acanthias*. *The IUCN Red List of Threatened Species* 2016: e.T91209505A2898271. IUCN Species Survival Commission Shark Specialist Group. <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T91209505A2898271.en>.

- Gascuel, D., Coll, M., Fox, C., Guénette, S., Guitton, J., Kenny, A., Leyla Knittweis, L., Nielsen, J. R., Piet, G., Raid, T., Travers-Trolet, M., and Shepard, S. 2016. Fishing impact and environmental status in European seas: a diagnosis from stock assessments and ecosystem indicators. *Fish and Fisheries*, 17: 31–55. <https://doi.org/10.1111/faf.12090>.
- Gibson, C., Valenti, S. V., Fordham, S. V., and Fowler, S. L. 2008. The Conservation of Northeast Atlantic Chondrichthyans. Report of the IUCN Shark Specialist Group. Northeast Atlantic Red List Workshop. viii + 76 pp. https://www.iucn.org/sites/dev/files/import/downloads/shark_report_1.pdf.
- ICES. 2019a. White skate (*Rostroraja alba*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, rja.27.nea, <https://doi.org/10.17895/ices.advice.4834>.
- ICES. 2006. Report of the Working Group on Elasmobranch Fishes (WGEF), 14–21 June 2006, ICES Headquarters. ICES CM 2006/ACFM:31. 291 pp.
- ICES, 2019a. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 1:25. 964 pp. <http://doi.org/10.17895/ices.pub.5594>.
- ICES. 2019b. Basking shark (*Cetorhinus maximus*) in subareas 1–10, 12, and 14 (Northeast Atlantic and adjacent waters). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, bsk.27.nea, <https://doi.org/10.17895/ices.advice.4827>.
- ICES. 2019c. Basking shark Stock Annex. In Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 1:25. 964 pp. <http://doi.org/10.17895/ices.pub.5594>.
- ICES. 2019d. Leafscale gulper shark (*Centrophorus squamosus*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, guq.27.nea, <https://doi.org/10.17895/ices.advice.4830>.
- ICES. 2019e. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 1:25. 964 pp. <http://doi.org/10.17895/ices.pub.5594>.
- ICES. 2019f. White skate (*Rostroraja alba*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, rja.27.nea, <https://doi.org/10.17895/ices.advice.4834>.
- ICES. 2019g. Porbeagle (*Lamna nasus*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, por.27.nea, <https://doi.org/10.17895/ices.advice.4831>.
- ICES. 2020a. Workshop to review and update OSPAR status assessments for stocks of listed shark, skates and rays in support of OSPAR (WKSTATUS). ICES Scientific Reports, 2:71. 152 pp. <http://doi.org/10.17895/ices.pub.7468>.
- ICES. 2020b. Workshop on the distribution and bycatch management options of listed deep-sea shark species (WKSHARK6). ICES Scientific Reports, 2:76. 85 pp. <http://doi.org/10.17895/ices.pub.7469>.
- ICES. 2020c. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 2:77. <http://doi.org/10.17895/ices.pub.7470>. Publication expected by 2 October 2020.
- Iglésias, S., Toulhoat, L., and Sellos, D. 2010. Taxonomic confusion and market mislabelling of threatened skates: Important consequences for their conservation status. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 20: 319–333. <https://doi.org/10.1002/aqc.1083>.
- Last, P. R., White, W. T., de Carvalho, M. R., Séret, B., Stehmann, M. F. W., and Naylor, G. J. P. (Eds.) 2016. Rays of the world. CSIRO Publishing & Cornell University Press, Comstock Publishing Associates. 800 pp. ISBN 978-0-643109-13-1.
- NEAFC. 2016. The NEAFC approach to conservation and management of deep-sea species and categorization of deep-sea species/stocks. Adopted at the 35th Annual Meeting, November 2016. 3 pp. <https://www.neafc.org/basictexts>.
- Nieto, A., Ralph, G. M., Comeros-Raynal, M. T., Kemp, J., García Criado, M., Allen, D. J., Dulvy, N. K., Walls, R. H. L., Russell, B., Pollard, D., García, S., Craig, M., Collette, B. B., Pollom, R., Biscoito, M., Labbish Chao, N., Abella, A., Afonso, P., Álvarez, H., Carpenter, K. E., Clò, S., Cook, R., Costa, M. J., Delgado, J., Dureuil, M., Ellis, J. R., Farrell, E. D., Fernandes, P., Florin, A. B., Fordham, S., Fowler, S., Gil de Sola, L., Gil Herrera, J., Goodpaster, A., Harvey, M., Heessen, H., Herler, J., Jung, A., Karmovskaya, E., Keskin, C., Knudsen, S. W., Kobylansky, S., Kovačić, M., Lawson, J. M., Lorange, P., McCully Phillips, S., Munroe, T., Nedreaas, K., Nielsen, J., Papaconstantinou, C., Polidoro, B., Pollock, C. M., Rijnsdorp, A. D., Sayer, C., Scott, J., Serena, F., Smith-Vaniz, W. F., Soldo, A., Stump, E. and Williams, J. T. 2015. European Red List of marine fishes. Luxembourg: Publications Office of the European Union. 88 pp. <https://doi.org/10.2779/082723>.

- OSPAR. 2010a. Background Document for White skate *Rostroraja alba*. OSPAR Commission, Biodiversity Series No. 476. 17 pp. ISBN 978-1-907390-17-3.
- OSPAR. 2010b. Background Document for Porbeagle shark *Lamna nasus*. OSPAR Commission, Biodiversity Series No. 474. 17 pp. ISBN 978-1-907390-15-9.
- OSPAR. 2010c. Background Document for Spotted ray *Raja montagui*. OSPAR Commission, Biodiversity Series No. 478. 17 pp. ISBN 978-1-907390-19-7.
- OSPAR. 2019a. Guidance on the Development of Status Assessments for the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2019-05). 42 pp. <https://www.ospar.org/documents?v=40966>.
- OSPAR. 2019b. Criteria for the Identification of Species and Habitats in need of Protection and their Method of Application (The Texel–Faial Criteria) (OSPAR Agreement 2019-03). 9 pp. <https://www.ospar.org/documents?v=40948>.
- Serra-Pereira, B., and Figueiredo, I. 2019. Scientific evidences on discard survival of skates and rays (Rajidae) in Portuguese mainland waters (ICES division 27.9.a). Working Document to the Working Group on Elasmobranch Fishes (WGEF) meeting, 18–27th June 2019. 23 pp.
- Schram, E., and Molenaar, P. 2018. Discards survival probabilities of flatfish and rays in North Sea pulse-trawl fisheries. Wageningen Marine Research report C037/18. 39 pp. Accessed 16 September 2020 at <https://edepot.wur.nl/449707>.
- STECF. 2019. Review of the implementation of the shark finning regulation and assessment of the impact of the 2009 European Community Action Plan for the Conservation and Management of Sharks (STECF-19-17). P. Walker and C. Pinto (Eds.) Report of the Scientific, Technical and Economic Committee for Fisheries. Publications Office of the European Union, Luxembourg. 133 pp. ISBN 978-92-76-11287-7, JRC119051, <https://doi.org/10.2760/487997>.
- Silva, J. F., Ellis, J. R., and Catchpole, T. L. 2012. Species composition of skates (Rajidae) in commercial fisheries around the British Isles, and their discarding patterns. *Journal of Fish Biology*, 80: 1678–1703. <https://doi.org/10.1111/j.1095-8649.2012.03247.x>.
- Sims, D. W. 2008. Sieving a living: a review of the biology, ecology and conservation status of the plankton-feeding basking shark *Cetorhinus maximus*. *Advances in Marine Biology*, 54: 171–220. [https://doi.org/10.1016/S0065-2881\(08\)00003-5](https://doi.org/10.1016/S0065-2881(08)00003-5).
- Thorburn, J., Neat, F., Bailey, D. M., Noble, L. R., and Jones, C. S. 2015. Winter residency and site association in the Critically Endangered North East Atlantic spurdog *Squalus acanthias*. *Marine Ecology Progress Series*, 526: 113–124. <https://doi.org/10.3354/meps11210>.
- Thorburn, J., Jones, R., Neat, F., Pinto, C., Bendall, V., Hetherington, S., Bailey, D. M., Noble, L., and Jones, C. 2018. Spatial versus temporal structure: implications of inter-haul variation and relatedness in the North East Atlantic Spurdog *Squalus acanthias*. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 28(5): 1167–1180. <https://doi.org/10.1002/aqc.2922>.

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