

12 Other pelagic sharks in the Northeast Atlantic

12.1 Ecosystem description and stock boundaries

In addition to the pelagic species discussed previously (Sections 6–11), several other pelagic sharks and rays occur in the ICES area (Table 12.1). Many of these taxa, including hammerhead sharks (*Sphyrna* spp.) and requiem sharks (*Carcharhinus* spp.), are tropical to warm temperate species, and often coastal pelagic species.

There are limited data with which to examine the stock structure of these species, and the ICES area would only be the northern extremes of their Northeast Atlantic distribution range. Other species, including long-fin mako, silky shark and oceanic white-tip are truly oceanic and likely to have either North Atlantic or Atlantic stocks, although data to confirm the exact stocks boundaries are limited. These species are found mostly in the southern parts of the ICES areas (subareas 9–10), though some may occasionally range further north into the Bay of Biscay (Subarea 8). Some of these species also occur in the Mediterranean Sea.

In October 2011, a whale shark *Rhincodon typus* was reported from southern Portugal (Rodrigues *et al.*, 2012), and the northern limits of this species also extend to the Azores (Afonso *et al.*, 2014).

12.1.1 Taxonomic changes

A recent treatise on batoids (Last *et al.*, 2016) considers all eight species of manta ray and devil ray to be in a single genus *Mobula*, with two of these species (giant manta ray *Mobula birostris* and giant devil ray *Mobula mobular* shown as occurring in the southernmost part of the ICES area (Subarea 9). Both these species also occur around the Azores (Subarea 10; Santos *et al.*, 1997), with Sobral and Afonso (2014) also indicating that the Chilean devil ray *Mobula tarapacana* also occurred as far north as the Azores.

12.2 The fishery

12.2.1 History of the fishery

Pelagic sharks and also some ray species are an incidental bycatch in tuna and billfish fisheries (mainly longline, but also purse-seine) and a very occasional bycatch in other pelagic fisheries. Some, like hammerhead and requiem sharks, may constitute a noticeable component of the bycatch and were traditionally landed, whilst others are only recorded sporadically (e.g. white shark, tiger shark and *Mobula* spp.). Some of these pelagic species (e.g. silky shark and oceanic whitetip) are an important bycatch in high seas fisheries, whilst others (e.g. various requiem sharks and hammerhead sharks) may be caught in continental shelf seas in the southern parts of the ICES area.

12.2.2 The fishery in 2021

No new information is available.

12.2.3 ICES advice applicable

ICES does not provide advice on these stocks.

12.2.4 Management applicable

EC Regulation No. 1185/2003 (updated by EU Regulation No 605/2013) prohibits the removal of shark fins of these species, and subsequent discarding of the body. This regulation is binding on EC vessels in all waters and non-EC vessels in Community waters.

Article 10 of Council Regulation (EU) 2019/1241 states the prohibition of for Union vessels to fish for, retain on board, tranship, land, store, sell, display or offer for sale the species listed in Annex I or species for which fishing is prohibited under other Union legal acts, and includes the following pelagic elasmobranchs relevant here:

- White shark *Carcharodon carcharias* in all waters;
- Mobulid rays (*Mobula* spp.) in all waters

Article 18 of Council Regulation (EU) 2022/109 lists prohibited species which, if caught accidentally, should not be harmed and should be released promptly. It is prohibited for EU vessels to fish for, to retain on board, to tranship or to land species listed in this Article, which include the following pelagic elasmobranchs:

- Whale shark *Rhincodon typus* in all waters.

Article 25 of Council Regulation (EU) 2022/109 also lists prohibited species in relation to fisheries operating in the ICCAT Convention area. The species prohibited include hammerhead sharks (Family Sphyrnidae, except for *Sphyrna tiburo*), oceanic whitetip *Carcharhinus longimanus*, silky shark *Carcharhinus falciformis*, North Atlantic shortfin mako *Isurus oxyrinchus*, and bigeye thresher *Alopias superciliosus*.

The listings on Article 27 of Council Regulation (EU) 2022/109 are in support of ICCAT recommendations that Contracting Parties “prohibit, retaining on board, transshipping, landing, storing, selling, or offering for sale any part or whole carcass” of silky shark *Carcharhinus falciformis* (Recommendation 2011–08), oceanic whitetip shark *Carcharhinus longimanus* (Recommendation 2010–07), bigeye thresher *Alopias superciliosus* and all hammerhead sharks (Family Sphyrnidae, except bonnethead shark *Sphyrna tiburo*) (Recommendation 2010–08). In addition, “It shall be prohibited to undertake a directed fishery for species of thresher sharks of the *Alopias* genus”.

12.3 Catch data

12.3.1 Landings

No reliable estimates of landings or catches are available for these species, as many nations that land various species of pelagic sharks have often recorded them under generic landings categories. There can also be differences in the data reported to ICES, ICCAT and FAO, and so the most accurate data sources need to be verified. Historical species-specific landings reported to ICES were summarised in earlier WGEF reports.

Data (landings and dead discards) reported to ICCAT are given in Table 12.2, with the data presented here restricted to the years 2000–2020 and from ICCAT Sampling Areas (SAs) BIL94B and BIL94C in the North-east Atlantic (i.e. including the ICES area and extending southwards into the central eastern Atlantic (to 5°N), but excluding the Mediterranean Sea). Spain and Portugal are the main European nations reporting ‘other pelagic shark species’ from the Northeast Atlantic.

The data that have been presented in the present report are shown by nation and year, and are shown for the various carcharhinid sharks (Tables 12.2a–b), hammerhead sharks (Tables 12.2c–

d), lamniform sharks, pelagic sharks nei and pelagic stingray (Table 12.2e), and mobulids (Table 12.2f).

Catch data provided for the Spanish longline swordfish fisheries in the NE Atlantic in 1997–1999 (Castro *et al.*, 2000; Mejuto *et al.*, 2002) showed that 99% of the bycatch of offshore longline fisheries consisted of pelagic sharks (Table 12.3), although 87% was blue shark.

Available landings data from FAO FishStat for the NE Atlantic (Table 12.4) are considered underestimates, due to inconsistent reporting and use of generic categories. However, this is the only database to report landings of devil ray (17 tonnes by Spain 2004–2011).

12.3.2 Discards

No data are available. Some species were usually retained, but other species, such as the pelagic stingray, usually discarded. There are now EU regulations to prohibit the retention of some species, and these species should now be discarded.

12.3.3 Quality of catch data

Landings/catch data have been reported inconsistently. For example, data for mobulids only appeared in the ICCAT time-series in 2017 (Table 12.2f), largely relating to reporting of dead discards. Some of the catch data that have been reported are known coding errors (e.g. some of the reported landings of ‘tiger shark’ by the Netherlands, Table 12.4), or suspected coding errors (e.g. the reported landings of white shark by Morocco, which were 92 t for 2011).

More dedicated effort to compile an appropriate time-series of landings is required, especially in relation to longfin mako (given that data for this species could usefully be appraised in relation to shortfin mako) and smooth hammerhead (given this species is one of the more frequent of the ‘other pelagic sharks’ in the ICES area).

Overall, catch data are of poor quality (see above), except for some occasional studies of the Spanish Atlantic swordfish longline fishery (e.g. Castro *et al.*, 2000; Mejuto *et al.*, 2002) and of Portuguese pelagic longline fishery in the Atlantic Ocean (e.g. Santos *et al.*, 2014).

Biological data are not collected under the Data Collection Regulations, although some generic biological data are available (see Section 12.7). Species-specific identification in the field is problematic for some genera, notably for *Carcharhinus* spp., *Sphyrna* spp. and mobulids.

12.3.4 Discard survival

There have been several studies on the at-vessel mortality of pelagic sharks in longline fisheries, although more limited data are available for purse-seine fisheries. These studies were reviewed by Ellis *et al.* (2017).

12.4 Commercial catch composition

No data on the species and length composition of these species were available to WGEF.

12.5 Commercial catch and effort data

No CPUE data are available to WGEF for these pelagic sharks in the ICES area. ICCAT is the main source for appropriate catch and effort data for pelagic sharks, with data also available for the Northwest Atlantic (e.g. Cramer & Adams, 1998; Cramer *et al.*, 1998; Cramer, 1999).

12.6 Fishery-independent data

No fishery-independent data are available for these species.

12.7 Life-history information

The overall biology of several species has been reviewed, including white shark (Bruce, 2008), silky shark (Bonfil, 2008), oceanic whitetip (Bonfil *et al.*, 2008; Young & Carson, 2020) and pelagic stingray (Neer, 2008). Other biological information is available in a range of sources (e.g. Branstetter, 1987, 1990; Stevens and Lyle, 1989; Shungo *et al.*, 2003; Piercy *et al.*, 2007). A summary of the main biological parameters is given in Table 12.5.

There is limited information on nursery or pupping grounds. Silky shark is thought to use the outer continental shelf as primary nursery ground (Springer, 1967; Yokota and Lessa, 2006), and young oceanic whitetip have been found offshore along the Southeast coast of the USA, suggesting offshore nurseries over the continental shelf (Seki *et al.*, 1998). Scalloped hammerhead nurseries are usually in shallow coastal waters.

In relation to *M. mobular*, Fortuna *et al.* (2014) estimated the size of the population of *M. mobular* in the Adriatic Sea as 3255 adults, from 60 field observations and available biological parameters. It was reported that several hundred specimens of *M. mobular* (estimates varied from 200–500) were caught by fishermen of the Gaza Strip on 27 February 2013.

Given the quantities of reported landings of longfin mako *Isurus paucus* and hammerhead sharks, of which *Sphyrna zygaena* is the main species occurring in the ICES area, further information is provided here for these two species.

12.7.1 Longfin mako *Isurus paucus*

Longfin mako is a pelagic species that is distributed widely in warm-temperate to tropical waters of the Atlantic, Indian and Pacific Oceans. Whilst most records of this species have been from the western Atlantic, including Cuba (Dodrill & Gilmore, 1979; Hueter *et al.*, 2017; Ruiz-Abierno *et al.*, 2021), it also occurs around the Azores, as far north as 44.8°N (Moreno & Moron, 1992; Queiroz *et al.*, 2008; Mucientes *et al.*, 2013) and occasional individuals have also been reported from the Mediterranean Sea (Hemida & Capapé, 2008).

Biological data for this species are limited. Typical of other lamnid sharks, it has a low fecundity (2–8 pups), which are born at about 97–120 cm (Gilmore, 1983; Compagno, 2001). The length at 50% maturity for males and females has been estimated at 215 cm and 230 cm total length, respectively (Ruiz-Abierno *et al.*, 2021). The smallest mature and largest immature females observed in that study were 220 cm and 257 cm, respectively, whilst the smallest mature and largest immature males were 208 cm and 224 cm, respectively (Ruiz-Abierno *et al.*, 2021).

Hueter *et al.* (2017) satellite tagged two individuals, which moved from the Gulf of Mexico into the oceanic waters of the western North Atlantic. These individuals also undertook vertical migrations, moving into surface waters at night, and spent most time at depths shallower than 600 m, with occasional dives into deeper (to 1767 m) waters.

Ellis *et al.* (Submitted) give a more detailed overview of the available data relating to longfin mako,

12.7.2 Smooth hammerhead *Sphyrna zygaena*

Smooth hammerhead is the more frequently recorded hammerhead shark occurring in both the ICES area and Mediterranean Sea (Celona & De Maddalena, 2005). Whilst this species has a global distribution, the Atlantic population(s) appears to be distinct to the Indo-Pacific (Miller, 2016). It appears to prefer warm ($>23^{\circ}\text{C}$) surface waters. In the eastern Atlantic, it is more abundant in the warmer waters west of Africa, though the distribution extends up into Division 9.a (Couto *et al.*, 2018; Santos & Coelho, 2019), with very occasional records as far north as the British Isles (Southall & Sims, 2008).

The biology of the species in the Atlantic is little known, though there are studies from elsewhere in the world (Miller, 2016). Growth parameters for smooth hammerhead caught in the eastern Atlantic have been estimated by Coelho *et al.* (2011), based on 139 specimens of 136–233 cm fork length (L_F). The estimated VBGP were $L_{inf} = 272$ cm L_F , $K = 0.06$, $t_0 = -9.4$ (males) and $L_{inf} = 285$ cm L_F , $K = 0.07$, $t_0 = -7.3$ (females). A subsequent study with increased sample size ($n = 304$; 126–253 L_F) estimated the growth parameters as $L_{inf} = 285$ cm L_F , $K = 0.09$ and $L_{inf} = 294$ cm L_F , $K = 0.09$ for males and females, respectively (Rosa *et al.*, 2017).

The length-at-maturity ($L_{50\%}$; based on samples from the Pacific) is estimated at 194 cm L_T and 200 cm L_T for males and females, respectively (Nava Nava & Márquez-Farías, 2014), with higher estimates ($L_{50\%} = 239.3$ cm L_T (females) and 263.7 cm L_T (males)) provided by López-Martínez *et al.* (2020).

The oceanic movements of smooth hammerhead in the Atlantic were described by Santos & Coelho (2018), with neonates and juveniles occurring in shallow, coastal waters, and larger individuals making more oceanic movements (Diemer *et al.*, 2011; Francis, 2016; Santos & Coelho, 2018, 2019). Whilst based on studies in the eastern Pacific, Félix-López *et al.* (2019) suggested that smooth hammerhead displayed philopatric behaviour. The diet of smooth hammerhead has been described for many parts of the geographical range (Smale, 1991; Smale & Cliff, 1998; Gonzalez-Pestana *et al.*, 2017; Dicken *et al.*, 2018; Estupiñán-Montaña *et al.*, 2019).

12.8 Exploratory assessments

No assessments have been made of these stocks in the NE Atlantic. Cortés *et al.* (2010) undertook a level 3 quantitative Ecological Risk Assessment (ERA) for eleven pelagic elasmobranchs (blue shark, shortfin and longfin mako, bigeye and common thresher, oceanic whitetip, silky, porbeagle, scalloped and smooth hammerhead, and pelagic stingray). Of these species, silky shark was found to be high risk (along with shortfin mako and bigeye thresher sharks), and oceanic whitetip and longfin mako sharks were also considered to be highly vulnerable.

McCully *et al.* (2012) undertook a level 2, semi-quantitative ERA for pelagic fish in the Celtic Sea area, and of the 19 species considered (eight of which were elasmobranchs), porbeagle and shortfin mako were found to be at the highest risk in longline and setnet fisheries, followed by common thresher. A comparable analysis examining the pelagic ecosystem for the Northeast Atlantic could usefully be considered.

12.9 Stock assessment

No stock assessments have been undertaken.

12.10 Quality of the assessment

No stock assessments have been undertaken.

12.11 Reference points

No reference points have been proposed for these stocks.

12.12 Conservation considerations

The recent European Red List of European marine fish (Nieto *et al.*, 2015) listed white shark *Carcharodon carcharias* as Critically Endangered (CR), and giant devil ray *Mobula mobular*, oceanic white-tip *Carcharhinus longimanus* and sandbar shark *Carcharhinus plumbeus* as Endangered (EN) in European seas. Many other pelagic sharks are listed as Data Deficient (DD) in European waters, including silky shark *Carcharhinus falciformis*, blacktip shark *C. limbatus*, dusky shark *C. obscurus*, tiger shark *Galeocerdo cuvier*, scalloped hammerhead *Sphyrna lewini*, great hammerhead *S. mokarran*, smooth hammerhead *S. zygaena* and longfin mako *Isurus paucus*. Pelagic stingray *Pteroplatytrygon violacea* is listed as Least Concern (LC).

Globally, many of the species considered here are listed as Threatened on the IUCN Red List (<https://www.iucnredlist.org>; consulted 16 June 2022), including *C. longimanus*, *S. lewini* and *S. mokarran* (CR), *I. paucus*, *R. typus*, *C. obscurus*, *C. plumbeus*, *C. signatus*, *M. mobular* and *M. birostris* (EN) and *C. carcharias*, *C. brachyurus*, *C. brevipinna*, *C. falciformis*, *C. limbatus* and *S. zygaena* (Vulnerable, VU), with *G. cuvier* listed as Near Threatened (NT) and *P. violacea* as LC.

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) lists several elasmobranchs on Appendix I (i.e. Contracting Parties that are a Range State should prohibit the taking of such species) including whale shark *Rhincodon typus*, *Carcharodon carcharias* and *Mobula* spp. These species are also listed on Appendix II of CMS (i.e. species that require international agreements for their conservation and management), with *Isurus paucus*, *Carcharhinus falciformis*, *Carcharhinus obscurus*, *Sphyrna lewini* and *S. mokarran* also listed on Appendix II. In 2020, *Sphyrna zygaena* was also added to Appendix II of CMS.

Carcharodon carcharias, *Rhincodon typus*, *Carcharhinus falciformis*, *C. longimanus*, *Sphyrna lewini*, *S. mokarran*, *S. zygaena* and *Mobula* spp. are also listed on Appendix II of CITES.

12.13 Management considerations

There is a paucity of the fishery data on these species, and this hampers the provision of management advice.

Some of the species considered in this section are included in various conservation initiatives, including CMS and CITES (see above), with some protected in the Mediterranean Sea, through their listing on Appendix II of the Barcelona Convention.

In 2012, a consortium of scientific institutions (AZTI, IEO, IRD and IFREMER) obtained a contract from the EC to review the fishery and biological data on major pelagic sharks and rays. The aim was to identify the gaps that could be filled in the frame of the implementation of the EU shark action plan (EUPOA-Sharks) in order to improve the monitoring of major elasmobranch species caught by both artisanal and industrial fisheries for large pelagic fish in the Atlantic, Indian and Pacific Oceans. The consortium reviewed and prioritised the gaps identified to develop a research programme to fill gaps and to support the formulation of scientific advice for management. The main gaps concerned fishery statistics, which are often not broken down by

species, a lack of size–frequency data and regional biological/ecological information. The final report was given to the DG-Mare of the EU in May 2013 (DG-Mare, 2013).

A subsequent project updated this work, providing updated information on the occurrence of pelagic sharks and rays in different fisheries, updated information on data collection and methodological approaches for assessing their status, a critical review of existing Conservation and Management Measures (CMMs) for sharks and their current conservation status, and approaches to improve and/or provide alternative options for conservation and management of sharks. The final report (Coelho *et al.*, 2019) is available at <https://publications.europa.eu/en/publication-detail/-/publication/bb27e867-6185-11e9-b6eb-01aa75ed71a1/language-en>.

In October 2019, STECF conducted a dedicated expert working group aiming to review the implementation of the shark finning regulation and to assess the impact of the 2009 European Community Action Plan for the Conservation and Management of sharks (CPOA). A review of the fisheries potentially involved in catching sharks and in particular marketing shark fins was conducted by main EU country. This included finning of pelagic sharks such as smooth hammerhead *Sphyrna zygaena* or silky shark *Carcharhinus falciformis* considered to be present on Chinese fins retailers (Fields *et al.*, 2017). The final report provides an overview of progress in the fisheries management of elasmobranch during the 10 years implementation of CPOA and proposes actions for improvements (STECF, EWG 19-17, 2019).

In 2013, the shark species group of ICCAT proposed the framework of a Shark Research and Data Collection Program (SRDCP) to fill up the gaps in our knowledge on pelagic sharks that are responsible for much of the uncertainty in stock assessments, and have caused constraints to the provision of scientific advice. The final report is available at ICCAT website (ICCAT, 2013).

12.14 References

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Table 12.1. Other pelagic sharks in the Northeast Atlantic. Summary of the distribution of pelagic elasmobranchs in the ICES area. Species that are resident or caught frequently in an area are denoted ●, species that may occur as occasional vagrants denoted ⊙ and species that have not been recorded in an area are denoted ○. Adapted from Whitehead *et al.* (1989).

Family	Common name	Scientific name	ICES Subarea				Notes
			7	8	9	10	
Lamnidae	White shark	<i>Carcharodon carcharias</i>	○	⊙	⊙	⊙	[1]
	Longfin mako	<i>Isurus paucus</i>	○	○	⊙	⊙	
Pseudocarcharidae	Crocodile shark	<i>Pseudocarcharias kamoharui</i>	○	○	○	?	
Rhincodontidae	Whale shark	<i>Rhincodon typus</i>	○	○	⊙	⊙	
Carcharhinidae	Bronze whaler	<i>Carcharinus brachyurus</i>	○	○	?	○	
	Spinner shark	<i>Carcharhinus brevipinna</i>	○	○	⊙	○	
	Silky shark	<i>Carcharhinus falciformis</i>	○	○	⊙	⊙	
	Galapagos shark	<i>Carcharhinus galapagensis</i>	○	○	○	?	
	Blacktip shark	<i>Carcharhinus limbatus</i>	○	○	⊙	○	
	Oceanic whitetip	<i>Carcharhinus longimanus</i>	○	⊙	⊙	⊙	[2]
	Dusky shark	<i>Carcharhinus obscurus</i>	○	○	⊙	?	
	Sandbar shark	<i>Carcharhinus plumbeus</i>	○	⊙	⊙	○	
	Night shark	<i>Carcharhinus signatus</i>	○	○	?	○	
	Tiger shark	<i>Galeocerdo cuvier</i>	?	?	⊙	⊙	[3]
Sphyrnidae	Scalloped hammerhead	<i>Sphyrna lewini</i>	○	○	⊙	?	
	Great hammerhead	<i>Sphyrna mokarran</i>	○	○	?	○	
	Smooth hammerhead	<i>Sphyrna zygaena</i>	⊙	⊙	⊙	⊙	
Dasyatidae	Pelagic stingray	<i>Pteroplatytrygon violacea</i>	⊙	⊙	⊙	⊙	[4]
Mobulidae	Giant devil ray	<i>Mobula mobular</i>	⊙	⊙	⊙	⊙	[5]
	Giant manta ray	<i>Mobula birostris</i>	○	○	⊙	⊙	
	Sicklefin devil ray	<i>Mobula tarapacana</i>	○	○	○	⊙	
	Bentfin devil ray	<i>Mobula thurstoni</i>	○	○	○	?	

[1] Three records from the Bay of Biscay; [2] One individual stranded in Swedish waters; [3] Some unconfirmed sightings in northern Europe; [4] Two specimens recorded from the North Sea; [5] Individual specimens reported from the Bay of Biscay (capture) and Celtic Sea (stranding).

[illegible]

Table 12.2b. Other pelagic sharks in the Northeast Atlantic. Summary of total reported landings data (2000–2020) as reported to ICCAT (Task 1 Nominal catch data; downloaded 16/06/2022; ICCAT version of 27/01/2022, includes landings and dead discards) for Sampling Areas (SAs) BIL94B and BIL94C in the North-east Atlantic. These data relate to both the ICES area and extend southwards into the central eastern Atlantic (to 5°N). Data for the Mediterranean Sea (BIL95) not included. These data may include coding errors and taxonomic errors.

Scientific name	Code	Nation	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>C. obscurus</i>	DUS	FRA										0.022					0						
		MAR												6	0.6	3							
		USA								0.264													
<i>C. plumbeus</i>	CCP	ESP								0		4.22	0.068				0	0			0	0	0
		PRT						0.14					0.074		0.175	0.869							
		SEN														0.373							
		USA							0.079			0.129											
<i>C. signatus</i>	CCS	ESP		0.025			0.142			0		0	2.012				0	0			0	0	0
		SEN														6581							
		USA									0.108												
<i>G. cuvier</i>	TIG	ESP	8.197	4.692	3.548	2.685	4.659			2.681		2.371	0.796	3.274	0.068	0.039	0	0			0	0	0
		LBR																					0.858
		BMU	4																				
		USA								0	0.164												
<i>R. acutus</i>	RHA	SEN	20	138	11	23	1	11	16	5	0	68	0	6	3								
Carcharhinidae	RSK	CUW																		0.004			
		SLV																		0.088			
		ESP		19.7	13.7	21.8					31.87			66.31	7.8	5.84				0.122			
		FRA									2.605	0.045	0.02	0.345			0						
		PRT				13.58		24.35	5.586	493.7			0.185										
		MAR															238	921.8		89.3			
		PAN																		0.009			
		SEN	1714	1806	1045	1387	1651	5401	1035	1221	1253	375	426	898	2046		727.6	320.9	524.1	55.63	65.63	27.6	

Table 12.2c. Other pelagic sharks in the Northeast Atlantic. Summary of total reported landings data (2000–2020) as reported to ICCAT (Task 1 Nominal catch data; downloaded 16/06/2022; ICCAT version of 27/01/2022, includes landings and dead discards) for Sampling Areas (SAs) BIL94B and BIL94C in the North-east Atlantic. These data relate to both the ICES area and extend southwards into the central eastern Atlantic (to 5°N). Data for the Mediterranean Sea (BIL95) not included. These data may include coding errors and taxonomic errors.

Scientific name	Code		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>Sphyrna lewini</i>	SPL	TWN																0.038	0	0	0	0	0
		CUW																		0.375			
		SLV																		0.577			
		ESP		0.074		0.066	2.153			0.252		0.526	0					0		3.093	0	0	0
		FRA															0	0.021	0.034	1.542	0.096	0.017	
		GBR										11.53	0.334										
		GTM																		0.15			
		KOR																0.08					
		MAR												1	0.4	0	0						
		PAN																		0.299			
		RUS																		0.019			0
<i>Sphyrna mokarran</i>	SPK	CUW																		0.036			
		SLV																		0.18			
		ESP																		0.832			
		FRA															0			0	0.077	0	
		GTM																		0.014			
		LBR																			1.2		
		PAN																		0.251			
		RUS																		0.019			0
<i>Sphyrna zygaena</i>	SPZ	CUW																	0.079	0	0.02	0	0
		SLV																		0.098			
		ESP	1.61	4.769	1.749	0.562	12.57			2.019		0.224	0					0		0.328	0	0	0
		FRA															0			0.842	0.412	9.9	1.975
		PRT				0.568		3.911	5.883			1.072	5.935		0.669	0.748	0.214	0					0.15
		GBR													0.029	0.035			0.033	0.08			0.009
		GTM																		+			
		KOR												0.781	1.009		0.088						
		MAR												153	155	0	0						
		PAN																		0.002			
		RUS																		0.103	0.016	0.132	0
		SEN	0	0	0	0	0	7	0	0	0				1.379	438.7		2.273					

[illegible]

Table 12.2e. Other pelagic sharks in the Northeast Atlantic. Summary of total reported landings data (2000–2020) as reported to ICCAT (Task 1 Nominal catch data; downloaded 16/06/2022; ICCAT version of 27/01/2022, includes landings and dead discards) for Sampling Areas (SAs) BIL94B and BIL94C in the North-east Atlantic. These data relate to both the ICES area and extend southwards into the central eastern Atlantic (to 5°N). Data for the Mediterranean Sea (BIL95) not included. These data may include coding errors and taxonomic errors.

Scientific name	Code	Nation	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>C. carcharias</i>	WSH	TWN													0.09	0.11	0						
		PRT						5.86								0.015							
		MAR												92	11	24.8	7						
<i>I. paucus</i>	LMA	ESP	16.01	38.06	52.63	52.02	47.33			40.23		64.62	37.32	42.77	90.5	94.03	63.64	34.38	42.3	33.24	77.9	80.61	6.344
		PRT											0.986	0.003	4.541	1.006	1.127						
		LBR																			19.08		
		USA									0.366	0.828	0.93										
<i>Isurus</i> spp.	MAK	LBR																					9.85
Lamnidae	MSK	ESP	44.18								39.54												
		FRA												3.06									
		IRL												0.065									
<i>Pseudocarcharias kamoharai</i>	PSK	KOR																1.354					
Pelagic Sharks nei	PXX	USA	14.31																				
<i>P. violacea</i>	PLS	CUW																		+			
		SLV																			0.001		
		ESP																			0.007		
		FRA															0	0.012		0	0.007	0.03	0.007
		GTM																		+			
		KOR																0.01					
		PAN																		+			

Table 12.2f. Other pelagic sharks in the Northeast Atlantic. Summary of total reported landings data (2000–2020) as reported to ICCAT (Task 1 Nominal catch data; downloaded 16/06/2022; ICCAT version of 27/01/2022, includes landings and dead discards) for Sampling Areas (SAs) BIL94B and BIL94C in the North-east Atlantic. These data relate to both the ICES area and extend southwards into the central eastern Atlantic (to 5°N). Data for the Mediterranean Sea (BIL95) not included. These data may include coding errors and taxonomic errors.

Scientific name	Code	Nation	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>M. birostris</i>	RMB	CUW																		0.058			
		SLV																		0.006			
		ESP																		0.162			
		GTM																		+			
		PAN																		0.003			
<i>M. japonica</i>	RMJ	CUW																		0.27			
		SLV																		0.184			
		ESP																		1.445			
		FRA																		0.148			
		GTM																		0.013			
<i>M. mobular</i>	RMM	PAN																		0.074			
		CUW																		0.242			
		SLV																		1.212			
		ESP																		2.604			
		FRA																		0.197	1.366	4.222	0
<i>M. tarapacana</i>	RMT	GTM																		0.007			
		PAN																		0.23			
		FRA																				0.15	1.206
		CUW																		0.355			
		SLV																		0.083			
Mobulidae	MAN	ESP																		1.315			
		GTM																		0.001			

Table 12.3. Other pelagic sharks in the Northeast Atlantic. Shark bycatch in the Spanish swordfish longline fisheries of the NE Atlantic. Data from Castro *et al.*, 2000 and Mejuto *et al.*, 2002.

Shark bycatches of the Spanish longline swordfish fishery								
Northeast Atlantic	<i>Carcharhinus</i> spp.	<i>Sphyrna</i> spp.	<i>Galeocerdo cuvier</i>	<i>Isurus paucus</i>	<i>Mobula</i> spp.	Total by-catch	% sharks	% blue shark
1997	148	382	3	8		28 000	99.4	87.5
1998	190	396	5	8	7	26 000	99.4	86.5
1999	99	240	4	18	1	25 000	98.6	87.2

Table 12.4. Other pelagic sharks in the Northeast Atlantic. Reported landings (t) by country for 2000–2018 (Source FAO Fish-Stat 2020) for Atlantic, northeast fishing area. * Data for *Galeocerdo cuvier* are considered to be coding errors

FAO FISHSTAT (2020)		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Country	Species																			
Portugal	<i>Sphyrna zygaena</i>	22	10	21	18	27	43	39	39	32	35	54	0	0	0	2	1	0	0	0
Spain	<i>Mobula mobular</i>					1	3	3	2	1	3	4	5	0						
	<i>Sphyrna zygaena</i>			9	88	167	246	117	144	66	85	0	0	0	0	0	0	0	0	0
	<i>Galeocerdo cuvier</i>					2	4	5	3	2	-									
France	<i>Pteroplatytrygon violacea</i>													1	0	0	0	0	0	0
Netherlands	* <i>Galeocerdo cuvier</i>			13	48	48	64	54	38	32	39	0	53	15	0	0	0	0	0	0
TOTAL		22	10	42	154	245	360	218	226	133	162	58	58	16	0	2	1	0	0	0

Table 12.5. Other pelagic sharks in the Northeast Atlantic. Preliminary compilation of life-history information for NE Atlantic sharks.

Species	Distribution Depth range	Max. TL cm	Egg development	Maturity size cm	Age at maturity (years)	Gestation period (months)	Litter size	Size at birth (cm)	Lifespan years	Growth	Trophic level
White shark <i>Carcharodon carcharias</i>	Cosmopolitan 0–1280 m	720	Ovoviviparous+ oophagy	372–402	8–10	?	7–14	120–150	36	$L_{\infty} = 544$ $K = 0.065$ $T_0 = -4.40$	4.42–4.53
Longfin mako <i>Isurus paucus</i>	Cosmopolitan	417	Ovoviviparous	230 F 215 M			2–8	97–120			4.5
Spinner shark <i>Carcharhinus brevipinna</i>	Circumtropical 0–100 m	300	Viviparous	176–212	7.8–7.9	10–12	Up to 20	60–80		$L_{\infty} = 214$ FL $K = 0.210$ $T_0 = -1.94$	4.2–4.5
Silky shark <i>Carcharhinus falciformis</i>	Circumtropical 0–500 m	350	Viviparous	210–220 M 225 F	6–7 7–9	12	2–15	57–87	25	$L_{\infty} = 291/315$ $K = 0.153 / 0.1$ $T_0 = -2.2 / -3.1$	4.4–4.52
Oceanic whitetip <i>Carcharhinus longimanus</i>	Cosmopolitan 0–180 m	396	Viviparous	175–189	4–7	10–12	1–15	60–65	22	$L_{\infty} = 245 / 285$ $K = 0.103 / 0.1$ $T_0 = 2.7 / -3.39$	4.16–4.39
Dusky shark <i>Carcharhinus ob- scurus</i>	Circumglobal	420	Viviparous	220–280	14–18	22–24	3–14	70–100	40	$L_{\infty} = 349 / 373$ $K = 0.039 / 0.038$ $T_0 = -7.04 / -6.28$	4.42–4.61
Sandbar shark <i>Carcharhinus plumbeus</i>	Circumglobal 0–1800 m	250	Viviparous	130–183	13–16	12	1–14	56–75	32	$L_{\infty} = 186$ FL $K = 0.046$ $T_0 = -6.45$	4.23–4.49
Night shark <i>Carcharhinus sig- natus</i>	Atlantic 0–600 m	280	Viviparous	185–200	8–10	~12	4–12	60		$L_{\infty} = 256 / 265$ $K = 0.124 / 0.114$ $T_0 = -2.54 / -2.7$	4.44–4.5
Tiger shark <i>Galeocerdo cuvier</i>	Circumglobal 0–350 m	740	Ovoviviparous	316–323	8–10	13–16	10–82	51–104	50	$L_{\infty} = 388 / 440$ $K = 0.18 / 0.107$ $T_0 = -1.13 / -2.35$	4.54–4.63
Scalloped ham- merhead <i>Sphyrna lewini</i>	Cosmopolitan 0–512 m	430	Viviparous	140–250	10–15	9–10	13–31	45–50	35	$L_{\infty} = 320 / 321$ $K = 0.249 / 0.222$ $T_0 = -0.41 / -0.75$	4.0–4.21

Species	Distribution Depth range	Max. TL cm	Egg development	Maturity size cm	Age at maturity (years)	Gestation period (months)	Litter size	Size at birth (cm)	Lifespan years	Growth	Trophic level
Great hammer-head <i>Sphyrna mokarran</i>	Circumglobal 1–300 m	610	Viviparous	250–292		11	13–42	60–70		$L_{\infty} = 264 / 308$ (FL) $K = 0.16 / 0.11$ $T_0 = -1.99 / -2.86$	4.23–4.43
Smooth hammer-head <i>Sphyrna zygaena</i>	Circumglobal 0–200 m	500	Viviparous	210–265		10–11	20–50	50–60			4.32–4.5
Pelagic stingray <i>Pteroplatytrygon violacea</i>	Cosmopolitan 37–238	160	Ovoviviparous	35–40 DW	2–3	2–4	4–9	15–25 DW	~10	$L_{\infty} = 116$ DW $K = 0.0180$	4.36
Giant devilray <i>Mobula mobular</i>	NE Atl. + Med. epipelagic	520	Ovoviviparous			25	1	≤ 166 DW			3.71