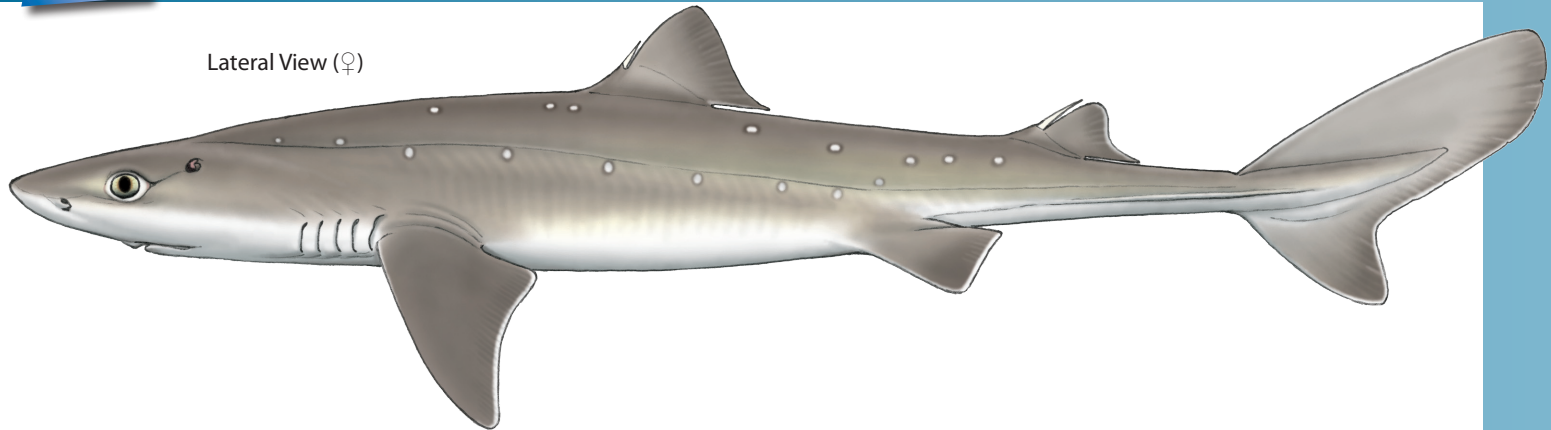
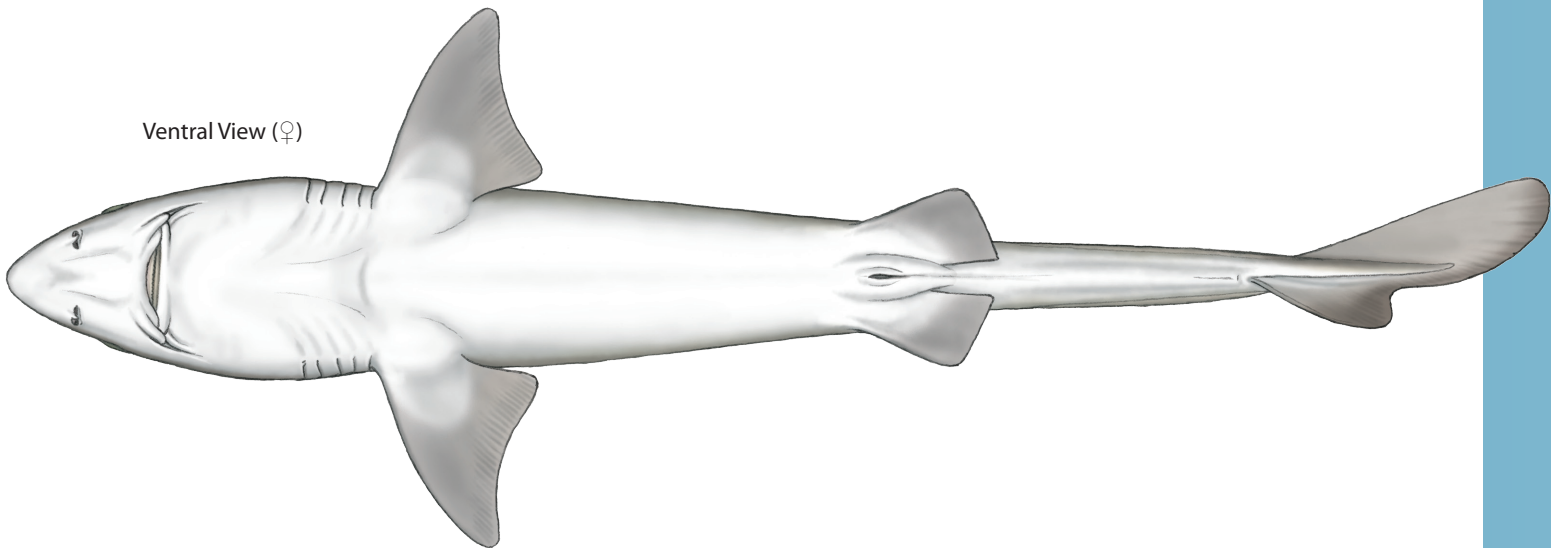


Lateral View (♀)



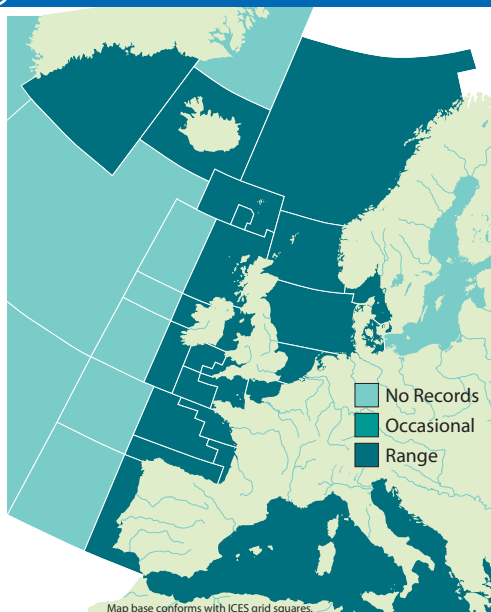
Ventral View (♀)



### SYNONYMS

*Squalus spinax* (Olivius, 1780), *Squalus fernandinus* (Molina, 1782), *Acanthias antiquorum* (Leach, 1818), *Acanthias vulgaris* (Risso, 1826), *Acanthias americanus* (Storer, 1846), *Spinax mediterraneus* (Gistel, 1848), *Spinax* (*Acanthias*) (Girard, 1854), *Acanthias sucklii* (Girard, 1858), *Acanthias linnei* (Malm, 1877), *Acanthias lebruni* (Vaillant, 1888), *Acanthias commun* (Navarette, 1898), *Squalus mitsukurii* (Tanaka, 1917), *Squalus wakiyae* (Tanaka, 1918), *Squalus kirki* (Phillips, 1931), *Squalus whitleyi* (Phillips, 1931), *Squalus barbouri* (Howell-Rivero, 1936).

### DISTRIBUTION



The Spiny Dogfish has a wide distribution excluding the poles, tropics and Indian Ocean. In the east Atlantic it can be found from Iceland and Murmansk to West Sahara and the Canary Isles, including the Mediterranean and Black Seas. It is known from South Africa, the west Atlantic and the Pacific (Compagno, 1984; Bester, Unknown).

### COMMON NAMES

**Spiny Dogfish**, Spurdog, Piked Dogfish, Dogfish, Blue Dog, Darwen Salmon, Rock Salmon, Spring Dogfish, Victorian Spotted Dogfish, White-Spotted Dogfish, Aiguillat Commun (Fr), Mielga (Es).

### APPEARANCE

- Two dorsal fins with large, ungrooved spines.
- First dorsal fin originates behind free rear tips of the pectoral fins.
- No anal fin.
- No subterminal notch on caudal fin.
- Strong lateral keel on caudal fin.
- White spots are present on the grey flanks.

Female Spiny Dogfish grow to a maximum total length of 110–124cm in the North Atlantic, 130–160cm in the North Pacific, 200cm in the Mediterranean and 111cm around New Zealand. Males grow to a maximum 83–100cm in the North Atlantic, 100–107cm in the North Pacific and 90cm around New Zealand (Anon, 2006). Both dorsal fins have large, ungrooved spines and conspicuous free rear tips. The first originates behind the free rear tips of the pectoral fins, the second is smaller and originates above or slightly behind the free rear tips of the pelvic fins. There is no anal fin. The dorsal caudal lobe is large with no subterminal notch or lobe. The caudal keel is well developed (Compagno, 1984).

The dorsal surface is slate coloured to brown. There is a row of small white spots along each side from above the pectoral fins to above the pelvic fins. These spots are more conspicuous on immature fish, fading with age. The edges of the dorsal fins and caudal fin can appear dusky in very young individuals but quickly fade with age. The ventral surface can be pale grey to pure white (Bester, Unknown).

## SIMILAR SPECIES

*Galeorhinus galeus*, Tope

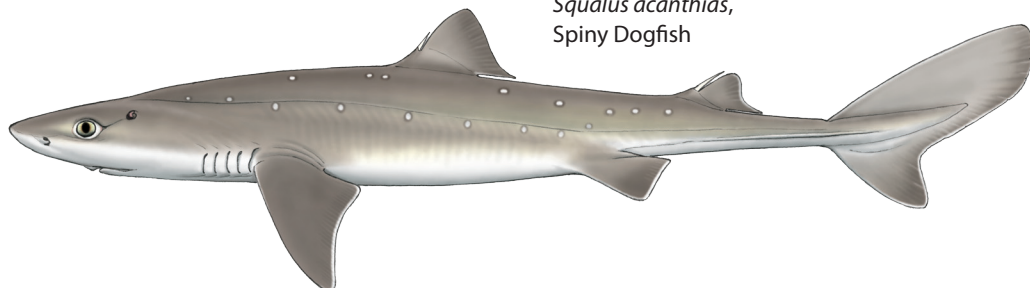
*Mustelus asterias*, Starry Smoothhound

*Mustelus mustelus*, Common Smoothhound

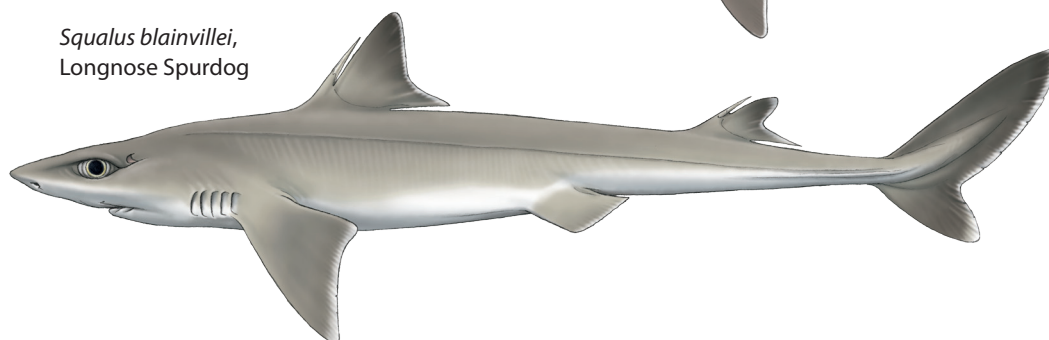
*Squalus blainvillei*, Longnose Spurdog

*Squalus megalops*, Shortnose Spurdog

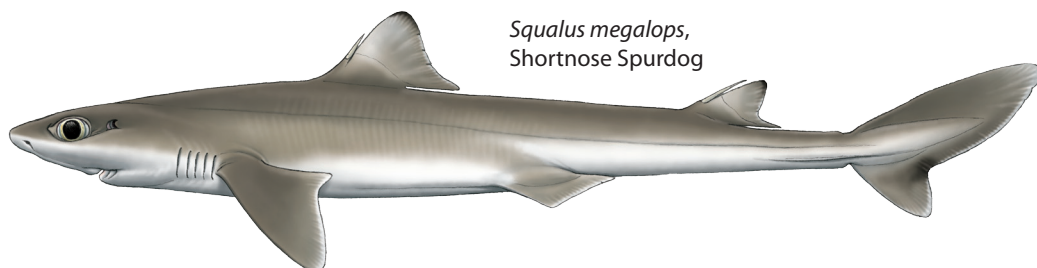
*Squalus acanthias*,  
Spiny Dogfish



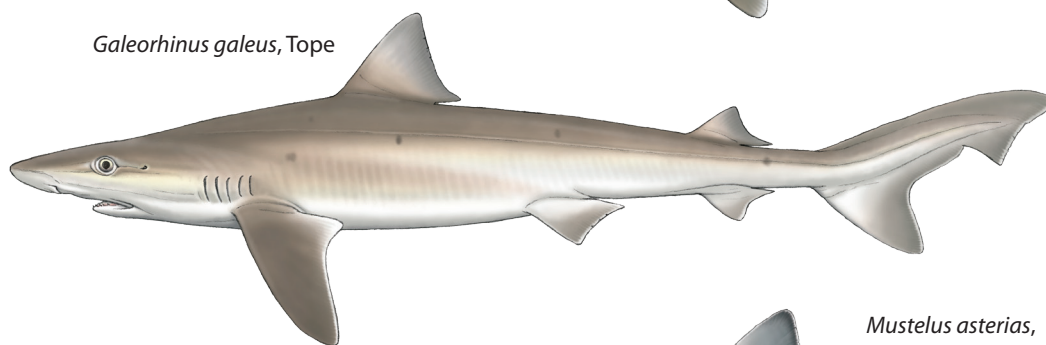
*Squalus blainvillei*,  
Longnose Spurdog



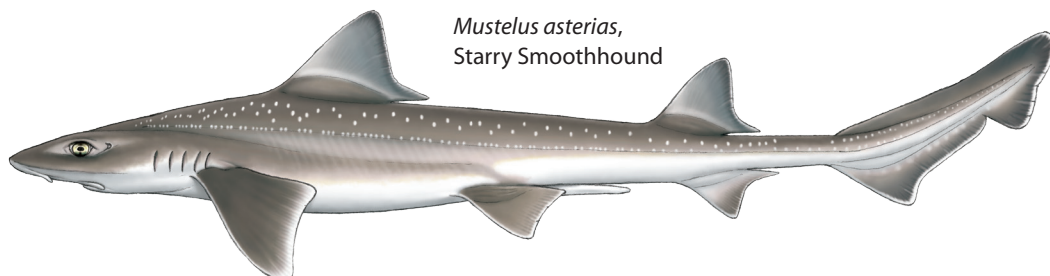
*Squalus megalops*,  
Shortnose Spurdog



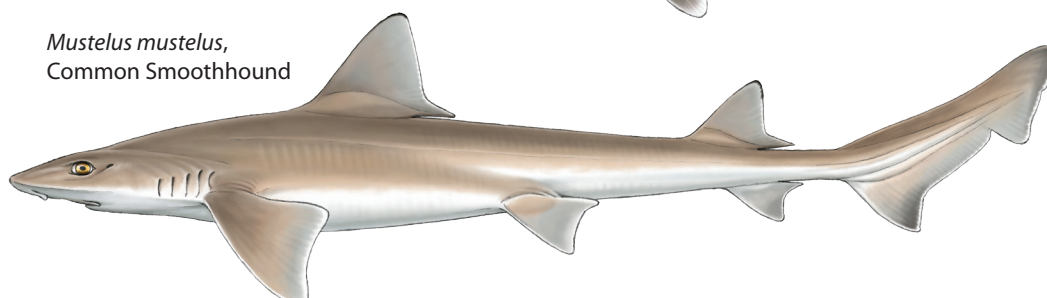
*Galeorhinus galeus*, Tope



*Mustelus asterias*,  
Starry Smoothhound



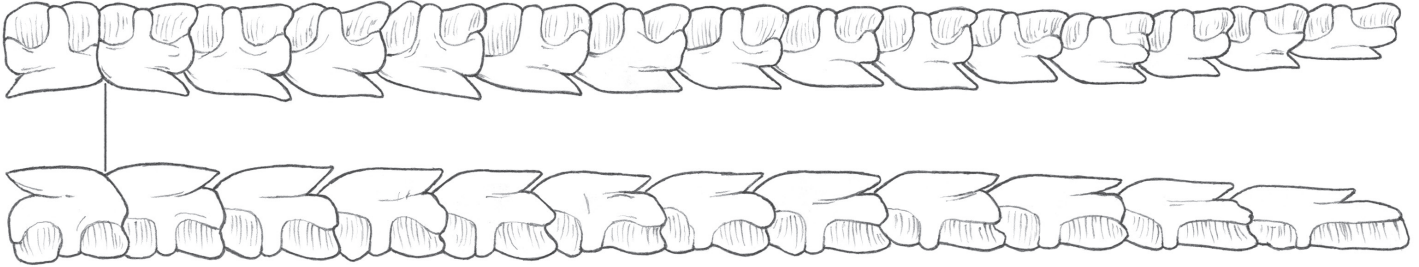
*Mustelus mustelus*,  
Common Smoothhound



(Not to scale)

### TEETH

There are oblique-cusped cutting teeth in both jaws, 28 in the upper jaw, 22–24 in the lower jaw (Compagno, 1984; Bester, Unknown).



### ECOLOGY AND BIOLOGY

#### HABITAT

The Spiny Dogfish is a highly migratory species which is not known to associate with any particular habitat (Fordham *et al.*, 2006). It is predominantly epibenthic although it can be found throughout the water column from inshore waters to the continental shelf (Bester, Unknown). The maximum depth recorded is 900m (2,950ft) but it is most commonly found around 10–200m (33–655ft) (Compagno, 1984).

They segregate by size before reaching sexual maturity, with the younger, smaller sharks staying near the surface. The older the sharks become, the deeper they stay (Wood *et al.*, 1979). After sexual maturity the males and females also segregate, although they still segregate by size. The females remain in mid-water, moving to shallow water to give birth. The males stay further from the coast and closer to the bottom (Hjertnes, 1980; Nammack *et al.*, 1985).

It has been recorded through tagging studies that the species is highly migratory. In both the northeast and northwest Atlantic there are single populations which migrate seasonally (Aasen, 1964; Hjertnes, 1980; Gauld and MacDonald, 1982; Templeman, 1976). There have also been transatlantic migrations recorded although these are rare (Holden, 1967; Templeman, 1976). It appears to be temperature which drives these migrations as the Spiny Dogfish favours temperatures around 7–8°C (44.6–46.4°F) to 12–15°C (53.6–59°F). Salinity can also drive small scale migrations such as in the San Francisco Bay, the salinity of which drops after heavy precipitation becoming less tolerable for the Spiny Dogfish (Compagno, 1984).

#### DIET

A 1996 study in the Irish Sea showed that the Spiny Dogfish feeds predominantly on teleost fish in that region, with crustaceans also forming a large part of the diet of smaller specimens (<60cm). For all sizes combined, the most important identifiable species were Atlantic Herring, *Clupea harengus* (11.87%), Whiting, *Merlangius merlangus* (8.15%), Norway Pout, *Trisopterus esmarkii* (6.17%), Poor Cod, *Trisopterus minutus* (5.36%) and Atlantic Mackerel, *Scomber scombrus* (5.36%). For animals less than 60cm in length, *Pagurus* spp. (9.70%) and *Calianassa* spp. (5.97%) were also important. In total, fish made up the majority of the diet (80.79%) followed by crustaceans (11.87%) and molluscs (2.79%) (Ellis *et al.*, 1996).

Conversely, a New Zealand study of the stomach contents of 7,283 Spiny Dogfish showed a preference for crustaceans (60%) with fish constituting a smaller part (15%) of the diet. Of these, Squat Lobster, *Munida greguria* (30%), and the euphausiid *Nyctiphanes*

#### DIET CONTINUED

*australis* (20%) were the most important. It is interesting to note that incidences of cannibalism were also reported to be high compared with North Atlantic studies (Hanchet, 1991). It has been reported that the species will scavenge on trawler discards, suggesting that it is an opportunistic feeder able to exploit a wide variety of prey (Kaiser and Spencer, 1994).

#### REPRODUCTION

The life history and reproductive characteristics of the Spiny Dogfish are relatively well known, particularly in the North Atlantic, due to its abundance and interest to fisheries. The size and age at maturity vary between sub-populations. In the northwest Atlantic females mature at around 75cm total length at an age of 12 years, males around 60cm total length and at an age of 6 years. In the northeast Atlantic, females are reported to mature slightly larger and older at 83cm total length and 15 years (Anon, 2006).

In the Pacific Ocean, it matures later and at a larger size. Females in the northeast Pacific reach maturity at 23 years of age and at around 93.5cm total length. Males also mature later in the northeast Pacific at around 14 years of age (Anon, 2006).

Mating occurs offshore and development is ovoviviparous (Bester, Unknown). The gestation period has been recorded as being 18–22 months, one of the longest recorded for any vertebrate (Anon, 2006). This does not appear to change between the Atlantic and Pacific Oceans. However, it has been reported that development in the Black Sea takes only 12 months (Kirnosova, 1989). During the last 17–19 months of development, the embryo receives no nourishment from the mother and is instead nourished by its yolk sac (Bester, Unknown).

Off the east coast of New Zealand's South Island it has been reported that during the first year of pregnancy, females move inshore to shallow water (~50m). During the second year however, the majority move back to deeper water (200–300m) where they give birth and then mate again (Hanchet, 1998). It has also been reported that the species gives birth in offshore, deepwater wintering grounds in the North Atlantic (Castro, 1983). However off Newfoundland, it has been reported that females move inshore to give birth from January to May (Templeman, 1944). This has also been recorded through July and August from the San Juan Islands of Washington (Camhi, 1999).

In both hemispheres, females give birth to a litter of 1–20 young varying from 18–30cm total length. The average size at birth in the northeast Atlantic (from Swedish waters) has been reported as 26–27cm total length, although these figures depend on the size of the mother (Stenberg, 2005; Compagno, 1984). There is believed to be no resting stage with females giving birth every 2 years (Anon, 2006).



## COMMERCIAL IMPORTANCE

A valuable species, the Spiny Dogfish is taken across much of its range in targeted fisheries and as bycatch in mixed species fisheries. The majority are taken by bottom trawls, gillnets, longlines and by rod and reel (Fordham *et al.*, 2006). The biggest demand is in western Europe with the majority landed from the northeast Atlantic or imported from North America and Scandinavia (European Commission, 2006).

## IUCN RED LIST ASSESSMENT

Vulnerable (2006).

Critically Endangered in northeast Atlantic.

## THREATS, CONSERVATION, LEGISLATION

The Spiny Dogfish is a highly migratory species which is protected in only a limited part of its range. Naturally abundant, its late maturity, low reproductive capacity, longevity, long generation time and very low rate of population increase makes it extremely vulnerable to overfishing. Once considered the most abundant and widespread elasmobranch species, populations have fallen across its range, particularly in the northeast Atlantic where declines of 95% have been recorded due to intense fishing pressure (Fordham *et al.*, 2006).

Despite these significant declines, very few management measures are in place for the Spiny Dogfish. In the EU, a Total Allowable Catch (TAC) has been in place since 1999 although it only became restrictive in 2005. The table below shows the TAC in ICES areas IIa and IV compared to landings from 1999 to 2007. In 2007, ICES areas I, IIIa, IV–VIII, XII and XIV were brought under a TAC and assigned 2,820t. In 2008 area IIIa was removed from this list and the TAC was reduced to 2,004t.

ICES Division	1999	2000	2001	2002	2003	2004	2005	2006	2007
TAC in IIa & IV	8,870	8,870	9,070	7,100	5,640	4,472	1,136	961	791
Landings in IIa & IV	3,006	2,847	2,259	1,963	2,148	2,044	1,406	978	714

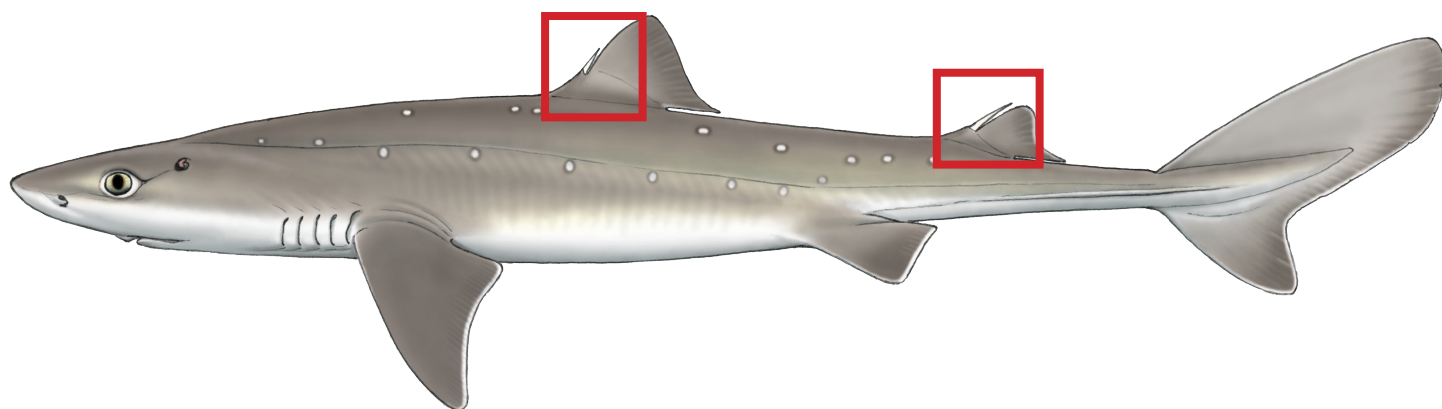
(All figures in tons.)

In 2009 the total TAC was reduced by 50% to 1,422t. Areas IIa and IV were assigned 316t, area IIIa was assigned 104t and areas I, V–VIII, XII and XIV were assigned 1,002t. A maximum landing size of 100cm was implemented for all of these areas to protect the largest, most fecund females. In 2010, this TAC was reduced by a further 90% with the remaining 10% only allowed to be taken as bycatch. In the UK, this has translated as two fish per trip per boat, with the 100cm maximum landing size still in place.

It has long been understood that the fishery must be closed if stocks are to recover and ICES have recommended that the TAC be set at zero since 2006 (Fordham *et al.*, 2006). As yet this has not been done, although it is believed that the European Commission will set the TAC for 2010 at 0. It remains to be seen if populations can recover to their previous levels.

## HANDLING

- Handle with care.
- Large, venomous dorsal spines.
- Powerful jaws and sharp teeth.
- Abrasive skin.



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