

Geographical, seasonal occurrence and incidental fishing captures of basking shark *Cetorhinus maximus* (Chondrichthyes: Cetorhinidae)

Julio Valeiras*[‡], Alfredo López^{†‡} and Manuel García^{‡‡}

*Instituto Español de Oceanografía, Puerto Pesquero, s/n, Apartado 285, 29640 Fuengirola (Málaga), Spain.
E-mail: julio.valeiras@ma.ieo.es. †Instituto de Investigaciones Marinas, Eduardo Cabello, 6, 36208 Vigo, Spain.

‡Instituto Español de Oceanografía, Apartado 1552, 36280 Vigo, Spain. †Co-ordinator for Marine Mammal Study (CEMMA), Apartado 165, 36380 Gondomar (Pontevedra), Spain

This is the first report on the presence of basking sharks *Cetorhinus maximus* in Galician waters (north-west Iberian Peninsula) from sightings, strandings and incidental catches by fishing gear. Morphometric, biological, geographic and temporal data on 19 basking sharks recorded from 1988 to 1998 are presented. Average total length is 401.4 cm. Male:female ratio is 0.6. Seventy per cent of records are from incidental fishing catches in bottom gill nets. Approximately 74% of sharks were recorded during February, March and April, which may suggest that the species occurs seasonally in this area.

Cetorhinus maximus is a plankton feeding shark (Lamniformes: Cetorhinidae) distributed world-wide in boreal to warm temperature waters. In the north-east Atlantic, this species occurs from the Arctic to North Africa, including the Iberian Peninsula waters, Canary Islands and Mediterranean Sea (Compagno, 1984).

Several authors have recorded occurrence of basking sharks in Atlantic Iberian Peninsula waters, but data are scarce. Navaz y Sanz (1961) reported the captures of six juveniles and two adults from 1946 to 1958 off the San Sebastian coasts (Cantabric Sea). De Buen (1935) included the basking shark in the fish catalogue of Spanish and Portuguese coasts, and Lozano Rey (1928) recorded a stranding in spring of 1915 in Pontevedra (north-west Spain). Solórzano et al. (1988) indicated occasional fishing captures in some Galician ports including A Coruña and Ribeira (north-west Spain). In 1945, a whaling boat landed a 7 m total length male in Ponteceso harbour (Co-ordinator for Marine Mammal Study, unpublished data).

Its biology is poorly known and many aspects on movements, reproduction and ecology are not clear (Castro et al., 1999). In Ireland and Great Britain, it is locally common in spring and summer at the same time of high plankton abundance (Sims & Quayle, 1998). Most of the records at Biscay Gulf are in May and June (Quéro et al., 1995). According to different authors, large changes in the frequency of observations throughout the year can suggest seasonal movements between low and high latitudes or maybe seasonal movements from shallow to deeper waters.

The species has been the target of regional fisheries for centuries in waters of great shark density, such as the west coast of Ireland, Iceland, Norway and Scotland (Kunzlik, 1988), and it is still the target of Norwegian ships in North Atlantic waters (Anonymous, 1995). In the Cantabrian Sea, the basking shark has been harpooned off the Basque coast (Lozano Rey, 1928).

Basking shark bycatches are not very well known, but it is incidentally caught by fixed bottom nets (Castro et al., 1999) and drifting nets (Anonymous, 1997). Stocks of basking shark have experienced a strong decrease due to overfishing and incidental catches and the species populations are considered to be extremely vulnerable (Castro et al., 1999; Compagno, 1984).

Information available for this work was obtained from sightings, strandings and incidental catches from the coastal area of

Galicia (north-west Iberian Peninsula) between the estuary of the River Miño (41°52.50'N 08°52.50'W) and the ría of Ribadeo (43°33.20'N 07°02.00'W).

Nineteen confirmed and documented records recorded from 1988 to 1998 were studied. Data on date, geographical position, total length, fate circumstances and biological samples were obtained when possible. Total length (distance between nose and top of upper lobe of caudal fin) of 16 basking sharks was recorded (N=19), which reached a minimum of 250 cm to a maximum of 860 cm. Average length was 401.4 cm. A percentage of 87.5% of observed specimens displayed less than 450 cm total length, which means that most of the sharks were in a juvenile stage (Compagno, 1984). Recorded presence or absence of pterigopods resulted in the sex identification of five females and three males (N=8). The male/female ratio ranges 0.6.

Specific external and internal examinations were made on three specimens: code Cma9, Cma11 and Cma18 (Table 1). Specimens Cma9 (March 1995) and Cma11 (April 1997) presented denticle gill rakers. Specimen Cma18 (November 1998) had a lack of gill rakers. Specimen Cma11 contained between 20 and 301 of red stomach content, exclusively made up of partially digested zooplankton. This could agree with the seasonal migration model developed by Parker & Boeseman (Kunzlik, 1988). According to these authors, *Cetorhinus maximus* lacks denticle gill rakers at the start of a non-feeding hibernation period until it experiences the annual growth of these essential structures for the plankton feeding period.

Male Cma9 presented several indeterminate parasitic copepods fixed to the ventral surface of the right pectoral fin. The spiral valve of specimen Cma11 was heavily parasitized by cestodes. Pectoral, anal and caudal fins of female Cma18 presented many of the parasitic copepods, *Dinemoura producta* (Müller, 1785), fixed to the epidermis.

In two cases, causes of death were not verified. Incidental fishing catches (N=12) occurred in fixed entanglement bottom nets (called 'trasmallo' or 'miño'), used by an artisanal coastal fleet (Figure 1). Incidental catches caused the death or injuries to sharks and made significant damage to the fishing gear. Afterwards, of the 12 incidental catches, three cases led to sales at landing markets, the release of two live sharks and the discard of three dead sharks at sea. Although the final destinations of

Table 1. Records of *Cetorhinus maximus* in Galicia (north-west Iberian Peninsula) (1988–1998).

Fish Code	Date	Location	Latitude–Longitude	Sex	TL (cm)	Type of record
Cma1	10/02/88	Carril (Pontevedra)	42°36.80'N 08°46.40'W	I	350	I
Cma2	11/02/92	Raxó -Poio (Pontevedra)	42°25'N 08°42.60'W	F	298	CL
Cma3	14/03/92	P. Cangas. Foz (Lugo)	43°37.20'N 07°19.20'W	I	860	ST
Cma4	28/04/92	Islas Sisargas (A Coruña)	43°30'N 09°00'W	I	400*	S
Cma5	03/04/93	Corme (A Coruña)	43°08.50'N 09°11'W	I	350	C
Cma6	19/04/93	O Grove (Pontevedra)	42°30'N 08°51.75'W	I	345	U
Cma7	13/02/94	Louro, Muros (A Coruña)	42°45'N 09°05'W	I	–	ST
Cma8	01/03/95	Pta. Restrelo, Fisterra (A Coruña)	42°54'N 09°15'W	I	–	ST
Cma9	29/03/95	Portosín (A Coruña)	42°45.40'N 08°57'W	M	445	CD
Cma10	20/03/96	Rodeira, Cangas (Pontevedra)	42°15.50'N 08°46.50'W	M	388	CD
Cma11	07/04/97	Ensenada de Baiona (Pontevedra)	42°07.30'N 08°53.30'W	I	347	C
Cma12	01/07/97	Puerto de O Grove (Pontevedra)	42°30'N 08°51.75'W	I	400	C
Cma13	01/09/97	Ría Vigo (Pontevedra)	42°13'N 08°50'W	I	700*	S
Cma14	23/04/98	Bueu (Pontevedra)	42°19.50'N 08°47'W	F	350*	CL
Cma15	25/04/98	Lonja de Cambados (Pontevedra)	42°31.10'N 08°48.75'W	I	–	CD
Cma16	27/04/98	Islas Cíes (Pontevedra)	42°13.25'N 08°55'W	M	300	C
Cma17	15/05/98	Lonja de Riveira (Pontevedra)	42°33.80'N 08°59.50'W	F	320	CS
Cma18	18/11/98	Islas Sisargas (A Coruña)	43°21'N 08°50'W	F	319	CS
Cma19	01/12/98	Lonja de Vigo (Pontevedra)	42°14'N 08°43.50'W	I	250	CS

C, capture in fishing gear; CD, capture and discard; CL, capture and free live; CS, capture and sell whole or part of the shark; F, female; I, indeterminate; M, male; S, sighting at sea; ST, stranding at coast; U, unknown; *, estimated total length.

the sold sharks were not clear, information indicates the use of their meat for fish meal and their sale in south Spanish markets.

Although most of the records have been reported, some differences in frequency of records between years could be explained by the difficulty of detecting findings. An increase in records in 1997 and 1998 could be the result of improved sampling resources and better collaboration with fishermen as well as an increased awareness of endangered marine animals. Despite this, monthly distribution indicates that 73.7% of records occurred during the months: February, March and April. This could suggest a seasonal pattern of local abundance, which could be related to seasonal movements in North Atlantic waters. Most of the records from the Biscay Gulf are in May and June (Quéro et al., 1995). In Ireland and Great Britain, the frequency of observations increased in the spring (Sims & Quayle, 1998). In agreement with these authors, this could be explained by a displacement of population during summer to northern areas richer in plankton resources. The effect from the geographical and seasonal distribution of fisheries effort and oceanographic factors must be taken into account. Fishing effort is very stable all year round and usually there is a small increase during the summer for small boats due to the good weather. Geographic position of records indicates that the basking shark could be more frequent in the western coastal waters of the studied area.

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