

Whale shark fishery off Veraval

E VIVEKANANDAN¹ and M S ZALA²

Veraval Research Centre, Central Marine Fisheries Research Institute, Veraval,
Gujarat 362 265

Received: 30 January 1992

The occurrence of the whale shark *Rhiniodon typus* Smith is considered a rarity and hence, most of the publications on the whale shark are restricted to its stranding, incidental catch and length measurements. Compagno (1984) reported that commercial harvesting of the whale shark is practically non-existent. However, Rao (1986) observed existence of a small harpoon fishery for the whale shark in Veraval (Saurashtra coast). Recently, there has been a remarkable increase in effort as well as catch. There are no records to indicate a directed fishery for the whale shark elsewhere in the world. The objective of this study is limited to reporting the existence of the whale shark fishery at Veraval.

The whale sharks occur in the fishing areas off Veraval during March–June every year. On seeing the shark the fishermen venture into the sea in mechanized boats (length: 43') and bring the boat very near to the docile shark. The fishermen manually shoot a specially made heavy hook (similar to harpoon) on the shoulder area of the shark above the gills. The hook is attached to a long nylon rope one end of which is tied to the boat. Accurate shooting penetrates the hook into the body and the shark starts dragging the boat. The engine is then switched off and the boat is allowed to be dragged by the shark. After about an hour,

the tired shark is towed to the harbour where the liver and the fins are removed by keeping the shark in water alongside the boat. The carcass is dumped in the sea as the flesh has no local demand. Each fishing operation commences by about 0500 hrs and is completed by 1500–1800 hrs, depending on the availability of the fish. The fishing season commences in March/April, and in the peak season (April and May) almost all the boats capture a shark each. The fishing season ceases in June.

The number of units engaged in fishing operation and the number of whale sharks caught were monitored both by direct observation in the Veraval Fisheries Harbour every day during March–June and by enquiring with the fishermen. The number of sharks caught every month was later counter checked from the merchants who purchase the liver and fins. The sharks were normally tied alongside the boat, to measure the length fairly accurately and to determine sex. The liver cut by the fishermen into large pieces was weighed by using spring balances. The weight of the liver in each observed shark was noted.

In the 4 years (1988–1991), a total of 647 whale sharks were captured by 701 fishing units. The effort increased by 33% from 153 units in 1988 to 203 units in 1991. Correspondingly, the number of sharks landed also increased by about 33% from 139 to 186 (Table 1). Despite increase in effort, the percentage of successful capture was uniformly high (above 90%) in all the

Present address: ¹Senior Scientist, Madras Research Centre, Central Marine Fisheries Research Institute, Egmore, Madras 600 008.

²Technical Assistant.

Table 1. Number and size range of whale shark *Rhiniodon typus* landed by boats at Veraval landing centre during 1988-1991

Year/Month	No. of fishing units	Number of whale sharks		Length range (m)	Modal length (m)	
		Captured	Observed			
1988	March	45	40	8	7.0-11.6	7.1-7.5
	April	25	25*	12	5.6-12.0	10.1-10.5
	May	51	51	4	9.5-11.6	-
	June	32	23	Nil	-	-
	Total	153	139	24	5.6-12.0	10.1-10.5
1989	March	43	40	2	-	-
	April	55	55	15	-	-
	May	62	55	3	-	-
	Total	160	150	20	-	-
1990	April	58	53	9	-	-
	May	108	108	Nil	-	-
	June	19	12	Nil	-	-
	Total	185	173	9	-	-
1991	April	27	24	3	9.1-11.0	-
	May	122	114	17	8.5-12.0	9.6-10.0
	June	54	48	19	8.0-11.0	9.6-10.0
	Total	203	186	39	8.0-12.0	9.6-10.0
Grand Total	701	648*	92*	5.6-12.0*	9.6-10.0	

*. Of the observed 92 sharks, length measurements were made only on 63 sharks; the length range pertains to 63 sharks. +. Includes one shark caught by gill net.

4 years which encouraged the fishermen to increase the effort further for the whale shark fishing. About 51% of the total number of sharks caught were in May, 24% in April and 12-13% each in March and June. During the other 8 months, no whale shark was sighted, hence no fishing effort was made.

The length range of the captured sharks was 5.6-12.0 m (n = 63). The smallest shark (5.6 m) was the only shark caught accidentally by gill net in April 1988 and the rest were caught by hook. The smallest shark caught by hook measured 7.0 m. The modal length group was 9.6-10.0 m (Table

2). Silas (1986) had concluded that *R. typus* measuring 3.2-12.2 m occur in Indian waters.

Of the 63 sharks, for which sex was determined, 32 were male and 31 were female. The smallest was a female and among the largest 3 specimens, 1 was male and 2 were female.

The whale shark is hunted for its liver. The oil extracted from the liver is used for painting boats and other wooden applications. The liver weight ranged from 200 to 900 kg (av. 543 kg, n = 63). There was linear relationship between the length

Table 2. Length frequency of the whale shark *Rhiniodon typus* in the commercial catch off Veraval observed during 1988-1991

Length group (m)	No. of sharks	Length group (m)	No. of sharks
5.6 - 6.0	1	9.1 - 9.5	7
6.1 - 6.5	0	9.6 - 10.0	14
6.6 - 7.0	1	10.1 - 10.5	8
7.1 - 7.5	2	10.6 - 11.0	7
7.6 - 8.0	3	11.1 - 11.5	1
8.1 - 8.5	8	11.6 - 12.0	6
8.6 - 9.0	5		

of the shark and the liver weight. The relationship was calculated by the method of least squares, using the formula, $\log W = a + b \log L$, where w , liver weight in kg; L , total length of shark in m and a and b are constants. The regression equation is:

$$\log W = 1.4419 + 1.3145 \log L; r = 0.814$$

The cost of liver increased from Rs 7/kg in 1988 to Rs 11/kg in 1991. Because of the increase in number of sharks, the total estimated weight of the shark increased from 755 to 1010 tonnes and that of the liver from 75 to 101 tonnes in 4-year period. Consequently the total value realized from the liver increased from Rs 5.28 lakhs in 1988 to Rs 11.11 lakhs in 1991. The total weight of the shark was calculated by considering that liver forms 10% of the total weight of the shark (Karbhari and Josekutty 1986, Rao 1986).

In earlier years, the fins were discarded. However, in 1991, there was demand for pectoral, dorsal and caudal fins of the whale shark and depending upon the size and weight the fins of each fish were sold for Rs 500-700. Thus, the average value of one whale shark at the 1991 market rate of Rs 11/kg for liver and Rs 600 for fins works out to Rs 6,573, taking the average liver weight as 543 kg.

The abundance and fishery of the whale shark is unique to Veraval/Saurashtra coast.

The whale shark normally inhabits offshore waters. Inshore movement in large numbers off Saurashtra coast in March-June is characteristic. Off the Maharashtra, Karnataka and Kerala coasts as well as off the west and east coasts of Sri Lanka, the whale shark occurs during December-March (Silas 1986). Probably, the shark migrates from Sri Lanka coast all along the west coast of India during December-March and reaches Saurashtra coast during March-June.

Compagno (1984) suggested that the whale sharks prefer areas where (i) the surface water temperature is 21°-25°C; (ii) the production of plankton and small nektonic organisms, which are supposedly food of whale sharks, are high; and (iii) bait fishes and tuna are abundant. However, none of these factors exists at Veraval. The water temperature was above 26°C during April-June and there was no evidence of higher production of plankton during March-June (Anonymous 1985). The abundance of bait fishes and tuna during March-June was normal as in other months. The reason for aggregation of whale sharks off Veraval during April-June, unfailingly every year, therefore, remains unknown.

Presently, only liver and fins of the whale shark are utilized. Elsewhere in the country, the meat recovered from incidental capture was salted, dried and used for human consumption (Karbhari and Josekutty 1986). Proper utilization of meat and skin would increase the value of whale shark landed at Veraval and also encourage capture of more sharks. However, Silas (1986) considered the whale shark as a highly vulnerable species, though not endangered, and opined that increase in any directed effort of capture, may result in great imbalance. To know the status of the whale shark resource, a detailed study on the basic biological characteristics, behaviour and migration of this largest fish is required.

REFERENCES

- Anonymous. 1985. Oceanographic studies off Sutrapada. Gujarat Heavy Chemical Ltd and National

- Institute of Oceanography Project Report*. 68 pp.
- Compagno L. J. V. 1984. Sharks of the world. *Food and Agriculture Organization, Fishery Synopsis*:125 (1): 249.
- Karbhari J. P. and Josekutty C. J. 1986. On the largest whale shark *Rhincodon typus* Smith landed alive at Cuffe Parade, Bombay. *Marine Fisheries Information Service, T and E Series* 66: 31-35.
- Rao G. S. 1986. Note on the occurrence of the whale shark *Rhincodon typus* Smith off Veraval coast. *Marine Fisheries Information Service, T and E Series* 66: 30.
- Silas E. G. 1986. The whale shark (*Rhincodon typus* Smith) in Indian coastal waters : Is this species endangered or vulnerable. *Marine Fisheries Information Service, T and E Series* 66: 1-19.