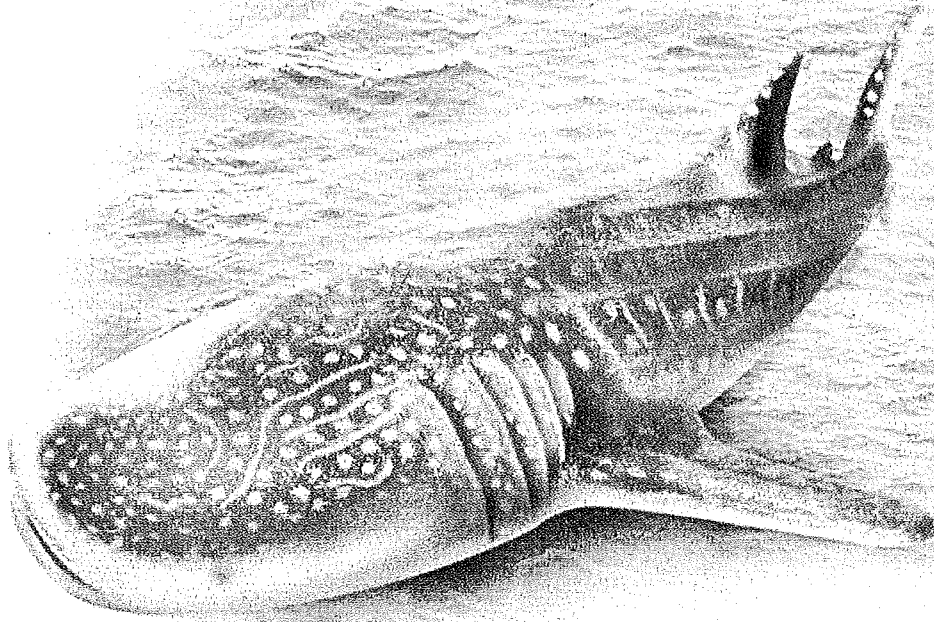


GENTLE GIANTS OF THE SEA

INDIA'S WHALE SHARK FISHERY

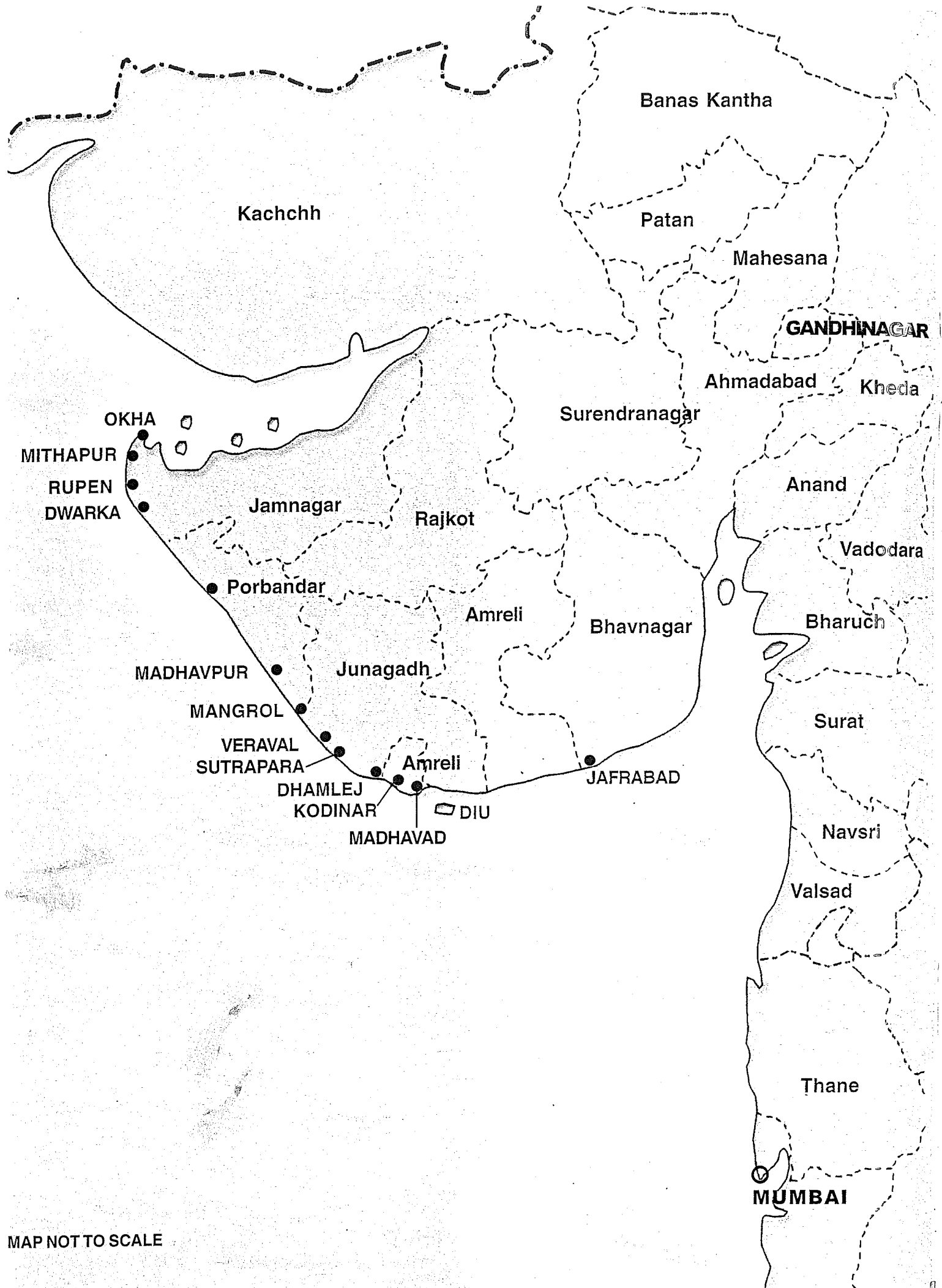
FAHMEEDA HANFEE



A report
on trade in Whale Shark
off the Gujarat coast



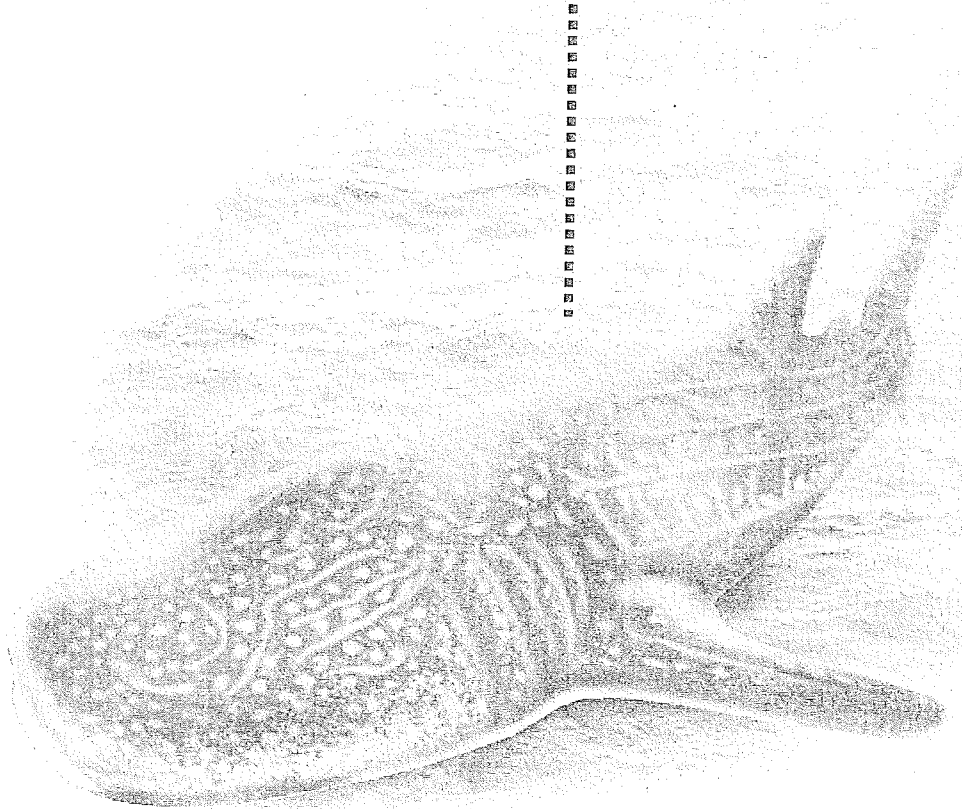
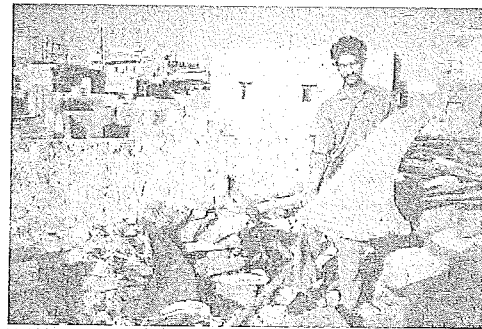
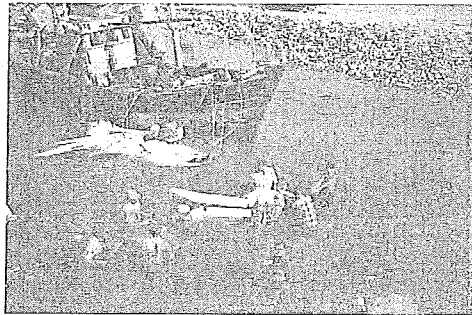
TRAFFIC
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GENTLE GIANTS OF THE SEA

INDIA'S WHALE SHARK FISHERY

Fahmeeda Hanfee



A report on
trade in whale sharks
off the Gujarat coast

The **World Wide Fund for Nature - India**, WWF-India has been working to promote harmony between humankind and nature for three decades. Today, it is recognized as a premier conservation NGO in the country dealing with conservation and development issues.

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Introduction

A preliminary survey of the trade in sharks and shark products in India was carried out in 1996-1997 by TRAFFIC-India. The sites selected for survey, were in the coastal states of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala, Maharashtra and Gujarat. During the survey in 1997 it was noticed that in Gujarat, Whale Shark (*Rhincodon typus*) fishing had started taking place on a considerable scale. It was understood that over the years fishery had become regular and Whale Sharks were being targeted for meat, fins, liver, skin and cartilage.

On reviewing the literature, it was noted that till the mid 1990's, Whale Shark was considered to be commercially unimportant. Recent surveys show that Whale Shark fishing is going on in an unregulated manner and the trade is uncontrolled. The fish is being killed particularly on the coast of Gujarat. Though there were reports of accidental catches from other maritime states it was observed that Whale Shark had become a target of the fishing industry around Veraval and Okha in Gujarat. Gujarat has been famous since times past for its large aggregations of Whale Sharks. Silas (1986) reports that a large aggregation was seen off Gujarat coast during April, 1982 when fishermen were reported to have harpooned about 40 sharks in four days from 12-15 April, 1982. Of these, 22 were taken to the Veraval fisheries harbour for removing the liver. The fate of the remaining 18 is not known.

The occurrence of the Whale Shark is rarely reported. Most publications on Whale Shark are restricted to reporting its stranding or stray accidental catches.

In the absence of any detailed studies, lack of information, awareness, and to highlight the current and potential threat from unregulated target fishing, TRAFFIC-India took up a year long field survey as part of a follow-up study of its earlier Shark study (Hanfee, F. 1997). The objective of the current study was to document the extent and composition of trade in Whale Shark (*Rhincodon typus*) along the coast of Gujarat.

Methodology

A detailed survey of literature pertaining to the Whale Shark occurrences and trade in India was carried out. Semi-structured interviews aimed at various fisheries experts and research institutes were carried out. People in processing plants dealing in Whale Shark processing and export in Veraval, Gujarat were personally interviewed and scientists at MPEDA-Cochin were contacted for information. Information on similar lines was also gathered from the fishermen in selected localities in and around Veraval including Bidia Bunder, Dhamlej and Okha. A field- assistant was identified and stationed in Veraval to document the actual catch on a day to day basis especially during peak season (March'99-May'99 and March'00-May'00).

Study area

The area selected for this study was the state of Gujarat, on the western coast of India. Whale Sharks occur in the fishing areas off Veraval during March-June every year (Vivekanandan and Zala, 1992). Gujarat has a long coastline of about 1,640 Kms, the longest of any state in India. It also has excellent estuarine areas. Mechanised boats were introduced first in 1956, initially at



Veraval, which is one of the most important fish-harbour of the state, although a few country crafts fitted with outboard engines had been in operation since 1953.

The state has 46 registered exporters, 1,426 fishing vessels, 41 freezing plants, 43 cold storage facilities and 16 other storage facilities. It has a total of 1,40,208 fishermen (subsistence and commercial) of which 52,388 are full-time. Total number of crafts are 2,10,108 with 4,283 motorised traditional crafts. The fishermen population was estimated to be 1,15,265 with 51,699 full time fishermen in 1992 (Handbook on fisheries statistics, 1996).

Duration

The field survey was conducted from March 1999 until May 2000, with recording of day to day landings of Whale Shark. Data from January 1999 to March 1999 was estimated from secondary sources (interviews with fishermen). First-hand data was collected for two subsequent seasons March-May 1999 and March-May 2000.

The areas examined during the survey for landings were Veraval, Dhamlej, Vanakbara (Diu), Rupen (Dwarka), Mangrel, Jafrabad, Kodinar, Sutrapada, Madhavad and Mithapur. (see map)

Limitations

A structured questionnaire could not always be used, as the fishermen were suspicious of the survey. More so because in the 1999 season the Coast Guards in the area detained a few boats fishing Whale Sharks mistaking Whale Shark to be a species of Whale. Since then the fishermen have been skeptical and non-cooperative for fear of a ban which could affect their livelihood.

Exact data on exports could not be obtained, as the MPEDA records do not show Whale Sharks as a separate species but group it with other Shark species within general catch statistics.

Background information on the species including its biology and trade was found to be sketchy.

Description

The Whale Shark (*Rhincodon typus*) was first described and named by Dr. Andrew Smith in 1828 as the world's largest living fish. Many scientists describe the species as a filter feeder. It is externally characterised by a flattened head, a broad large and terminal mouth, very large gill slits, three prominent keels (longitudinal ridges) on the dorsal surface, a large first dorsal fin, a semi-lunate caudal fin, and unique checker-board pattern of light spots and stripes on a dark background. The spots are arranged in a regular series of vertical rows.

Taxonomic classification (Smith, 1826)

Class Elasmobranchii
Order Orectolobiformes
Family Rhincodontidae
Genus *Rhincodon*
Species *typus*

Observations on the color of the species reveal variations, which is understandable on account of a wide distribution range of the species. But due to meager data no connection with the distribution has been established. Available literature shows that the specimen from Central and Eastern Pacific and the Atlantic have a brown or shade of brown on the upper surface. The specimens from Indian Ocean have a deep bluish-grey to lavender purple dorsal surface. (Prater, 1941; Coleman, 1997)

Information on the reproduction, development, longevity and size at sexual maturity of the Whale Shark is limited and sparse. It is speculated that Whale Sharks do not reach sexual maturity until they are 30 years of age. They may have a life span of over 100 years. It is also said that sexual maturity in both the sexes may not occur until the sharks are over 9m in length. (Coleman, 1997)

About 300 embryos were found in the uteri of a pregnant female harpooned on the east coast of Taiwan by a commercial fishing boat on 15 July, 1995. This extraordinary catch exceeds the largest number of embryos reported for any shark. (Joung *et al*, 1996)

In general, sharks grow slowly, matures late, have small number of young and live for many years. As a result there is a direct relationship between stock size and recruitment, with population replacement rates being very low. All these factors indicate that shark stocks are vulnerable to over-fishing, and once over-fished, may take years, even decades, to recover. Limited biological capacity of sharks makes them vulnerable to ill effects of large-scale exploitation (www.fishbase.org). The Whale Shark has been a subject of curiosity and interest since the past owing to its huge size. The largest record is from Gulf of Siam measuring a little above 59 ft (approx. 18 m) and the smallest known record is of 55.0 cm collected in Purse Seine from the high seas of Eastern Pacific and Tropical Atlantic where the depth was 2,600m (Coleman, 1997).



Table 1
Common and local names for the Whale Shark (*R.typus*) in India and other parts of the world

Country	Common Name
India	
<i>Tamil Nadu</i>	Panai meen, Uravi, Pullian surrow, Pulli-udoombu
<i>Kerala</i>	Makara sravu, Osman shira
<i>Maharashtra</i>	Karanj, Bharait, Bahiri, Bhari
<i>Lakshadweep Is.</i>	Vori mas meer
<i>Gujarat</i>	Barrel
Pakistan	Mhor
Sri Lanka	Muni-muthu-mora
Philippines	Butanding, balilan, toki, tawiki
China	Jing Sha
Japan	Ebisuzame
France	Requin-baleine
Spain	Tiburon ballena, pez dama
Taiwan	Tofusa

Source: Prater [1941], TRAFFIC India surveys [1999], CITES doc. Prop.11.47 [2000]

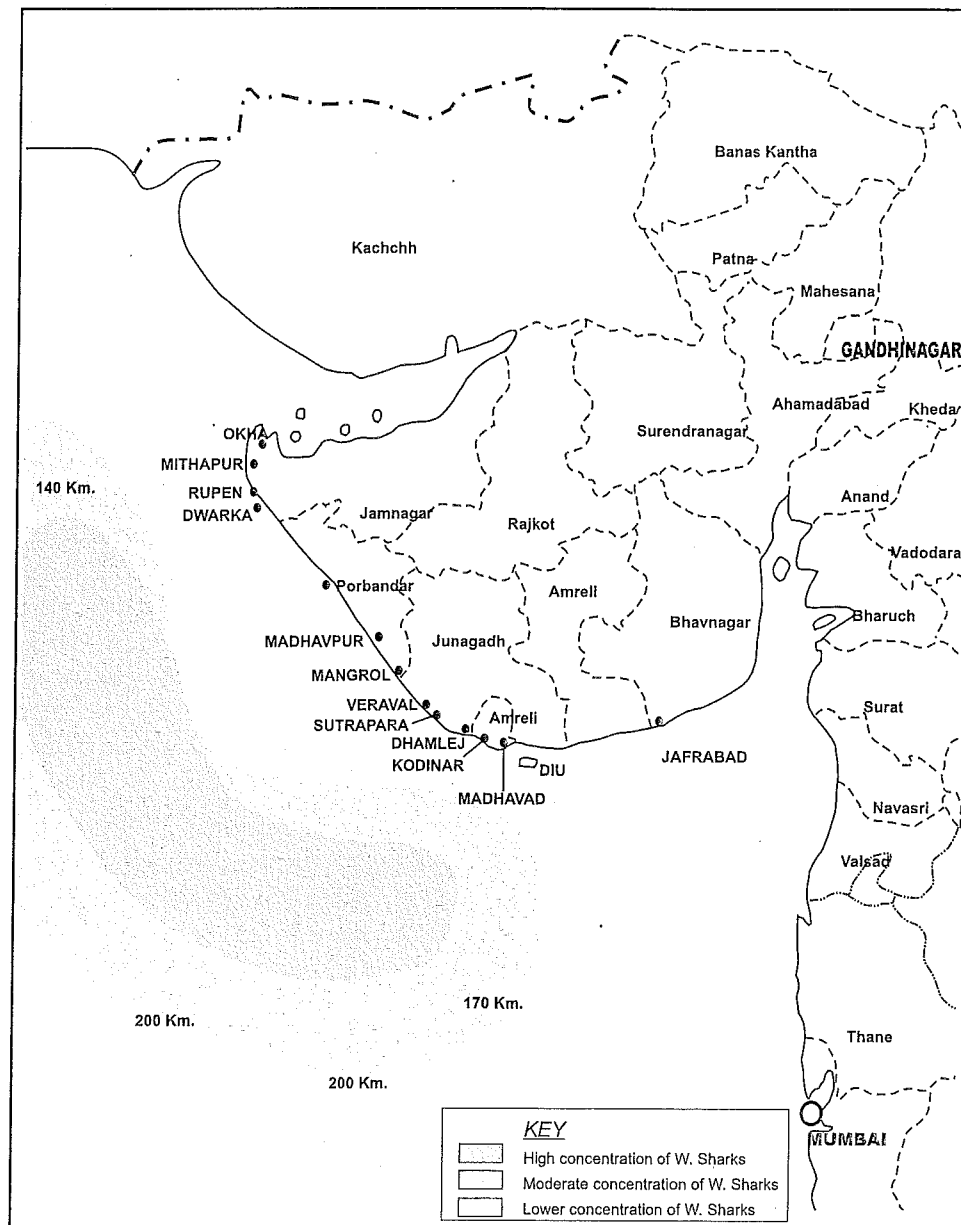
In Indian waters the smallest record was of 3.15m and the largest of 12.18m which was a male (Silas, MFIS, 1986)

The TRAFFIC-India survey recorded the smallest specimen of 2.0m and largest of 14.5m (Annex. II)

Distribution & Habitat

Whale Sharks (*R. typus*) are reported to occur in all tropical and warm temperate seas except the Mediterranean. Its distribution is thought to be cosmopolitan. It is found both in coastal and oceanic waters. It is found in a band around equator between 30°N and 35°S. It occurs throughout the Indian Ocean and has been reported from the Maldives, Seychelles, Comores Islands, Madagascar, South Africa, Mozambique, Kenya, Pakistan, Sri Lanka, Thailand, Malaysia, Indonesia and India (Coleman, 1997).

Map showing the concentration of Whale Shark in the study area (Gujarat)



Source: TRAFFIC India survey, (1999-2000)



Available records (Annex. I) show the preponderance of Whale Shark occurrence on the Western Coast of India, with very few reports from the East Coast. The records further show that most of the catches were between the months of March and June though seasonal occurrences of the species have been reported also in other months. (Graph 3)

During the current survey (Annex. II), when the fish catch was recorded from November 1999 to May 2001¹, more landings were reported between March and May, which is also considered the peak season by the local fishermen. (Graph 5)

It is reported that the Whale Shark normally inhabits off-shore waters. In-shore movement in large numbers off Gujarat coast in March-June is characteristic. The Whale Sharks occur, off the coasts of Maharashtra, Karnataka and Kerala as well as the west and east coasts of Sri Lanka, during December-March (Silas, 1986). The fish probably migrates from the Sri Lankan coast, moving along the West Coast of India during December – March, reaching the Gujarat coast by March-June.

Possible reasons for their occurrence only on the West Coast have been analysed by a few scientists but it still remains an enigma.

Compagno (1984) suggests that Whale Sharks prefer areas where:

- i. The surface water temperature is between 21°-25°C
- ii. There is an abundance of food (high production of plankton and small nektonic organisms)
- iii. There is an abundance of tuna and other fishes ²

But Vivekanandan and Zala (1992) mention that none of the above factors exist in Veraval during the time of occurrence of Whale Sharks.

The earliest records by Prater (1941) give the best description and provide a better understanding of the reasons of Whale Sharks occurring mainly along the West Coast. He has tried to explain the phenomenon based on influences related to plankton outbursts and has given plausible reasons for Whale Shark confining itself to the west coast as a result of surface currents.

¹ Primary data. Data from January 1998 to October 1999 was collected from secondary sources.

² The tendency of the Whale Shark to associate with large schooling fishes is very significant. In many countries the fishermen consider it as an indicator of Tuna schools. On the West Coast of India from November to April, Sardines and Mackerels occur in abundance and this coincides with the occurrence of Whale Sharks in the waters of that area. This is also a period when schools of other fishes like Skipjack Tuna and Yellowfin Tuna visit the coastal waters. The association is worth investigating and studying further because in San Diego on the California coast, whenever the Whale Shark is sighted fishermen know that it will invariably be surrounded by Yellowfin Tuna, and so head for it (Silas, E.G 1996).

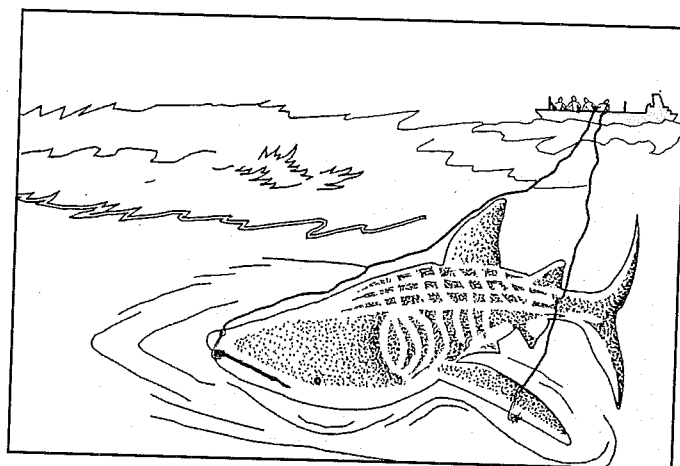
Fishing Methods

Despite the fact that Whale Shark fishing is risky and uncertain, fishermen in Gujarat have started targeting it. Fishermen and processors/exporters report that till some years back only a few boats were targeting Whale Sharks. In recent times, due to lower catches of other fishes from the sea and constraints in export resulting from an increasingly strict European standards, more and more fishermen have now started targeting Whale Sharks. It was found during the survey that around 100-150 mechanised trawlers exclusively fish for Whale Sharks during the peak period. (March – May) Fishermen in the area have adopted two methods of fishing Whale Sharks:

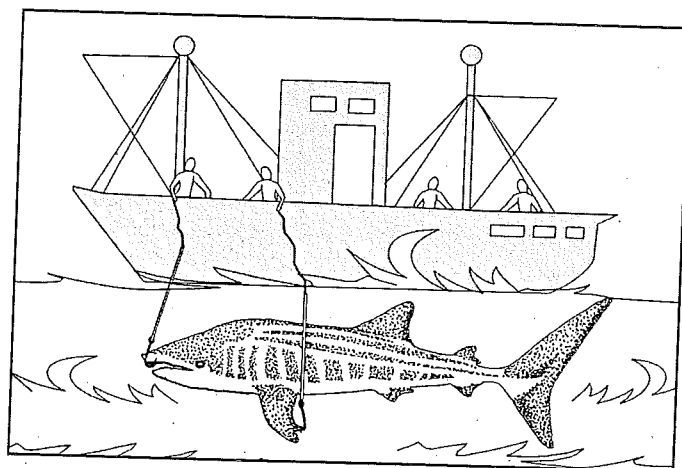
Trawler Fishing

In this method a mechanised boat is used. The length of the mechanised boats range from 9 - 17m OAL (Overall length) and are fitted with diesel engines of 88 - 165 HP (Horse Power). A group of fishermen collaborate and on seeing the first fish in the season they venture out to sea in-groups of 2-4 boats with 6-7 men in each boat. An experienced fisherman climbs the mast of the fishing vessel as a lookout which gives him the best vantage point. The Whale Shark is a surface feeder and can be spotted easily. It is visible as a dark circle/greyish-black patch in the clear sea waters. The dorsal side and caudal fin can be identified and are visible from the boat. Fishermen say that during the new moon period, Whale Sharks are more frequently seen on the surface. On spotting the Shark the boat is steered towards it and brought very close and parallel to its hind quarters.

Once near the docile fish, the fisherman shoots, towards the mouth of the shark, a specially made large heavy hook/harpoon weighing 8-10 Kgs (Fig. 1), which gets attached either to the lip - because the mouth is fully open while feeding - or the shoulder area of the shark, above the gills. The hook is attached to a long nylon rope, the other end of which is tied to the winch in the boat. Simultaneously, another fisherman on-board inserts a hook attached to a bamboo pole into its pectoral fin (Fig. 1). The fish, said to be generally docile, becomes agitated because of the insertion. It initially dives to the bottom,



(Figure 1)

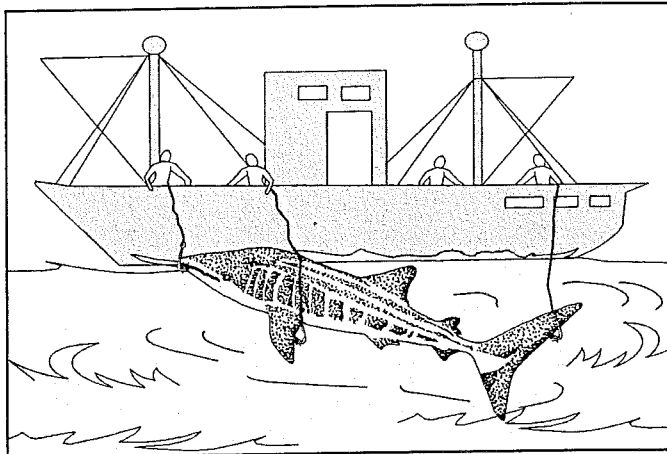


(Figure 2)



swimming away from the boat, and starts dragging it along. The engine of the boat is then switched off and the boat is allowed to be towed for a while, after sometime the engine is started again and run at full speed.

This continuous effort sometimes lasts for 6-7 hours, or even more, until the fish is completely exhausted. Finally, the fish is pulled in by the boatmen, with the help of winch and rope, and tied to the outer side, near the bottom of the boat (Fig 2 & 3). It is towed in this way along side the boat to the shore/landing center. Owing to its large size, the fish is cut into large chunks while afloat in water. The liver is removed for oil extraction, and is consumed locally, while the meat is distributed to the agents/middlemen for processing and export.



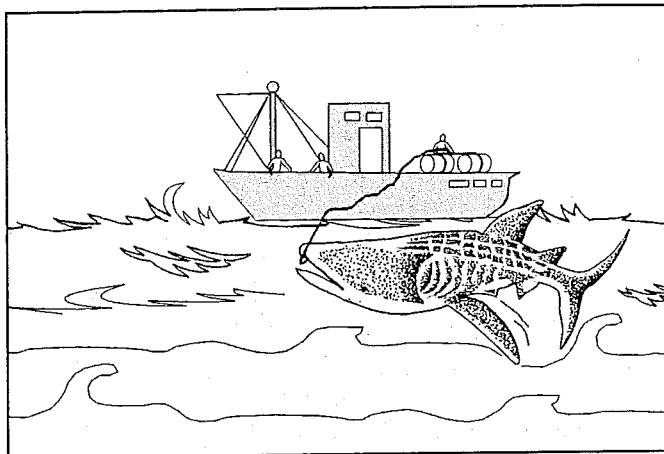
(Figure 3)

Small Canoe Fishing

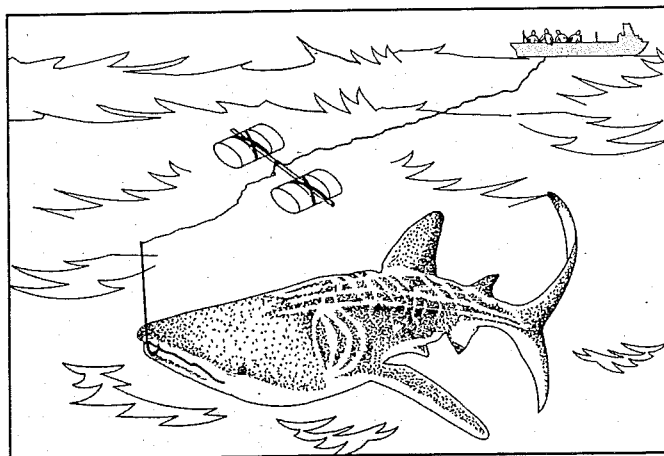
In this type of fishing small sized wooden dugout or FRP (Fiber Reinforced Plastic) canoes are used. The length of the canoes with OBMs (out board motors) range from 7 - 10 m. These were mainly found in areas such as Rupen, Okha, Jaleswar, Sutrapada and Dhamlej. In this *modus operandi* two huge empty PVC barrels of approximately 200 liter capacity (to provide buoyancy) are tied to the ends of a pole (5-6m long). The centre of the pole is tied to a hook with a 15-20m long fishing-line.

The empty PVC barrels act as a powerful float (Fig 4). Fishermen (3-4) in a small canoe, locate the fish and, after coming close, harpoon the Sharks' jaw. The fish so harpooned, dives deeper into the sea with the pole, hook and barrels. After some time, the barrels break the surface and float (Fig 5). The rope attached to the barrels pushes the fish upwards, making the hold of the harpoon, firmer and stronger. Resultantly, the fish is forced to dive again or swim away from the boat. This process continues till the fish gets exhausted.

The boat trails the fish, whose location is monitored with the help of the floating barrels. Finally, the exhausted fish is towed to the shore, where it is cut while afloat.



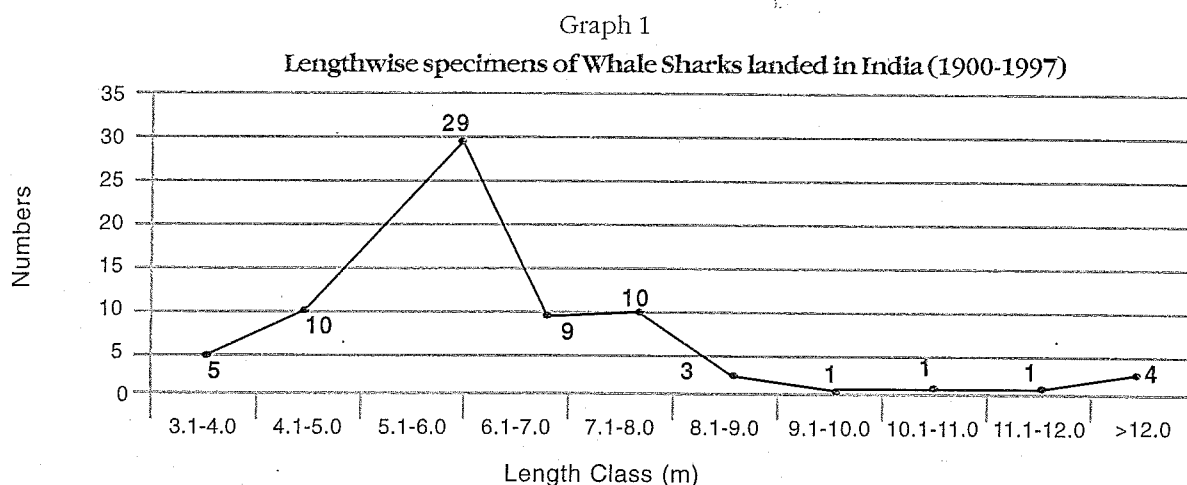
(Figure 4)



(Figure 5)

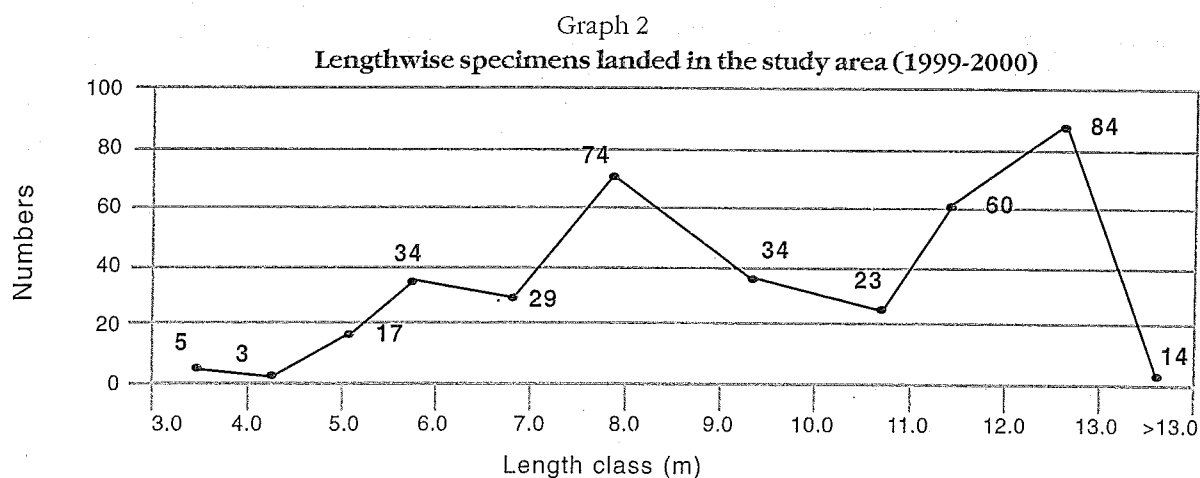
Catches

The available records (1900-1997) from secondary sources, points to the fact that individuals between 5m to 9m in length were more likely to be encountered in Indian coastal waters (Graph 1).



Source: TRAFFIC India, compilation from various historical CMFRI publications

However, during the current survey (1999-2000), data (Annex-II) shows that Whale Shark specimens between 8m to 12m in length were frequently found in the study area (Graph 2). The number of specimens below 9m (juveniles) were a substantive proportion of the catch, with 162 (37%) specimens comprising the recruitment class captured during the peak period out of a total of 440 catches, recorded. (Recruitment class here refers to the size class of 5-9m and should not be mistaken for the 'young of the year'.)

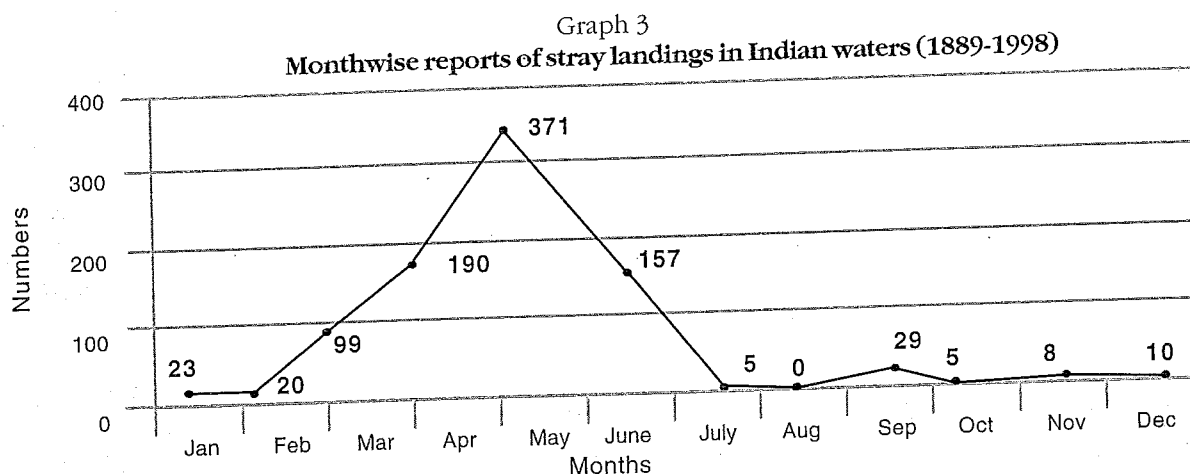


Source: TRAFFIC India survey, (1999-2000)

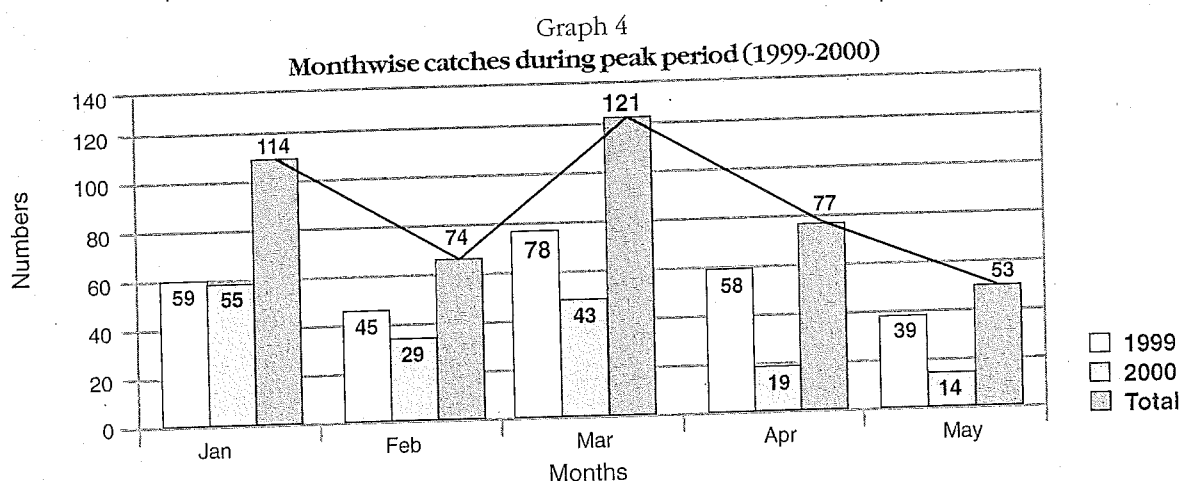
The above difference in the size of Sharks captured during earlier times, when capture was accidental in nature and now when it is targeted, is due to the fact that while earlier, large fishes managed to escape, now they cannot, as the fishing targets them.



As shown in Graphs 3 and 4, while historically, large numbers of occurrences/captures were recorded in April (190), May (371) and June (157), with the peak being in May, during the current survey (1999-2000), it was observed that the maximum landings occurred in March (121).



Source: Puthran, P. (2000)



Source: TRAFFIC India survey, (1999-2000)

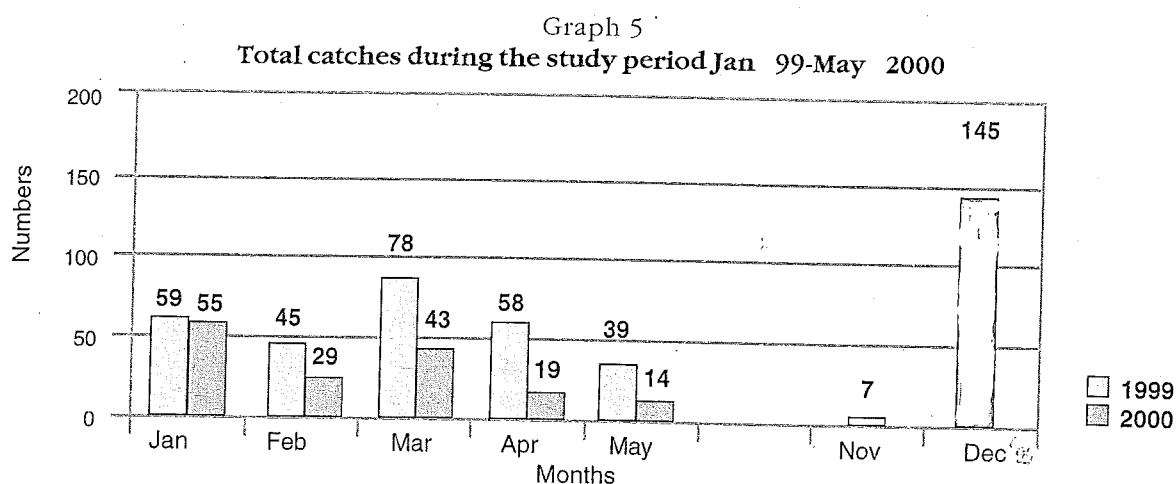
Note

1. Data for Jan'99 is estimated and compiled from interviews with fishermen held before the actual field work started in March'99.
2. Jan'99 data includes reports from Dwarka in Jan'99 Feb'99 and March'99.
3. Remainder of the data shown in Feb'99 and March'99 includes data from landing centers other than Dwarka.

Whale Shark landings during the current survey 1999-2000

TRAFFIC India survey recorded Whale Shark landings/catches on a day to day basis from March 1999 to May 2000. Information for the period from January 1999 to February 1999 of 60 individuals caught between Rupen to Okha, was collected from interviews with the fishermen. In all, a total of about 600 Whale Shark landings with smallest catch of 2.0m in length (0.5 tons) and largest catch of 14.5m (12 tons) were recorded.

It is unusual that, while there were few catches in November 1999 (Graph 5), in December 1999 a large number (145), ranging from 2 to 12 tons (Annexure III) were caught in Veraval. Even from past records such high catches in winter are not found. The reason for this is not known. The fishermen revealed that they



Source: TRAFFIC India, (1999-2000)

found a school of approximately 300 to 500 Whale Sharks in the area and thus headed for it. These fish were captured at a depth of 20-26m and a distance of 10-15 Kms from the coastline in the area between Dwarka and Veraval.

The 1998 data (Table 2) from Veraval gives the exact number of boats venturing out to sea for fishing whale sharks and the number of sharks caught.

Table 2
Number of boats from Veraval fishing for Whale Sharks and their catches (Jan 98 to Jun 98)

Date	No. of trawlers	Total no. of sharks
04-01-98	12	3
06-02-98	8	3
28-05-98	2	2
29-05-98	25	10
30-05-98	30	12
31-05-98	50	14
01-06-98	125	8
02-06-98	130	10
03-06-98	130	18
04-06-98	110	12
05-06-98	105	14
06-06-98	100	8
07-06-98	75	1
15-09-98	Not known	25

Source: Putthran, P. pers. Comm, (2000)

Table 2 shows that while during May 1998, 25 trawlers caught 10 whale sharks, an increased effort in June 1998 (130 trawlers) did not materially affect the catch, as on 02 June 1998 and 03 June 1998 only 10 and 18 Whale Sharks respectively were caught.

During the current survey, the fishery effort was not specifically investigated and hence no co-relation could be established between the effort and the catches. However, it is estimated that on an average between 40 to 50 boats went to sea per day for fishing Whale Sharks. Sometimes as many as 150 boats on a single day were also seen.

Trade

The discovery of the Whale Shark and possibility of Whale Shark fishing came as a boon to the fishermen of Gujarat beginning late 1980s. The fish proved to be a source of income at a time when other fish catches off the Saurashtra coast were declining. It was understood from interviews with fishermen and processors/exporters that this was also the time when fish exports to Europe declined and several other countries, such as the Philippines, Taiwan, Maldives and USA, banned their whale shark fishery (CITES doc. Prop.11.47, 2000) presumably to sustain and conserve their stocks. Hence, it is assumed that overseas demand for supplies from India had grown, and the exporters soon realised that it was a lucrative business. Fishermen were lured by sizeable income arising from it and started targeting Whale Sharks. According to Puthran (*Pers. Comm.*, 2000) the fishermen succeeded in making big catches (Table 3), and deriving significant monetary returns from the Whale Shark fishing.

Table 3
Number of Whale Sharks landed in Veraval, their utilisation and value (1988-1998)

Year	Approx. nos.	Body parts utilized	Value (fisherman's level) one fish of size 7-8m.
1988	150	Liver	-
1989	180	Liver	-
1990	165	Liver	-
1991	150	Liver & Fins	INR 8,000-9,000 (US\$352-396)
1992	150	Liver & Fins	INR 10,000-20,000 (US\$440-881)
1993	125	Liver & Fins	INR 20,000-30,000 (US\$541-961)
1994	200	Meat, Liver & Fins	INR 50,000-60,000 (US\$1604-1925)
1995	230	Meat, Liver, Fins & skin	INR 50,000-80,000 (US\$1543-2469)
1996	200	Meat, Liver, Fins & skin	INR 50,000-80,000 (US\$1543-2469)
1997	120	Meat, Liver, Fins & skin	INR 80,000-100,000 (US\$2222-2777)
1998	140	Meat, Liver, Fins, skin & cartilage	>INR 100,000 (US\$2500)

Source: Puthran, P (2000)

Table 4
Relative value of Whale Shark parts

Contents by % of total body weight		Price (fisherman's level)	
Parts	%	1999	2000
Meat	40-50%	INR 8-10 per Kg (US\$0.1-US\$0.2)	INR 5-10 per Kg (US\$0.1-US\$0.2)
Fins*	2-3%	INR 30000-50000 per set* (US\$ 566-US\$1100)	INR 15000-30000 per set (US\$330-US\$566)
Liver	10-12%	INR 14-18 per Kg (US\$0.2-US\$0.3)	INR 10 -15 per Kg
Cartilage	10-12%	INR 20-25 per Kg	INR 1-2 per Kg
Skin	28-30%	INR 10 -12 per Kg (US\$0.2)	INR 8-12 per Kg (US\$0.1-US\$0.2)
Viscera	1-2%	Nil	Nil

Source: TRAFFIC India survey, (1999-2000)

*Set=four fins



Every part of the Whale Shark (from the cartilage to leather) fetches a high price in the market. The fins alone fetched between INR 15,000-30,000 (US\$330-US\$1100), depending on the size, for a set of four fins, during the 2000 season.

Table 5
Export of Whale Shark meat from Veraval

Year (April-May)	Weight (kg)	Value		Rs/Kg
		INR	US\$	
1998-1999	4,56,260	2,18,00,000	4,84,444	Approx. 47
1999-2000	4,65,000	3,09,00,000	5,86,666	Approx. 66

Unpublished data - MPEDA-Veraval, 2000

While the exporters in India sell fresh frozen meat at a cost of Rs.40-70 per Kg the same is sold in Taiwan, where Whale Shark meat has become very popular and expensive, for US\$15 (INR 650) per Kg. (CITES doc. Prop.11.47, 2000)

Table 6
Country wise export of frozen Shark meat from India (1993-1997)

Q: Quantity in tons; V: Value in Lakhs (1 Lakh=1,00,000)

Country	1995			1996			1997			1998			1999	
	Q	V		Q	V		Q	V		Q	V		Q	V
		INR	US\$		INR	US\$		INR	US\$		INR	US\$		
USA	1	5	.13	-	-	-	-	-	-	-	-	-	-	-
CHINA	24	6	.16	24	6	.18	48	12	.37	-	-	-	-	-
TAIWAN	34	14	.38	55	18	.55	408	119	3.6	-	-	-	-	-
HONGKONG	18	6	.16	19	6	.18	33	10	.30	-	-	-	-	-
SINGAPORE	-	-	-	23	7	.21	66	18	.55	104	24	7.7	-	-
THAILAND	-	-	-	4	1	.03	-	-	-	-	-	-	-	-
JAPAN	-	-	-	1	< 1	.03	15	15	.46	-	-	-	-	-
UAE	-	-	-	-	-	-	-	-	-	20	7	0.22	-	-
GERMANY	-	-	-	< 1	< 1	.03	-	-	-	-	-	-	-	-
UK	43	18	.5	4	2	.06	-	-	-	-	-	-	-	-
AUSTRIA	-	-	-	-	-	-	1	< 1	.03	-	-	-	-	-
SWITZERLAND	-	-	-	12	9	.27	-	-	-	1	< 1	.03	-	-
SPAIN	-	-	-	-	-	-	13	9	.27	-	-	-	-	-
TOTAL	120	49	1.36	142	49	1.51	584	183	5.64	125	31	.99	-	-

Source: V.K.Dey pers.comm. (MPEDA, 1998)

Note

MPEDA does not provide specific data for Whale Shark. It is presumed that all frozen Shark meat exported out of India is from Whale Sharks.



Table 6 indicates that the Whale Shark exports from India first started in the year 1994 with Singapore and UAE as the main importers. In subsequent years the market expanded to other countries such as Hong Kong, China, U.S, U.K, Thailand, Japan, Germany, Taiwan etc.

Table 7
Export of Shark (including Whale Shark) Products from India (1993-1999)

Q=Quantity in tons; V= Value in Lakhs (1 Lakh=1,00,000)

Product	Units	1999	1998	1997	1996	1995	1994	1993
Fresh frozen Shark meat (Possibly Whale shark)	Q	-	-	120	142	584	125	-
	V(INR)			49	49	183	31	-
	V(US\$)			1.3	1.5	5.6	0.99	-
Gutted finless shark	Q	-	-	41	-	-	-	-
	V(INR)			16				
	V(US\$)			0.4				
Dried shark fins/rays	Q	112	131	219	214	303	185	139
	V(INR)	455.7	972.8	954	1045	838	707	590
	V(US\$)	10.1	24.3	26.5	32.25	25.8	22.6	18.8
Shark cartilage	Q	51	1	1	Neg.	-	-	-
	V(INR)	76.1	3.58	3	0.04			
	V(US\$)	1.6	.08	.08	-	-	-	-

Source: Unpublished data MPEDA, 2000

A comparison between Tables 5 and 7 indicates under reporting in Table 7 for the year 1999 as far as figures for export of fresh frozen meat from India is concerned.



Utilization

The commercial harvesting of Whale Sharks in India for export was practically non-existent till the 1980's. Rao (1986) took note of a small harpoon fishery for Whale Shark off Veraval, primarily for local extraction of Shark liver oil. Till 1990 even the fins were discarded. However, in 1991, there arose demand for pectoral, dorsal and caudal fins of the Whale Shark.

The fishermen revealed to TRAFFIC India during interviews that the Whale Sharks were hunted for liver as early as 1955-1960. During the mid-1970's, a small number of fishermen hunted it for its liver as well as for fins, but by 1992-93 it was being hunted for almost all its parts including liver, fins, cartilage, skin and meat.

Table 8

Utilization of whale shark showing gradual change in consumption from (1980-1990)

Items	Prior to 1980's (Incidental catches)	1980's (Incidental and captured)	1990's (Commercial fishing)
Liver oil	Preservatives for fishing boats	Preservatives for fishing boats	Preservatives for fishing boats
Meat	Not used	Salt dried (curing)	Cured mainly for domestic market and fresh meat or frozen for export
Skin	Not used	Not used	Cured for leather industry and also processed for export. (Usage in the countries of destination not known, perhaps for food?)
Fins		Dried and fin rays exported	Dried and fin rays exported
Cartilage	Not used	Not used	Dried and exported for medicinal purpose

Source: Putthran, P. & TRAFFIC India survey, (2000)



Processing

Interaction with the processors in the field indicated that Veraval in Gujarat, is the main processing centre with maximum number of processing units. Even the townships around Veraval, such as Okha and Dhamlej, either transport or land their material directly at Veraval for processing.

There are nearly 65 processing units, of which 12 were found to be dealing in Whale Sharks destined for exports and some 20 were engaged in semi-drying of the meat for domestic supplies. It was found that while a few units were exporting Whale Shark meat for the last six years, some new units have started Whale Shark exports only in 1999.

Immediately after landing, the fish is sold to middlemen. Prices depend on the size and weight of the fish. The fish sizes landed at Veraval are normally sold by the fishermen at prices ranging between Rs.40,000 to Rs.1,50,000 per fish. The middlemen undertake the cutting of the fish and sell it to the exporters.

The fins are the first parts to be removed after landing, thereafter the skin and meat are cut and finally the liver and bones, which are then sold separately.

Expert Whale Shark cutters handle the cutting of this huge fish. It is done quickly, while the fish is afloat in water, because, if left for a while, ammonia formation takes place and the meat becomes soft and unpalatable. Therefore, the processing and packaging of meat is normally completed within 24 hours and exported. The first grade meat and skin are sold to the exporters, while the lower quality meat is semi-dried and then sold to local agents. These local agents send the dried or semi-dried meat to Kerala or to Sri Lanka. Most of the cartilage is sent to Mumbai (formerly called Bombay) and South India, where it is further processed and exported. (Table 9)

Table 9
Utilization of various parts of whale sharks (1999-2000)

Part used	Form of product	Uses	Destinations
Meat	Fresh frozen	Export - for food	Taiwan, China, HongKong & the Philippines
Meat		Dried / semi dried For food	Karnataka, Kerala, Tamil Nadu & Sri Lanka
Fins	Dried / fin rays	For food	To various countries with other shark fins. HongKong, Singapore, Taiwan & USA.
Liver	Fresh	Locally used- for oil extraction	Domestic use for painting & preserving boats & supply to local shoe-polish manufacturers.
Cartilage	Powdered	Export- for pharmaceutical purposes	USA
Cartilage	Dried/Frozen	For further processing (drying & powdered)	Mumbai, South India
Skin	Frozen	Export probably for food	Taiwan, China, HongKong & Philippines
Skin	Semi-dried	Leather industry	Karnataka, Kerala & Tamil Nadu
Viscera	Fresh/Dried	Local consumption as fish meal	
Teeth	Whole teeth	Ornamental uses	

Source: TRAFFIC India survey, (1999-2000)

Processing of meat and skin

Meat is separated from the skin.

Skin is removed from the red meat and cleaned with water.

White meat is separated from red meat

Meat is stored in salt layers for 7-10 days.

Meat is cut into chunks of 0.5 Kg-10 Kg. Salt and ice are applied. The meat is kept in lowered temperature in salt medium for 3-4 hrs.

Meat is taken out of salt layers and dried for 2 days.

It is boiled in fresh clean seawater for 15-30 minutes.

The meat is washed with clean water and each piece is wrapped in a plastic sheet.

This semi-dried meat and skin is then transported to Kerala, Karnataka and Tamil Nadu.

Scales are removed which becomes easy after boiling.

The wrapped meat is then kept in an air blast freezer at 32° C for 18-20 hrs, till it is frozen solid. The polythene sheet is removed.

Skin is cut into pieces and wrapped in plastic sheet.

The frozen meat is then packed in master cartons having capacity of 20 Kgs.

Plastic packets are frozen in the same manner as meat.

Export

Regulation

International Measures

The Whale Shark is reported from about 100 countries but only a few provide protection to it. The Philippines imposed a ban in 1998 on the taking or catching, selling, purchasing, possession, transporting and exporting of the species. Protected in the U.S. in Federal Atlantic and Gulf of Mexico and in Florida State waters, it is also protected in Western Australia by an indefinite closed season under the Fish Resources Management Act and the Wildlife Conservation Act. It is protected in the Maldives and most recently in October 1999, it has been given full protection in Honduras (CITES doc. Prop.11.47, 2000).

There are no international control measures to protect the species, though the species has been included in the IUCN Red List (2000) as vulnerable and listed as a "species under threat."

The species is not included in the CITES appendices. At the CoP XI of CITES held in Nairobi, Kenya (10th - 20th, April'2000) all the proposals to restrict/monitor international trade in Shark species were defeated. The USA proposed whale shark for listing on Appendix II and called for a vote but the delegates rejected the proposal with most noting "lack of evidence of threats resulting from commercial exploitation and the absence of trade data." (Sarah Fowler, Pers. Comm, 2000).

The Whale Shark is included in UNCLOS as a highly migratory species.

Domestic Measures

In India, fishery is generally regarded as a common property resource and, as such, its access is open to all. Anyone can fish at any time using any fishing method except poison and dynamite. At present fishery managers are not equipped with specific legal powers to manage Shark fishery.

With particular reference to the fisheries sector, India's objectives currently consist of promoting production and exports for earning foreign exchange, generating employment, and to ensuring the welfare of fishermen communities.

The Indian Fisheries Act of 1897 continues to be the basis of regulation relating to fisheries in India and most States have made this Act applicable to their areas or have based their local laws on it. The Act seeks to protect fish by prohibiting certain activities. For instance, Section 4 prohibits the destruction of fish by explosives in inland waters and along coasts and Section 5 prohibits the destruction of fish by poisoning waters. Violations of these provisions of the Act are met with penal action and therefore all dispute settlement powers lie with the criminal courts. The Act allows for the protection of fish in selected waters by the framing of rules by the concerned State Governments. These rules may prohibit or regulate specific matters for fixed periods of time, including

- (i) the erection and use of fixed engines
- (ii) the construction of weirs
- (iii) the dimension and kind of nets and modes of using them.

It may also provide for the prohibition of all fishing in specified areas for a period not exceeding two years.

In 1972, the Wildlife (Protection) Act was legislated for the protection and conservation of wildlife and their habitat. However, neither the Whale Shark nor any other species of marine fish has



been identified for exclusive protection under this Act. However, fish habitats have been protected through the provisions of Chapter IV of this Act, which allows for the declaration of such habitat as Marine National Parks or Sanctuaries, within which entry and activities (including fishing) are prohibited or severely restricted.

In India, there is only one Marine National Park on the west coast, with the other seven being on the east coast.

- Marine National Park, Gulf of Kutch, Gujarat (West Coast)
- Marine National Park, Gulf of Mannar, Tamil Nadu (East Coast)
- Mahatma Gandhi Marine National Park, Andaman & Nicobar Island. (East Coast)
- Pulicat Bird Sanctuary, Tamil Nadu (East Coast)
- Nalbund-Chilka Sanctuary, Orissa (East Coast)
- Point Calimere Sanctuary, Tamil Nadu (East Coast)
- Bhitarkanika Sanctuary, Orissa (East Coast)
- Gahirmatha Marine Wildlife Sanctuary, Orissa (East Coast)

The exporters of marine products are issued registration cum membership certificates from MPEDA (Marine Product Export Development Authority), which is a government body that undertakes all promotional work relating to export of seafood from India. The registration of vessels is mandatory under Section 11 of the MPEDA Act, 1972. The Licenses for fishing are issued by the Ministry of Food Processing Industry under the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981.

In exercise of the powers conferred by section 25 of this act, the Central Government has made some rules. The relevant rules are given below:

- i) The crew of the vessel shall fish only for the stocks described in the license.
- ii) The crew of the vessel shall not catch any fish by a species, size or age set out in the license as prohibited catches, that are covered under the Wildlife (Protection) Act, 1972 (53 of 1972) and where such fish are caught they shall be retained and preserved on board the vessel, accounted for in the prescribed form (Form 'C') and shall be surrendered at such places as may be directed by the authorized officer.

The Constitution of India places a duty on the States to direct its policies to "protect and improve the environment", which would include fisheries and therefore shark fisheries. Similarly, the Environment Protection Act, 1986 makes it obligatory for the Government to take necessary steps for the protection of the environment, which also includes fisheries. Under the same Act, the Central Government issued a notification in 1991 declaring coastal stretch upto 500m from the High Tide Line as Coastal Regulation Zone (CRZ) and regulating industrial and other activities in the CRZ. However the thrust of this law is protection of the land and not the waters offshore and therefore does not directly affect shark fisheries.

Typically, each of the above mentioned pieces of legislation have a different enforcement authority, leading to an overlapping of jurisdictions, confusion and, consequently, dilution of their effectiveness.

Results

- In 1999 landings were monitored/documentated from Jan'1999 to Dec'1999. Notably, there were no catches for five months from June'1999 to October'1999. Literature review had suggested that the fish was either found in very small numbers or not found at all during winter on the Indian coast. Interestingly, during the course of the survey the highest number of landings were recorded in December 1999, accounting for 145 whale sharks.
- The length and class analysis of the catches in 1999-2000 indicate (Graph 2) that 37% of the total catch represents juveniles (5-9 m length) recruitment class. Past literature also indicates catches between 5m-9m, although those were reports of accidental catches/stray landings only. Clearly, a high exploitation of juveniles has taken place for a long time with a potential of leaving a negative impact, on the overall population in the wild.
- Landings specifically in the peak period (March-May) indicate a decline in numbers in the year 2000 as compared to 1999. But the data is not large enough to indicate a trend, if any.
- No correlation has been found between the number of boats going for capture and the number of Sharks caught. Catch appears to be influenced by availability of fish rather than fishing effort. The fact that more boats don't catch more Sharks could be a sign of overfishing, which requires further research for validation through CPUE (Catch Per Unit Effort).

Though the field data collection for this report was over in May 2000, updates on the Whale Shark landings kept pouring in even later. The reports from the area suggest that fishing for 2001 season commenced a bit early. On 15th September, 2000 (Friday) the fishermen caught 40 Whale Sharks. Reportedly the appearance of this fish on the auspicious day of Friday sent a wave of joy among the fisherfolk as they considered it a good omen for the rest of the fishing season. Reports also indicate that certain villages have stopped any other fishing activity and are now fully into Whale Sharks fishing. These reports were received while the publication was being finalised.

Conclusions

- A growing demand, expansion of more fishing areas and evidence of local depletion in some of the range states (eg Taiwan and Philippines) clearly indicate that continuation and growth of international trade in Whale Shark can pose a threat to the species. With a few countries imposing bans on the Whale Shark trade (US, Maldives, Taiwan, Philippines, Honduras) India is likely to experience increasing pressure on its Whale Shark populations.
- It is believed that the actual number of Whale Sharks captured in Indian waters may be more than what is reported. It is also understood that Whale Shark fishery is unregulated.
- With the decline of traditional fisheries and the marketing potential for Whale Shark products in India and elsewhere, it is likely that the exploitation will increase and further intensify.
- In general, sharks grow slowly and mature late. As a result there is a direct relationship between stock size and recruitment. All these factors indicate that in general Shark stocks are vulnerable to over-fishing, and once over-fished, may take years, even decades, to recover. The present situation with Whale Shark, therefore, requires particularly careful monitoring and species management.

Recommendations

- Greater international collaboration in Whale Shark research with special reference to its migratory, shoaling behavior and biology needs to be promoted.
- Sufficient information is required about the size and state of India's Whale Shark stocks, basic biology and the magnitude of their exploitation. Status surveys of the species be taken up by the following organisations on a priority basis:
 - a) Fishery Survey of India (FSI), Mumbai.
 - b) Central Marine Fisheries Research Institute (CMFRI), Cochin.
 - c) National Institute of Oceanography (NIO), Goa.
- Organisations such as CMFRI is encouraged to conduct further research on this species and also monitor its trade.
- The most important biological information needed are those on life history and reproduction, and stock structure. With bans in place in many range countries, the fishery in India may be an opportunity for biologists to examine a good supply of dead sharks and make optimum use of the situation for scientific purposes.
- Another important aspect for study is the movement of sharks and their migration patterns at the end of the season. It is important to establish if the Whale Shark population off the coasts of India are resident or migratory. Such studies need to include Maldives, Sri Lanka and Pakistan.
- The Indian Fisheries Act (1897), the Wildlife (Protection) Act, 1972 and the Deep-Sea Fishing Policy (1991) are silent on the issue of fishing of species in danger. It is essential that the existing laws be reviewed and effective legal mechanisms and management be planned keeping in view the conservation of fisheries in general and the Whale Sharks in particular. Specifically, provisions under The Indian Fisheries Act, can be utilised by the executive to regulate Whale Shark fishing during the peak period (March – May).
- MPEDA, while promoting export of shark products should also become more involved in its conservation, particularly in the case of Whale Sharks.
- All commercial fishing vessels be required to maintain logbook for reporting details of Shark catches to designated authorities.
- Protection of Whale Sharks should begin with education and awareness. An illustrated information brochure, posters/pamphlets in local languages be prepared with basic information for creating general awareness, about it.
- Surveys be conducted along the coast to check for Whale Shark fishing that might have started and also to check for Whale Shark concentration in areas other than the Gujarat coast. Tie up with range countries (Pakistan, Sri Lanka, Maldives and Seychelles) in the region for joint surveys, be promoted.
- Generation of information on Catch per unit effort is a good indicator for assessing an over-exploited fishery.
- India needs to follow FAO-IPOA recommendations and develop a National Shark Plan and improve data collection and trade monitoring.
- The species be included in Schedules of Wildlife (Protection) Act and CITES Appendix II.
- Along the coast of mainland India, there is little or no 'Dive tourism', which in many parts of the world is a popular past time and has a good potential for revenue generation for the local fishermen as an alternative to returns from Whale Shark fishery.



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Appendix 1

Taiwan's Whale Shark Fishery

There was no dedicated Whale Shark fishery in Taiwan in the past. However in the last 5-6 years there has been a lot of interest in this fishery (Chen, C.T., 1997). Whale Sharks are caught commercially by harpoons while, smaller ones are occasionally caught on long-line or by set net in the coastal waters. About 250 Whale Sharks land in Taiwan annually ranging from several hundred kilograms to as much as 30 tons. Like most commercially hunted sharks, the Whale Shark population around Taiwan seems to be decreasing, as discussed by Joung et al, 1996. Further the paper says that in 1970's and 1980's it was usual for a fisherman to catch 30-100 sharks in one season in the Peng Hu area (off south-west coast of Taiwan), which is a series of over 60 islands. By late 1980's in some seasons less than 10 whale sharks were caught. (Joung et al, 1996; Chen, C.T., 1997)

The An-ping harbor, about 80 miles south east of Peng Hu islands, is a major landing site for Whale Sharks in Taiwan. The records of the harbor show:

Date	Measurement	No. caught	Remarks
21 March 1994	17 m	1	Took 3 hrs to exhaust the fish with floating balloons attached to the head and another 6 hrs to tow the fish to the harbor. 17m fish as mentioned by the captain who spent 50 years whale shark fishing is small compared to his catches of 30m.
30 March 1994	15, 22, 36m	3	-
1994	-	14	-
1993	-	2	-
1992	-	>70	-

Source: Joung et al, (1996)

It is reported that Whale Shark meat is dried and exported to HongKong. The Whale Shark is called 'Tofu sa' in Taiwan, since the meat is soft like Tofu (Bean curd).

Prior to 1985 a specimen weighing several tons would fetch between (New Taiwanese Dollar) NT\$ 5500 and NT\$8200 (US\$200-US\$300) at an auction price. Since late 1980's the wholesale price has increased roughly to NT\$190 per Kg (US\$7). Now it is considered the most expensive among shark meats available. A small whale shark (2000 Kg) could fetch NT\$360000 (US\$14000) while a larger species (10000 Kg) could sell for NT\$1.9 million (US\$70000). The retail price for Whale Shark meat in the local fish market is NT\$400 (US\$15) per Kg.

The higher price as compared to other commercial Shark species and the constant demand makes fishery worthwhile even if the meat is from small Sharks. Joung, *et al* reports that out of 2000 fishermen in Southern Taiwan several hunt Whale Sharks during the peak season (February-March 1991) (Joung, *et al*, 1996; Chen, C.T., 1997).



Appendix 2

Phillipine's Whale Shark Fishery

A small report by WWF-Philippines program documents the existence of a community-based fishery in the Bohol Sea. The report mentions about a significant number of Whale Sharks being landed by the hunting communities each year. The target of these hunters are Bryde's Whales. Apparently when these whales become scarce the fishermen shift to Whale Sharks as a lucrative alternative.

The Whale Shark becomes an easy target for the whale hunters, as it is another large species, which is relatively abundant in their fishing grounds during the whale-hunting season. Also, their skills and techniques in catching Bryde's Whales can be easily and effectively adapted to hunt Whale Sharks. The fishing method is the buoy or float method, similar to the small-canoe method used in Dhamlej etc. areas in Gujarat, India.

The fins, meat and skin are the most sought after parts of the Whale Shark because of its economic value. Similar to the Indian Whale Shark fishery the Sharks in Philippines were primarily hunted for their fins in the past. After cutting off their fins they were dumped back into the sea.

The fins are sold fresh or dried. A set in the landing area sells for US\$116 to US\$ 174. A set consists of eight pieces i.e caudal, dorsal, pectoral and anal. In the market one set of dried fin sells for US\$296 for the smallest (15 footer) and as high as US\$ 523 for a 40 feet long Shark. (WWF-Philippines report, 1996).

According to the WWF-Philippines report (1996), the buying price for meat (fresh) ranges from US\$ 0.08/kg during peak season to US\$ 0.20/Kg during lean months. Dried meat is sold at US\$ 1.55/Kg to US\$ 2.71/Kg. A single shark can yield upto 300 Kgs of dried meat. (i.e between US\$ 465 to US\$ 813).

Dried skin sells for US\$0.42/Kg to US\$ 1.55/Kg. One whale Shark is reported to have a market price of US\$887 to US\$1,801.

The group of fishermen interviewed by the WWF Philippines team was of the perception that the Whale Shark population in their hunting grounds is declining. The group reported that the landing figures for three years declined from 100 Sharks in 1994 to 80 in 1995 and only 30 in 1996. The steady increase in the number of fishermen is reported by the local people which corresponds to the increase in hunting pressure on the Whale Shark population. The reports suggests there is now lesser recruitment and some hunters are forced to pursue their prey in distant fishing grounds due to decline in sighting incidences in their traditional hunting grounds.



Appendix 3

Rates of conversion from Indian Rupees (INR) to US\$ used in this report

Years	Rs. - \$
1984	11.35
1985	12.33
1986	12.60
1987	12.94
1988	13.90
1989	16.21
1990	17.50
1991-92	22.71
1993	31.25
1994	31.16
1995-96	32.40
1997	36.00
1998	40.00
1999-00	45.00

Appendix 4

Abbreviations used

BNHS	Bombay Natural History Society
CIFT	Central Institute of Fisheries Technology
CMFRI	Central Marine Fisheries Research Institute
CPUE	Catch Per Unit Effort
FAO	Food and Agriculture Organization
IPOA	International Plan of Action
IUCN	The World Conservation Union
MFIS	Marine Fisheries Information Service
MPEDA	Marine Products Export Development Authority
UNCLOS	United Nations Conference on Law of the Sea

ANNEXURE I

KNOWN RECORDS OF WHALE SHARKS (<i>Phaenogadion opus</i>) ALONG THE INDIAN COAST							
S.no	Date	Landing center	Type of gear	Sex	Total Length (in m)	Weight (in tons)	Depth at which occurred (in m)
1.	1900	Near Trivandrum	-	-	8.83	-	-
2.	23.03.1908	Hooghly, West Bengal	-	-	4.26	-	-
3.	Feb'1909	Near Trivandrum	-	-	4.14	-	-
4.	Mar'1934	Near Trivandrum	-	-	3.96	-	-
5.	03.10.1936	Ratnagiri, Maharashtra	-	-	6.09	-	-
6.	13-02-1938	Mumbai, Maharashtra	-	M	6.55	-	-
7.	16.01.1940	Mumbai, Maharashtra	-	M	5.66	-	-
8.	21.02.1948	Mumbai, Maharashtra	-	F	6.98	-	-
9.	11.12.1953	Tuticorin, Tamil Nadu	-	-	6.62	-	-
10.	12.02.1954	Calicut, Kerala	-	M	6.47	-	-
11.	25.03.1958	Periathalai, Tamil Nadu	-	-	8.53	-	-
12.	16.05.1958	Palk Bay, Tamil Nadu	-	F	7.72	-	-
13.	05.03.1959	Mangalore, Karnataka	-	F	12.09	-	-
14.	Jan'1960	CapeComorin, Tamil Nadu	-	-	5.48	-	-
15.	Feb'1960	Vizhinjam	-	-	9.75	-	-
16.	July 1960	Palk Bay, Tamil Nadu	-	-	6.00	-	-
17.	15.03.1961	Veraval, Gujarat	-	F	5.25	-	-
18.	??	Okha, Gujarat	-	-	-	-	-
19.	28.07.1961	Tuticorin, Tamil Nadu	-	F	5.62	-	-
20.	27.02.1963	Kannur, Kerala	-	-	4.65	-	-
21.	26.05.1965	Vishakapatnam, AP	-	-	6.10	-	-
22.	15.04.1967	Pamban, Tamil Nadu	-	M	5.52	-	-
23.	26.07.1968	Tuticorin, Tamil Nadu	-	M	5.96	-	-
24.	05.01.1970	Calicut, Kerala	-	M	5.6	-	-
25.	16.06.1970	Tuticorin, Tamil Nadu	-	M	7.45	-	-
26.	20-12-1971	Colachel, Kanyakumari	-	-	5.17	-	-
27.	23.12.1971	Vizhinjam, Kerala	-	F	3.93	-	-

contd.

S.no	Date	Landing center	Type of gear	Sex	Total Length (in m)	Weight (in tons)	Depth at which occurred (in m)
28.	16-03-1972	Vizhinjam	-	-	5.65	-	-
29.	02.02.1973	Manapad, Tamil Nadu	-	M	5.4	-	-
30.	22.04.1975	Quilon, Kerala	-	-	7.67	-	-
31.	17.01.1976	Veraval, Gujarat	-	F	6.65	-	-
32.	Jan'1978	Kothapeta, Kakinada	Shore-seine	M	6.09	-	5-8
33.	Jan'1978	Yerralahpeta, Kakinada	Shore-seine	F	5.68	-	5-8
34.	Jan'1978	Yellaiahpetta, Kakinada	Shore-seine	F	5.93	-	5-8
35.	Jan'1978	Perumallapuram, Kakinada	Shore-seine	M	6.61	-	5-8
36.	Jan'1978	Koppirivanipeta, Kakinada	Shore-seine	F	5.85	-	5-8
37.	18.01.1978	Mumbai, Maharashtra	-	F	6.68	-	-
38.	Feb'1979	Yetimoga, Kakinada	Gill-net	M	7.40	-	50
39.	Nov-	Dakshin Kannada	Purse-seine	4M:1F	4.9-7.9	1.2-4.0	16-27
	Dec, 1980	7 juveniles caught					
40.	8.01.1980	Mumbai, Maharashtra	-	F	7.58	-	-
41.	23.03.1980	Chennai, Tamil Nadu	-	M	7.40	-	-
42.	21.01.1981	Karwar, Karnataka	-	F	8.81	-	-
43.	29-01-1981	Anjuna, Goa	Gill-net	F	5.70	2.2	27
44.	12.04.1982	Veraval, Gujarat (9)*	Hook	-	-	-	-
45.	13.04.1982	Veraval, Gujarat (7)*	Hook	-	-	-	-
46.	14.04.1982	Veraval, Gujarat (4)*	Hook	-	-	-	-
47.	15.04.1982	Veraval, Gujarat (2)*	Hook	-	-	-	-
48.	07.02.1983	Kilakarai, Tamil Nadu	-	-	4	-	-
49.	23.02.1983	Kilakari, Tamil Nadu	-	M	4.75	-	-
50.	18.03.1983	Karwar, Karnataka	-	-	5.35	-	-
51.	21.11.1983	Mumbai, Maharashtra	Gill net	M	12.18	-	33
52.	30.01.1984	Pondicheri	-	M	4.97	-	-
53.	April'1984	Dummulapeta, Kakinada	Gill-net	F	6.01	3	50
54.	02.07.1984	Chennai, Tamil Nadu	-	F	5.63	-	-
55.	17.12.1984	Cochin, Kerala	-	F	-	-	-

contd.

*Number of fishes caught

Annexure I contd.

S.no	Date	Landing center	Type of gear	Sex	Total Length (in m)	Weight (in tons)	Depth at which occurred (in m)
56.	March'1985	Kakinada fish harbor	Trawl net	M	7.64		60
57.	19.10.1985	Adirampatnam, Tamil Nadu	-	-	-	-	-
58.	10.11.1985	Mumbai, Maharashtra	-	-	5.00	-	-
59.	21.11.1985	Mumbai, Maharashtra	-	M	12.18	-	-
60.	Jan'1987	Kakinada fish harbour	Trawl net	F	5.93		50
61.	April'1988	Panathpura, Trivandrum	Shore-seine	F	6.06	2	-
62.	April'1988	Thumba, Trivandrum	Shore-seine	M	-	-	-
63.	18-04-1988	Colachal, Kanyakumari (3)*	-	-	7.32	1.5	
64.	25-07-1989	Palk Bay, Tamil Nadu	Shore-seine	F	5.95	3.5	
65.	8-10-1989	Kovalam, Chennai	Gill-net	F	4.48	2	
66.	13-12-1990	Dakshin Kannada, Malpe	Purse-seine	F		900 Kg	36
67.	28-02-1991	Bey pore, Calicut	Ring-net	M	3.27	-	-
68.	23-10-1991	Dhanushkodi, Rameswaram	-	M	5.56	3	-
69.	26-10-1992	Palk Bay, Tamil Nadu	Shore-seine	M	10.22	5	
70.	08-06-1992	Dibbapalem, Visakhapatnam	Gill-net	M	7.42	4	-
71.	30-07-1992	Visakhapatnam	Gill-net	M	5.48	-	-
72.	15-04-1993	Gulf of Mannar, Tamil Nadu	Gill-net	M	3.8	650 Kg	40
73.	13-03-1994	Kovalam, Kanyakumari	Gill-net	M	5.34	1.5	32
74.	12-12-1994	Vettukadu, Trivandrum	Gill-net	-	5.50	4.75	
75.	30-09-1995	Ratnagiri, Maharashtra	-	-	20.75	-	-
76.	29-01-1995	Vizhinjam, Kerala	Gill-net	M	5.37	4.75	-
77.	03-03-1995	Kanyakumari	Shore-seine	M	4.75	3.75	-
78.	06-02-1996	Uppada, Kakinada	Gill-net	M	5.30	1000 kg	15
79.	19-06-1996	Kaveripattinam	Bag-net	-	4.9	2	15
80.	04-11-1997	Paradeep, Orissa	-	F	6.69	3	-

*Number of fishes caught

Compiled from various Marine Fisheries Information Services - CMFRI publications.

DAY TO DAY RECORDED LANDINGS DURING THE STUDY 1999-2000

DATE	LENGTH (IN Mts)				LANDING CENTER	LOCATION	
	WEIGHT (IN TONS)					Depth	Distance
08-02-99	09	12.5	13	12	VERAVAL	35-80m	40-120 Kms
	6	9	10	8.5			
09-02-99	8.5	11.0			VERAVAL	35-80m	40-120 Kms
	5.5	7.5					
11-02-99	13	11.5	11	10	VERAVAL	35-80m	40-120 Kms
	10	8	7.5	7			
12-02-99	9				VERAVAL	35-80m	40-120 Kms
	6						
14-02-99	13				VERAVAL	35-80m	40-120 Kms
	10.5						
15-02-99	9	10			VERAVAL	35-80m	40-120 Kms
	6	7					
18-02-99	6.5	6.0	7.0	8.5	VERAVAL	35-80m	40-120 Kms
	3	2.5	3.5	5.5			
19-02-99	9	9.5	10.0		VERAVAL	35-80m	40-120 Kms
	6	6.5	7				
20-02-99	9				VERAVAL	35-80m	40-120 Kms
	6						
21-02-99	9	10	14.5	13.0	VERAVAL	35-80m	40-120 Kms
	6	7	12	10			
22-02-99	8.5	11	12.5		VERAVAL	35-80m	40-120 Kms
	5.5	7.5	9				
23-02-99	9	9	11		VERAVAL	35-80m	40-120 Kms
	6	6	7.5				
24-02-99	12	9			VERAVAL	35-80m	40-120 Kms
	8.5	6					
25-02-99	11.5	10			VERAVAL	35-80m	40-120 Kms
	8	7					
26-02-99	17.5	14			VERAVAL	35-80m	40-120 Kms

27-02-99 : 12 fishes were caught but fishermen had to throw them back into the sea forced by coast-guards.

Jan'99 to Mar'99 59 whale sharks were caught in Rupen (Dwarka) weighing 3-10 tons at a depth of 20-40 m and distance of 50-100 Kms from the shore.

contd.

Annexure II contd.

DATE	LENGTH (IN Mts) WEIGHT (IN TONS)			LANDING CENTER	Direction	LOCATION Depth	Distance
08-03-99	07	3.5		VERAVAL	South of Veraval	60 mts	110 Kms
12-03-99	08	04		DHAMLEJ	SE of Dhamlej	30 mts	60-70Kms
13-03-99	3.5	06		VERAVAL	South of Veraval	40 mts	80-100Kms
14-03-99	07	09		VERAVAL	South of Veraval	35 mts.	90-100Kms
15-03-99	08	6.5	8.2	DIU / VERAVAL	SW of Diu and South of Veraval	45mts	100-160Kms
16-03-99	04	03	4.5	DIU / VERAVAL	SW of Diu and South of Veraval	30-40mt	70-140Kms
17-03-99	05	07	09	VERAVAL	South of Veraval	45mt	110-140Kms
18-03-99	06	11		VERAVAL	South of Veraval	45-60mt	110-160Kms
19-03-99	07	12.5		VERAVAL	South of Veraval	40mt.	50Kms
20-03-99	08	08	6.5	VERAVAL / DHAMLEJ	South of Veraval	40-45mt.	80-11-Kms
21-03-99	09	12.5		DIU	South from DIU	30mt.	60Kms From DIU
22-03-99	06	07	09	VERAVAL	South from Mangal	35mt.	60-70Kms
23-03-99	03	3.5	06	VERAVAL	South from Veraval	30-55mt.	40-110Kms
24-03-99	08	6.5	07	VERAVAL	South from Veraval	35mt.	60Kms.
24-03-99	09	11	11.5	DIU / VERAVAL	South from Veraval	20-30mt.	30-40Kms.
	06	7.5	08				

DATE	LENGTH (IN Mts)				LANDING CENTER	LOCATION		Depth	Distance
	WEIGHT (IN TONS)					Direction			
25-03-99	12.5				DHAMLEJ	South from		30mt.	40-45Kmt.
	09					Dhamlej			
26-03-99	11.5	13.00	09	8.25	VERAVAL	South from		25-30mt.	40-60Kms.
	08	10	06	4.5		Veraval			
27-03-99	8.5	09	11.5	8.75	VERAVAL	South from		30-35mt.	60-70Kms.
	05	06	08	5.5		Veraval			
28-03-99	6.5	08	06	11.5	VERAVAL	South from		40-60mt.	60-80Kms.
	03	04	2.5	08		Veraval			
29-03-99	07	11.5			VERAVAL	South from		30-35mt	50-70Kms.
	3.5	08				Veraval			
30-03-99	6.5	12.5			VERAVAL	South from		25mt	30-40Kms.
	03	09				Veraval			
31-03-99	07				VERAVAL	South from		30mt.	40-50Kms.
	3.5					Veraval			
02-04-99	09	11.5	10		VERAVAL	South from		30mt	60-75Kms
	06	08	07			Veraval			
04-04-99	10				VERAVAL	South from		45mt	80-100Kms
	07					Veraval			
05-04-99	6.5				VERAVAL	South from		50mt	80-90Kms
	03					Veraval			
06-04-99	11.5				VERAVAL	South from		35mt	70Kms
	08					Veraval			
07-04-99	8.5				VERAVAL	South from		30mt	50Kms
	4.5					Veraval			
08-04-99	08	09	11.5	10	VERAVAL	South from		30-60mt	50-140Kms
	04	06	08	07		Veraval			
09-04-99	08	10.5			VERAVAL	South from		35-40mt	60-8-Kmt
	04	7.25				Mangrol			
10-04-99	10	11			VERAVAL	South from		30mt	30Kms.
	07	7.5				South from			
11-04-99	8.5	08	11		VERAVAL	Mangrol			
						Dhamlej from		30-60mt	40-8-Kms.
						Veraval			
	05	04	7.5						

contd.

Annexure II contd.

DATE	LENGTH (IN Mts)				LANDING CENTER	Direction	LOCATION	
	WEIGHT (IN TONS)						Depth	Distance
12-04-99				7.5	VERAVAL	South from Dhamlej	60-70mt	80-150Kms
15-04-99				3.75	VERAVAL	South from Veraval	45mt	60-70Kms
16-04-99					VERAVAL	S-Ver., SE-Mangrol SW-Dhamalej	20-40mt	25-30Kms
19-04-99					VERAVAL	SW-Veraval, S-Mangrol	30-40mt	30-60Kms
21-04-99					VERAVAL	South from Veraval	30mt	60Kms.
23-04-99					VERAVAL	South from Veraval	30mt	40-45Kms.
24-04-99					VERAVAL	SE from Veraval	35mt	60Kms.
25-04-99					VERAVAL	S-Veraval, SW-Dhamlej, South-Mangrol	40mt, 20-25mt 30-40mt	80Kms, 30Kms 50-70Kms
26-04-99					VERAVAL	South from, Veraval DIU	45mt, 35mt	80-90Kms, 60Kms.
28-04-99					VERAVAL	South from Veraval	30mt	60Kms.
29-04-99					VERAVAL	SW-Veraval	45mt	80Kms.
30-04-99					VERAVAL	SW-Veraval	50-60mt	90-110Kms.
03-05-99					VERAVAL	South-Dhamlej	30-15mt	50-60Kms.
04-05-99					DWARKA			
05-05-99					DIU- VERAVAL	SW-DIU	20-25mt	25-40Kms. 40-50Kms.

contd.

DATE	LENGTH (IN Mts)		WEIGHT (IN TONS)		LANDING CENTER	Direction	LOCATION		Annexure II contd.
							Depth	Distance	
06-05-99*									
07-05-99	6.5	4.5			VERAVAL	South-Veraval	30mt	30Kms.	
08-05-99	03	02							
	08				VERAVAL	South-Mangrol	15mt	40, 30-40Kms.	
09-05-99	04								
	7.5	09			VERAVAL-DIU	S-Veraval, S-DIU	20mt, 25mt	30, 40Kms.	
10-05-99	3.7	06			VERAVAL	S-Dhamlej, S-Veraval	22mt, 30mt	40Kms.	
	09	06	07	7.5		SW-DIU	25mt	50-60Kms.	
11-05-99	06	2.5	3.5	3.7	VERAVAL	South from Veraval	40mt	30Kms.	
	06								
12-05-99	2.5								
	06				VERAVAL	South from Veraval	15-20mt	30-60, 30Kms.	
14-05-99	09	11.5	13	14.5	VERAVAL-DIU	South-Veraval, South-DIU	15-30mt, 15mt	40Kms.	
	09								
15-05-99	06	08	10	12					
	11	11.5	6.5	03					
16-05-99	7.5	08	03		VERAVAL	SW-Veraval	20mt	30-40, 25Kms.	
	4.5	8.5	6.5	06	VERAVAL	S-Veraval, SW-DIU	30mt, 15mt	30Kms.	
17-05-99	02	05	03	2.5		South-Dhamlej	20mt	30-40Kms.	
	6.5				VERAVAL	South from Veraval	15-20mt		
	03								

* Another 10 fishes were caught (2-7 tons) but morphometric measurements could not be taken.

contd.

Annexure II contd.

DATE	LENGTH (IN Mts)				LANDING CENTER	Direction	LOCATION	
	WEIGHT (IN TONS)						Depth	Distance
1/1/00	9.00	11.00	8.00		VRL	SE from Diu	20 m	15-20 kms
	06	7.5	04					
2/1/00	8.50	11.50	6.50	11.00	VRL	SE from Diu	15-20 m	15-20 kms
	05	08	03	08				
3/1/00	9.00	9.50	12.50	12.00	VRL	SE from Diu	10-25 m	10-20 kms
	06	6.5	09	05				
				08				
4/1/00	8.00	8.30	12.00	10.00	VRL	SE from Jafrabad	20-30 m	10-15 kms
				11.00				
				11.50				
	04	4.5	8.5	07				
				7.5				
				08				
5/1/00	8.80	10.00	11.50	12.50	VRL	SW from Diu	10-25 m	10-20 kms
	5.5	07	08	09				
				8.5				
6/1/00	11.50	8.00	8.50		VRL	SW from Diu	12-30 m	15-40 kms
	08	04	05					
7/1/00	11.50	8.30			VRL	SW from Diu	10-15 m	15-20 kms
	08	4.5						
10/1/00	8.30	8.50	9.00	12.50	VRL	S from VRL	10-25 m	10-40 kms
	4.5	05	06	09				
10/1/00	12.00	12.50	11.00	9.00	-do-	-do-	-do-	-do-
	8.5	09	7.5	06				
				08				
20/02/00	9.00	11.00	11.50	8.50		West from Rupen	25 m	10-15 kms
				12.50				
	06	7.5	08	05				
26/02/00	11.50	12.50	13.00	11.50	VRL	S Sutrupuda	25 m	15-25 kms
				12.50	DRK	W from DRK	16-17 m	10-15 kms
	08	09	10	08				
27/02/00	10.00	11.50	13.00	13.00	VRL	S from Sutrupuda	25 m	15-20 kms
	07	08	10	10				
28/02/00	11.50	11.50	12.50	11.50	VRL	S from Sutrupuda	25-30 m	20-30 kms
	08	08	09	08	DRK	W from DRK	15-20 m	10-15 kms
29/02/00	12.50	12.50	11.50	12.50	VRL	S from Madhawad	25 m	20-30 kms
	09	10	08	10	DRK			
01/03/00	9.00	10.00	9.00	11.50	VRL	S from Sutrupuda	10-25 m	10-20 kms
	06	07	06	08				

contd.

DATE	LENGTH (IN Mts)					LANDING		LOCATION		Annexure
	WEIGHT (IN TONS)					CENTER	Direction	Depth	Distance	
02/03/00	9.00	12.50	13.00			VRL	S from Sutrupuda	10-25 m	10-20 kms	
	06	09	10							
03/03/00	12.50	13.00	13.00			VRL	S from Sutrupuda	8-15 m	5-25 kms	
	09	10	10			DRK	W from DRK	10-12 m	10-15 kms	
05/03/00	12.50					VRL	S from Sutrupuda	10-14 m	8-10 kms	
	09									
12/03/00	13.00	14.00	11.50	12.50	12.50	VRL	S from Sutrupuda	10-15 m	8-11 kms	
	10	11	08	09	09	DRK	W from DRK	10-20 m	10-15 kms	
13/03/00	11.50	12.50	13.00	12.50		VRL	Sf rom Madhawad	20 m	8-12 kms	
	80	09	10	09		Shile	SW from Madhupur	17 m	10-15 kms	
26/03/00	13.00	14.00	12.50			VRL	S from Sutrupuda	10 m	5-10 kms	
	10	11	09			DRK	W from DRK	15 m	8-10 kms	
27/03/00						VRL	S from Sutrupuda	15-20 m	8-20 kms	
	06	07	08	8.5	6.5	DRK	W from Mithapur	10-20 m	10-12 kms	
27/03/00						-d0-	-d0-	-d0-	-d0-	
	09	10				-d0-	-d0-	-d0-	-d0-	
28/03/00						VRL	S from Sutrupuda	10-20 m	8-15 kms	
	07	09	10	10	07	M-DRK	S from Diu	10-15 m	5-10 kms	
03/04/00	12.5	11.50	10.00	11.50		M-DRK	S from M-DRK	15-20 m	10-15 kms	
	09	08	07	08		DRK	W from DRK	10 m	8-12 kms	
11/04/00	11.5	12.50	13.00			VRL	S from Sutrupuda	15-25 m	10-15 kms	
	08	09	10							
12/04/00	11.5	13.00	14.00			VRL	S from Madhawad-Diu	15-25 m	10-15 kms	
	08	10	11							
13/04/00	11.5									
	08					VRL	S from Madhawad-Diu	15-25 m	10-15 kms	
19/04/00	12.50									
	09					VRL	S from Sutrupuda	15 m	8-10 kms	
20/04/00	6.50	8.00				VRL	S from Sutrupuda	15 m	8-10 kms	
	03	04								
24/04/00	8.50	10.00	13.00			VRL	S from Sutrupuda	15 m	8-10 kms	
	05	07	10			DIU				

contd.

Annexure II contd.

DATE	LENGTH (IN Mts)				LANDING		LOCATION	
	WEIGHT (IN TONS)		CENTER	Direction	Depth	Distance		
25/04/00	07	10	VRL	S from Diu	18-20 m	15-20 kms		
01/05/00	9.00	8.00						
	06	05						
04-05-00	13.0	10.00	VRL	S from Sutrupuda	15m	10-12kms		
		9.00	VRL	S from Sutrupuda	10m	8-10 kms		
06-05-00	8.50							
	05							
15-05-00	11.50	9.5	VRL	S from Dwarka	15m	10-15 kms		
	08	6.5	VRL	S from Sutrupuda	10-12m	8-10 kms		
20-05-00	11.5	12.5						
	08	09	VRL	S from Diu	8-10M	10-15 kms		
		06	VRL/	S from Diu	8-10M	10-15 kms		
26-05-00	12.5	8.00	DRK	S from DRK	8-9M	6-8 kms		
	09	04	VRL	S from Sutrupuda	10 m	8-15 kms		
27-05-00	6.50							
	03		VRL	S from Sutrupuda	5m	6 kms		

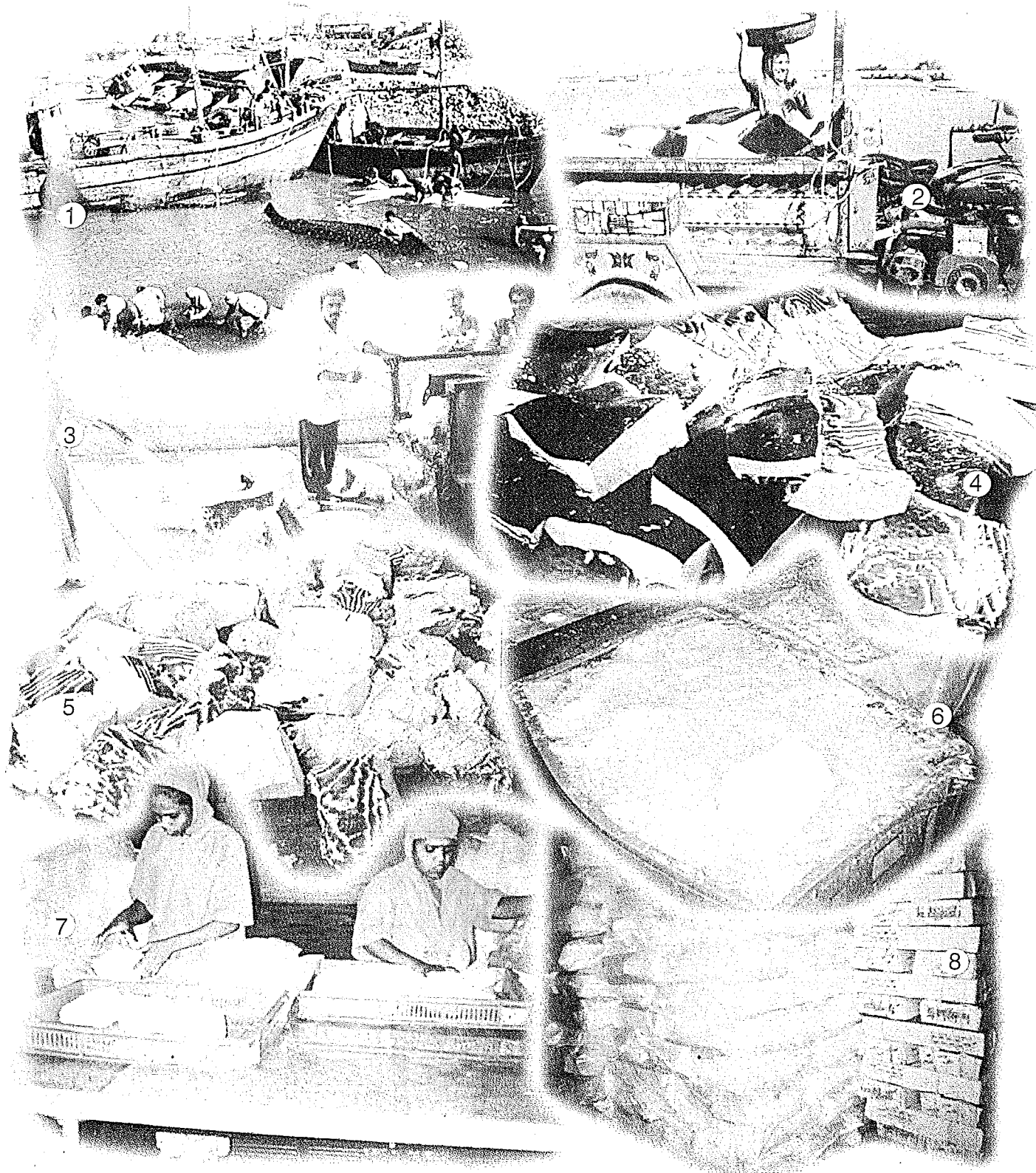
TRAFFIC India survey, (1999-2000)

LANDING DURING NOVEMBER - DECEMBER 1999

Date	Nos.	Place	Weight	Depth	Distance
18-19 Nov'99	7	Veraval	2-12 tons	-	-
1-12-99	72	Rupen-Dwarka	2-12 tons	20-25 m	15-20 Kms
2-12-99	45	-do-	3-10 tons		
3-12-99	8	-do-			
4-12-99	10	-do-			
4-12-99	1	Veraval	.5 tons (2 m in length)		
10-12-99	1	-do-	3 tons (6.5 m length)	20-26 m	10-15 Kms
15-12-99	2	-do-	2 t (4m) & 6 t (9m)	20-26 m	10-15 Kms
20-12-99	1	-do-	4 t (8m)	20-26 m	10-15 Kms
27-12-99	2	-do-	8 t (11.5m) & 10 t (13m)	20-26 m	10-15 Kms
28-12-99	3	-do-	6t (9m), 8 t (11m), 10 T (13m)	20-26 m	10-15 Kms

TRAFFIC India survey, (1999-2000)

Processing of Meat and Skin



1 Expert cutters. 2 On way to processing centers 3 Washing chunk 4 Separated red meat & skin
5 Separated white meat 6 Curing 7 Wrapping for freezers 8 Packed for export



The TRAFFIC Network is the world's largest wildlife trade monitoring programme with offices covering most parts of the world. TRAFFIC (Trade Records Analysis of Flora and Fauna In Commerce) is a joint programme of WWF (World Wide Fund for Nature) and IUCN (The World Conservation Union) to monitor trade in wild plants and animals. It works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).

TRAFFIC-India is a programme division of World Wide Fund for Nature-India, WWF-India and forms part of the worldwide TRAFFIC Network.

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