

APPENDIX I

Number of dhonis reported to be engaged in shark fishing in the islands visited during the shark fisheries survey (August-October 1992)

Island	Gillnetting		Longlining		Spiny Dogfish		Others
	F/T	P/T	F/T	P/T	F/T	PIT	PIT
HA. Huvarafushi	—	1	—	—	—	—	—
H.A. Kelaa	—	—	—	—	—	—	—
H.A. Maarandhoo	—	—	—	—	—	—	—
H.A. Thakandhoo	—	—	—	—	—	1	—
H.A. Baarah	—	—	—	5	—	—	—
H.Dh. Kuthudhufushi	—	—	—	10	—	1	—
H.Dh. Makunudhoo	—	—	—	2	—	1	—
Sh. Kanditheem	—	2	—	5	—	35	Madu miyaru
Sh. Lhaimagu	—	—	—	3	—	—	—
Sh. Funadhoo	—	—	—	3	—	5	Madu miyaru
N. Kudafari	—	—	—	4	—	—	—
N. Manadhoo	—	—	—	15	—	20	Whale Shark
R. Alifushi	—	—	—	—	—	5	Madumiyaru
R. Vaadhoo	—	—	—	—	—	—	—
R. Kandholhudhoo	—	—	—	—	—	10	Oivaali miyaru
R. Maduvvari	12	17	—	12	—	—	—
R. Meedhoo	16	14	—	16	—	—	—
B. Dhonafanu	—	—	—	5	—	—	Whale Shark
B. Thulhadhoo	—	—	—	2	—	—	Oivaali miyaru
B. Goidhoo	—	—	—	6	—	—	—
Lh. Kurendhoo	—	—	—	—	4	6	—
Lh. Naifaru	—	—	—	—	—	—	Oivaali miyaru
K. Thulusdhoo	—	—	—	—	—	—	—
K. Malé	—	—	—	—	—	—	—
A. Dungati	12	—	—	—	—	—	—
A. Mahibadhoo	—	—	—	3	—	—	—
A. Maandhoo	—	2	—	2	—	—	—
A. Himendhoo	—	10	—	10	—	—	—
A. Ukulhas	—	—	—	7	—	—	—
A. Rasdhoo	—	—	1	—	—	—	—
A. Thoddoo	—	—	—	10	—	—	—
V. Keyodhoo	—	—	—	—	—	—	Madu miyaru
V. Rakeedhoo	—	—	—	3	—	—	—
M. Dhiggaru	—	—	—	—	—	2	—
M. Maduvvan	—	1	—	2	—	—	Madu miyaru
M. Mulaku	—	—	—	—	—	1	Madu miyaru, Oivaali miyaru
F. Magoodhoo	—	4	—	4	—	—	—
F. Feali	—	16	—	8	—	—	—
Dh. Kudahuvadhoo	—	—	—	—	—	—	Oivaali miyaru
Dh. Maaboodhoo	—	—	—	12	—	—	—
Dh. Hulhudheli	—	—	—	—	—	3	Madu miyaru
Dh. Bandidhoo	—	18	—	18	—	—	—
Dh. Meedhoo	—	—	—	24	—	1	Madu miyaru
Th. Vilifushj	—	8	—	12	—	10	—
Th. Hirilandhoo	—	2	—	5	—	1	Madu miyaru
Th. Kandoodhoo	—	—	—	4	—	3	Madu miyaru
L. Isdhoo	—	—	—	—	—	6	—
L. Dhabidhoo	—	—	—	—	—	2	—
L. Maabaidhoo	—	—	—	—	—	—	—
L. Mundoo	—	—	—	—	2	15	—
L. Maamendhoo	—	—	—	—	—	—	—
L. Maavah	—	—	—	2	—	2	Oivaali miyaru
S. Hithadhoo	—	—	—	3	—	3	Oivaali miyaru
S. Maradhoo	—	—	—	—	—	—	—
S. Feydhoo	—	—	—	—	—	—	—
TOTAL	40	95	1	217	6	133	—

Note: Excludes reef shark handlining

Abbr.: (FIT = Full-time PIT = part-time) H.A. = Haa Alifu H.Dh = Haa Dhaalu Sh. = Shaviyani N. = Noonu R. = Raa B. = Baa
Lh. = Lhaviyani K. = Kaafu A. = Alif V. = Vaavu M. = Meemu F. = Faafu Dh. = Dhaalu Th. = Thu L. = Laamu S. = Seenu

APPENDIX II

Maldivian shark names

In the Maldivian language (Dhivehi), shark are known as *miyaru*. A few individual species that are large, distinctive and have probably been subject to widespread fishing since early times have simple and distinctive names. For example

<i>Femunu</i>	Tiger Shark
<i>Fehurihi</i>	Whale Shark
<i>Madu miyaru</i>	Sixgill Shark

These names are used and recognized by fishermen throughout the length of the Maldives. However, for most shark species the situation is not so simple. Some common species are given different names in almost every island; some groups of shark are lumped together under 'catch-all' names; some shark appear to have no separate common name at all; some names may be used for completely different shark in different areas; and some fishermen may sometimes give or change shark names almost at whim.

The proliferation of names between islands and atolls is well illustrated by three common shark: the Silky Shark (*Carcharhinus falciformis*), the Oceanic Whitetip Shark (*C. longimanus*), and the Blacktip Reef Shark (*C. melanopterus*). Listed on the following pages are 13, 19 and 19 names respectively for these species. In fact, in these cases, the situation is not as confusing as it might at first seem. For *C. falciformis*, most names are variations on a theme referring to the association of this species with tuna schools (*ainu*) or to its rather dark coloration (*kaihu*). Juvenile *C. falciformis* associate with floating objects (*oivaali*) and are universally known as *oivaali miyaru*. Most names of *C. longimanus* refer to the long pectoral fins (*kanfaiy*) and/or to its supposedly weak or slow nature (*fee*). Most names of *C. melanopterus* refer to its shallow lagoon habitat (*faihu*) and its pale brown coloration (*dhon*).

Some names are used for a number of different species. Thus, *aadhaige m'iyaru* (Common Shark) refers to *C. falciformis* but also to *C. amblyrhynchos*, *C. melanopterus*, and *T. obesus*. *Loathandi miyaru* (brass bangle shark) can refer to any grey shark with a brassy sheen. *Dhon miyaru* (pale or white shark) can refer to any light-coloured species, and may even be used for some Gulper Shark that are slightly less dark than others.

Confusion that can arise over the use of the same name for different shark in different areas is illustrated by the Nurse Shark (*Nebrius ferrugineus*), the Variegated Shark (*Stegostoma fasciatum*), and the Whitetip Reef Shark (*Triaenodon obesus*). *N. ferrugineus* is widely known as *nidhan miyaru* (sleeping shark), *S. fasciatum* as *hitha miyaru* and *T. obesus* as *faana miyaru* (grouper shark). However, in M. Maduvvari, the names for *N. ferrugineus* and *S. fasciatum* have been swapped. Also, *T. obesus* is known as *hitha miyaru* in R. Meedhoo and *S. fasciatum* as *faana miyaru* in several central atolls.

Fishermen consider the Guitarfish (*Rajiformis*, *Rhinobatoidei*) to be shark; and call them *madi miyaru* (Ray Shark). Non-fishermen sometimes confuse *madi miyaru* and *madu miyaru* (Sixgill Shark). *Madu miyaru* are known as *madi miyaru* in Addu Atoll, but the fishermen there are well aware of the distinction.

It is clearly not always easy to communicate with Maldivian fishermen and to be sure that all parties are talking about the same species. The list on the following pages is therefore offered as a rough guide to some of the common names in use. The first and sometimes also second Dhivehi names listed for each species are recommended for general use as being distinctive and already widespread. It should be borne in mind that many names used by fishermen could not be assigned to species, and that several identifications are only tentative. Also, this list is far from comprehensive, particularly as no names from Gaafu Alifu and Gaafu Dhaalu Atolls are included.

Names of Maldivian shark species

<i>Scientific name</i>	<i>English name</i>	<i>Dhivehi name</i>	<i>Area of use</i>	<i>Atoll</i>
<i>Hexanchus griseus</i>	Bluntnose Sixgill Shark	<i>Madu miyaru</i>	Widespread	
		<i>Madi miyaru</i>	Addu Atoll	Seenu
<i>Centrophorus spp.</i>	Gulper Shark Spiny Dogfish	<i>Kashi miyaru</i>	Widespread	
		<i>Maa kashi miyaru</i>	H. Dh Makunudhoo	Haa Dhaalu
		<i>Koalhi miyaru</i>	Th. Vilufushi	Thaa
		<i>Kaathu miyaru</i>	Sh. Kanditheem	Shaviyani
<i>Stegostomafasciatum</i>	Variegated Shark	<i>Hitha miyaru</i>	M. Dhiggaru	Meemu
			An Atoll	Alif
			F. Feeall	Faafu
		<i>Faana miyaru</i>	K., F., and	Kaafu, Faafu and
			Dh. Atolls	Dhaalu
		<i>Oashikuri miyaru</i>	Sh. Kaditheem	Shaviyani
			H.Dh. Makunudhoo	Han Dhaalu
		<i>Ras miyaru</i>	N. Kudafari	Noonu
		<i>? Olhufathi miyaru</i>	R. Meedhoo	Ran
		<i>Nidhan miyaru</i>	M. Maduvvari	Meemu
		<i>? Nidhanmaru</i>	R. Maduvvari	Ran
<i>Nebriusferrugineus</i>	Tawny Nurse Shark	<i>Kunboa miyaru</i>	R. Kandholhudoo	Ran
		<i>Samara miyaru</i>	V. Keyodhoo	Vaavu
		<i>Nidhan miyaru</i>	Widespread	
		<i>Nidhanmaru</i>	Northern Atolls	
		<i>Nidhaa miyaru</i>	N. Kudafari	Noonu
		<i>Nidhanbara</i>	Addu Atoll	Seenu
		<i>Goimaru</i>	Notern Atolls	
		<i>Goimiyaru</i>	Dh. Makunudhoo	Dhaalu
		<i>? Gohmiyaru</i>	M. Maduvvari	Meemu
		<i>? Hila miyara</i>	R. Meedhoo	Ran
		<i>Hitha miyaru</i>	M. Maduvvari	Meemu
<i>Rhincodon typus</i>	Whale Shark	<i>Fehurihi</i>	Widespread	
<i>Odontaspisferox</i>	Smailtooth Sandtiger	<i>Theyo miyaru</i>	Ari Atoll	Alif
		<i>Hikandhi thun miyaru</i>	R. Vaadhoo,	Ran
			Addu	Seenu
		<i>Meedha miyaru</i>	Sh. Kanditheem	Shaviyani
<i>Alopias superciliosus</i>	Bigeye Thresher		Dh. Bandidhoo	Dhaalu
		<i>Kandi miyaru</i>	Widespread	
		<i>Loabodu kandi miyaru</i>	HA. Baarah	Han Alifu
		<i>Nagoo miyaru</i>	Addu Atoll	Seenu
<i>Alopias vulpinus</i>	Thresher Shark	<i>Kandi miyaru</i>	Widespread	
		<i>Thandi miyaru</i>	F. Magoodhoo	Faafu
		<i>Nagoo miyaru</i>	Addu Atoll	Seenu
<i>Isurus oxyrinchus</i>	Shortfin Mako	<i>Woshimas miyaru</i>	Widespread	
		<i>Weshimas miyaru</i>	Addu Atoll	Seenu
		<i>Meshimas miyaru</i>	Addu Atoll	Seenu
C. albimarginatus	Silvertip Shark	<i>Kattafulhi miyaru</i>	Widespread	
		<i>Thila miyaru</i>	Widespread	
		<i>Thila kolu miyaru</i>	Dh. Meedhoo	Dhaalu
		<i>Vaadhili miyaru</i>	An Atoll	Alif
		<i>Voadhili miyaru</i>	Ari Atoll	Alif
		<i>Hiruelhi miyaru</i>	F. Feeali	Faafu
		<i>Urahakolhu hudhu miyaru</i>	Dh. Maneboodhoo	Dhanlu
		<i>Ushaakolhu hudhu miyaru</i>	Th. Vilufushi	Than
C. altimus	Bignose Shark	<i>Mendhan miyaru</i>	Widespread	
		<i>Mendhaa miyaru</i>	Widespread	
		<i>Mendhey miyaru</i>	Widespread	
		<i>Theyo miyaru</i>	Widespread	
C. amblyrhynchus	Grey Reef Shark	<i>Thila miyaru</i>	Widespread	
		<i>Thila koihu miyaru</i>	V.and Dh. Atool	Vanvu and Dhaalu
		<i>Thila kuri miyaru</i>	M. Maduvvari	Meemu
		<i>Thila kolhu dhon miyaru</i>	F. Magoodhoo	Fanfu
		<i>Vahboa miyaru</i>	K. Mate	Kanfu
		<i>Faanamaru</i>	Northern Maldives	
		<i>? Aadhaige miyaru</i>	Sh. Lhaimagu	Shaviyani
		<i>? Feeoasha miyaru</i>	Th. Hirilandhoo	Than

<i>Scientific name</i>	<i>English name</i>	<i>Dhivehi name</i>	<i>Area of use</i>	<i>Atoll</i>
<i>C. falciformis</i>	Silky Shark	<i>Oivaali miyaru</i> <i>Ainumathi miyaru</i> <i>Ainu miyaru</i> <i>Mas ainu miyaru</i> <i>Mas miyaru</i> <i>Aadhaige miyaru</i> <i>Loadhuni miyaru</i> <i>Loadhandi miyaru</i> <i>? Kandu miyaru</i> <i>? Medhu miyaru</i>	Widespread (juv.) Widespread Widespread Widespread Widespread Widespread HA. Baarah H.Dh. Kulhudhufushi R. Meedhoo R. Maduvvari	 Han Alifu Haa Dhaalu Ran Ran
<i>C. limbatus</i>	Blacktip Shark	<i>? Loathandi miyaru</i> <i>? Dhon miyaru</i> <i>? Thun hima miyaru</i>	Widespread Th. Hirilandhoo Dh. Bandidhoo	 Than Dhanlu
<i>C. longimanus</i>	Oceanic Whitetip	<i>Feekanfaiy miyaru</i> <i>Bodukanfaiy miyaru</i> <i>Kanfaiy bodu miyaru</i> <i>Dhigukanfaiy miyaru</i> <i>Maakanfwy miyaru</i> <i>Feeboa miyaru</i> <i>Fee miyaru</i> <i>Feeuraha miyaru</i> <i>Feeoasha miyaru</i> <i>Bodufee miyaru</i> <i>Koaka miyaru</i> <i>Madu miyaru</i> <i>Lhos miyaru</i> <i>Vaali miyaru</i> <i>Goh kanfathi miyaru</i> <i>Faalha miyaru</i> <i>Ishikulhu miyaru</i> <i>Ushaakolhu hudhu miyaru</i> <i>7 & iafahi miyaru</i>	Widespread Ari Atoll F. Magoodhoo Th. Vilufushi F. Feeali Dh. Maneboodhoo Sh. Kanditheem Widespread Widespread L. Dhambidhoo Dh., Th., and L. Atolls Th. Hirilandhoo Sh. and N. Atolls B. Thuthaadhoo HA. Hoarafushi HA. Baarah V. and M. Atolls Dh. Meedhoo S. Hithadhoo S. Maradhoo S. Hithadhoo	 Alif Fanfu Than Fanfu Dhanlu Shaviyani Lhaviyani Dhaalu, Than and Lhaviyani Than Shaviyani and Noonu Baa Han Dhaalu Han Alifu Vaavu and Meemu Dhaalu Seenu Seenu Seenu
<i>C. melanopterus</i>	Blacktip Reef Shark	<i>Faihu mathi dhon miyaru</i> <i>Falhu miyaru</i> <i>Falhu mathi miyaru</i> <i>Falhu dhon miyaru</i> <i>Falhu mathi mai miyaru</i> <i>Falha miyaru</i> <i>Dhon miyaru</i> <i>Dhon fan miyaru</i> <i>Dhon faiy miyaru</i> <i>Gondu miyaru</i> <i>Gondu dhashu miyaru</i> <i>Olhafathi miyaru</i> <i>Olhu miyaru</i> <i>Mendhan miyaru</i> <i>Aadhaige miyaru</i> <i>Ishakolhu miyaru</i> <i>Kalhu miyaru</i> <i>Kalhafathi miyaru</i> <i>Kalhavathi miyaru</i>	Sh. Kanditheem F. Feeali K. and Lh. Atoll R. Maduvvari H. Dh. Makunudhoo A. Rasdhoo S. Hithadhoo R., Sh., F. and Dh. Atoll H. Dh. Makunudhoo H. A. Kelan <i>Mi</i> Atoll A. Himendhoo ? Th. Vilufushi N. Manadhoo Dh. Kudahuvadhoo H.A. Hoarafushi HA. Kelaa S. Maradhoo S. Feydhoo ? V. Keyodhoo F. Magoodhoo M. Maduvvari	Shaviyani Fanfu Kanfu and Lhaviyani Ran Han Dhaalu Alif Seenu Ran, Shaviyani, Fanfu and Dhaalu Han Dhaalu Han Alifu Alif Alif Than Noonu Dhaalu Han Alifu Han Alifu Seenu Seenu Vanvu Fanfu Meemu
<i>C. sorrah</i>	Spottail Shark	<i>Thilaa kolhu dhon miyaru</i> <i>Dhon miyaru</i> <i>Ura miyaru</i>	Ari Atoll Th. Atoll A. Himendhoo	Ailf Than Alif
<i>Galeocerdo cuvier</i>	Tiger Shark	<i>Femunu</i> <i>Femunu miyaru</i> <i>Alhigaa miyaru</i> <i>7Huras miyaru</i>	Widespread Widespread Widespread Widespread	

<i>Scientific name</i>	<i>English name</i>	<i>Dhivehi name</i>	<i>Area of use</i>	<i>Atoll</i>
<i>Loxodon macrorhinus</i>	Sliteye Shark	<i>Oashi miyaru</i> <i>Hikandhi thun miyaru</i> <i>Olhufathi miyaru</i> <i>Loathandi miyaru</i>	Raa Atoll Kanfu Sh. Kanditheem M. Maduvvari Dh. Kudahuvadhoo	Shaviyani Meemu Dhaalu
<i>Negaprion acutidens</i>	Sicklefin Lemon Shark	<i>Olhufathi miyaru</i> <i>Vani dhon miyaru</i> <i>? Dhon miyaru</i> <i>Faana miyaru</i> <i>Falhu femunu</i>	Widespread R. and Sh. Atolls L. Manvah Th. Hirilandhoo Dh. Atoll	Ran and Shaviyani Laamu Than Dhaalu
<i>Prionace glauca</i>	Blue Shark	<i>Andhun miyaru</i> <i>Garahitha miyaru</i>	Widespread A. Mahibadhoo	Alif
<i>Triaenodon obesus</i>	Whitetip Reef Shark	<i>Faana miyaru</i> <i>Uraha kolhu hudhu miyaru</i> <i>? Uraha kolhu dhon miyaru</i> <i>Ushakolhu miyaru</i> <i>Uraha dhashu miyaru</i> <i>Hitha miyaru</i> <i>Olhufathi miyaru</i> <i>1 Aadhaige miyaru</i> <i>Thilakolhu miyaru</i> <i>Nidhanseyku</i>	Widespread R. Alifushi Dh. Bandidhoo F. Magoodhoo Addu Atoll Lh. Naifaru R. Meedhoo R. Maduvvari N. Manadhoo Dh. Meedhoo Th. Hirilandhoo	Ran Dhanlu Fanfu Seenu Lhaviyani Ran Ran Noonu Dhaalu Than
<i>Sphyrnalewini</i>	Scalloped Hammerhead	<i>Kaaligandu miyaru</i> <i>Kanoihi miyaru</i> <i>Ashigandu miyaru</i>	Widespread B., A., F and Dh. Atolls F., Dh. and Th. Atolls	Baa, Alif, Fanfu and Dhanlu Fanfu, Dhaalu and Than Seenu
<i>Rhina ancylostoma</i>	Bowmouth Guitarfish	<i>Thelaagandu miyaru</i> <i>Madi miyaru</i> <i>? Kalhu madimiyaru</i>	Addu Atoll Widespread Lh. Naifaru	Lhaviyani
<i>Rhynchobatus djiddensis</i>	Giant Guitarfish	<i>Madimiyaru</i> <i>Hikandithun madimiyaru</i> <i>Madi nidhan maru</i> <i>Dhon madi miyaru</i> <i>Madimaa miyaru</i>	Widespread Widespread R. Atoll Lh. Naifaru M. Maquvvari	Raa Lhaviyani Meemu

APPENDIX III

Accounts of shark species found in the Maldives

Biological information about shark in Maldivian waters is available for four sources:

- The exploratory offshore fishing survey carried out by MRS with assistance from FAO/BOBP (Anderson and Waheed, 1990). Original data are maintained at MRS.
- The reef fish resources survey carried out by MRS with assistance from FAO/BOBP (Van der Knaap et al., 1991; Anderson et al., 1992). Original data are maintained at MRS.
- This survey.
- Other published information.

To date, 26 species of shark have been positively identified from the Maldives. Four species (three *Centrophorus* and one proscylliid) have been collected but it has not been possible to name them at present. Four more species are believed, on circumstantial and anecdotal evidence, to exist in Maldivian waters. Thus, a total of 34 shark species are currently thought to be found in the Maldives. Many more species will no doubt be found as further studies are made. This applies particularly to deepwater shark: the seven species listed here are from a total of only 14 specimens.

At least two species of Guitanfish (Rajiformes, Rhinobatoidel) occur in the Maldives: *Rhina ancylostoma* and *Rhincobatus djiddensis*. Although these are, strictly speaking, rays, Maldivian fishermen consider them to be shark, calling them madi miyaru. These two species are not dealt with here, but have been mentioned in Table 3 and Appendix II.

Summaries of biological information relating to shark collected in Maldivian waters are presented in the pages that follow. The order of presentation and the majority of the names used follow Compagno (1984). Where possible, a colour photograph of each species is included. Colour sketches are given for those species which have been positively recorded in the Maldives but for which no photograph is available. These sketches are based on Compagno (1984) with the kind permission of FAO.

Length-weight relationships for some species are presented in Table 15. Van den Knaap et al. (1991) recorded fork lengths of shark, and presented fork length-weight relationships for three species. Fork length-total length relationships for these species are presented in Table 15.

Table 15. Summary of length-weight and length-length relationships for Maldivian shark (weight in kg, length in cm)

Relationship/species	a	b	N	r	Length range	Source
Fork length-Total length						
<i>C. albimarginatus</i>	1.210	3.417	38	0.99	58 — 102 cm FL	A
<i>C. amblyrhynchos</i>	1.183	5.584	21	0.99	58 — 92cm FL	A
<i>Loxodon macrorhinus</i>	1.103	9.885	57	0.9	63 — 73 cm FL	A
Fork length-Weight						
<i>C. albimarginatus</i>	0.6457	3.138	59	0.98	58 — 102cm FL	A
<i>C. amblyrhynchos</i>	0.3311	3.293	36	0.94	53 — 92cm FL	A
<i>Loxodon macrorhinus</i>	1.708	2.736	289	0.78	47 — 76 cm FL	B
Total length-Weight						
<i>C. albimarginatus</i>	0.2239	3.216	47	0.99	74 — 229 cm TL	A
<i>C. amblyrhynchos</i>	0.01264	3.337	23	0.98	73 — 144 cm TL	A
<i>C. falciformis</i>	0.8174	2.914	203	0.99	56 — 257 cm TL	C
<i>C. longimanus</i>	1.822	2.780	65	0.99	74 — 263 cm TL	C
<i>C. sorrah</i>	0.1267	3.327	16	0.99	69 — 112cm TL	A

Note: 1. Relationships are of the form $TL = a FL + b$ and $W = ax 10^{-5} L^b$

2. N = numbers in sample; r = correlation coefficient.

Sources: A. Unpublished data at MRS.

B. Van der Knaap et al. (1991).

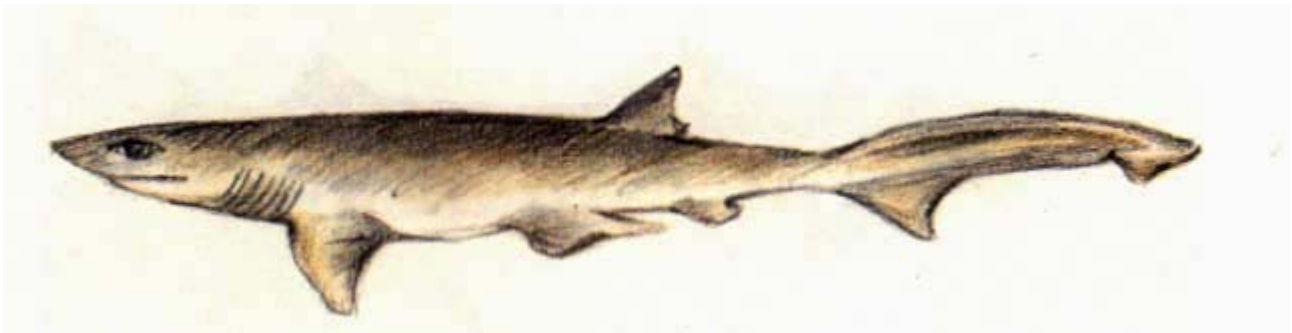
C. Anderson and Waheed (1990).

FRILLED SHARK *Chlamydoselachus anguineus* (Garman, 1884).

Not positively recorded from the Maldives. However, many fishermen who fish for deepwater Gulper Shark report occasional catches of a species known as *yen miyaru* (eel shark). Since deepwater eel are also taken as by-catch in this fishery, many fishermen say that *yen miyaru* is not a shark. A minority of fishermen, however, say that *yen miyaru* is, indeed, a shark and tentatively identified it from drawings as *C. anguineus*.

SHARPNOSE SEVENGILL SHARK *Heptranchias perlo* (Bonnaterre, 1788).

A single specimen of 8.4 kg was recorded by Stromme (1983). It was caught by bottom trawl in 248m about 4 km east of A. Thoddoo on August 22, 1983 by the Norwegian research vessel *Dr. Fridtjof Nansen* during an UNDP/FAO fish resources survey. Probably taken by Maldivian fishermen in the deepwater shark fishery as *madu miyaru*, but not seen by us.



Sharpnose Sevengill Shark

BLUNTNOSE SIXGILL SHARK *Hexanchus griseus* (Bonnaterre, 1788).

A single female of 195cm TL was observed by R C Anderson on R. Ailfushi on October 4, 1990. The jaws were preserved. It was reported to have been caught in about 400m. From fishermen's descriptions, this appears to be the main species known as *madu miyaru*. *Madu* means slow or soft, a reference to their behaviour and to the texture of their meat. Reported to be relatively common in 200 m+ on outer atoll slopes throughout the Maldives.



Bluntnose Sixgill Shark

BRAMBLE SHARK *Echinorhinus brucus* (Bonnaterre, 1788).

Not positively recorded from the Maldives. However, many fishermen who fish for deepwater Gulper Shark report occasional catches of a large spine-covered shark known as *berebedhi miyaru*. *Berebedhi* is a thorny tree (Indian coral tree, *Erythrina variegata*). Fishermen consistently identified this species from drawings as *Echinorhinus brucus*.

GULPER SHARK *Centrophorus* spp.

Gulper Shark are common in Maldivian waters where they are known in Dhivehi as *kashi miyaru* (Spine Shark) and in English as Spiny Dogfish. They form the basis of the deepwater shark liver

oil fishery (*kashimiyaru keyolhu kan*). This fishery peaks during the calm of the Northeast Monsoon, so there was little activity during the period of this survey. As a result only seven specimens were seen (one on L. Mundoo on October 1, 1992, and six on Th. Vilufushi on October 29, 1992). In addition, Anderson saw and collected material from three specimens on R. Alifushi on October 4, 1990. These ten specimens are believed to represent three species. However, the taxonomy of *Centrophorus* is not well worked out and it is not currently possible to assign names to these putative species with any degree of confidence.

All three have sessile, block-like denticles, thus belonging to a group which Compagno (1984) characterized as being “particularly troublesome”. Compagno (pers. comm., January 30, 1992) was unable to positively name two Alifushi specimens sent to him for identification. Much further work will be needed to sort out this problem. Material collected from the specimens seen during this survey has been sent to Dr. Compagno.



Gulper Shark

KITEFIN SHARK *Dalatias licha* (Bonnaterre, 1788)

A single set of dried jaws was purchased from a fisherman on L. Isdhoo on September 30, 1992. The shark from which they came was caught “some time before” on a deep vertical longline set for Gulper Shark. The fishermen called this shark *kashineh miyaru* (no spine shark).

It is apparently rare; the jaws were collected only because this species had not been seen before. The jaws are preserved at MRS (catalogue no. MRS - 0397 - 92) and have the following dental formula: 8 - 1 - 8 / 9 - 1 - 9. (See photo, p. 21).

This specimen constitutes a new record for the Maldives and, apparently, for the central Indian Ocean.



Kitefin Shark

COOKIE-CUTTER SHARK *Isistius brasiliensis* (Quoy and Gaimard, 1824)

Not positively recorded from the Maldives. However, during the exploratory offshore fishing survey (Anderson and Waheed, 1990), two fish (a large Skipjack Tuna and a Swordfish) were caught which each had a smooth almost hemispherical crater about 3cm in diameter in its belly (Anderson, pers. obs.). This might have been caused by *I. brasiliensis*. The two fish were caught on consecutive nights (August, 8-9 and 9-10, 1988) approximately 75 km east of Thaa Atoll.

VARIEGATED SHARK *Stegostomafasciatum* (Hermann, 1783)

Previously recorded from the Maldives by Compagno in Fischer and Bianchi (1984) and MRS (1988). This species does not appear to be especially common in the Maldives. It is most often known as *hitha miyaru*. It occurs mainly in the atoll basins. *S. fasciatum* is occasionally taken by bottom-set gillnet or bottom-set longline. It is occasionally seen resting on the bottom by divers.

During the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992) ten specimens were caught, all by bottom-set longline within the atolls. These ranged in length from 112cm to 180cm TL (average weight 19.6kg). The Variegated Shark may be more common in the north Maldives than the south, if catch rates during the reef fish survey are a reliable indication:

Shaviyam Atoll	0.06 shark / 100 longline hooks	Ari Atoll	0.02 shark / 100 longline hooks
N. Male Atoll	0.01 shark / 100 longline hooks	Laamu Atoll	0.00 shark / 100 longline hooks

Given the very small numbers involved, these catch rates may not be representative. Nevertheless, there is some anecdotal evidence to support the suggestion of latitudinal variation in abundance. Fishermen from the northern Maldives readily recognized drawings of *Stegostoma fasciatum*; fishermen from the southern Maldives had some difficulty identifying drawings of this species; and fishermen from Addu Atoll do not know of this species at all.



Variegated Shark

TAWNY NURSE SHARK *Nebriusferrugineus* (Lesson, 1830)

Previously recorded from the Maldives by Compagno in Fischer and Bianchi (1984) and MRS (1988). Widely known in the Maldives as *nidhan miyaru* (Sleeping Shark). This is a bottom-dwelling, reef-associated species that usually rests in caves during the day. The same caves may be used for extended periods of time, and some become well-known to divers. Caught at night using bottom-set gillnet, bottom-set longline and handline. Table 9 gives details of three small individuals caught by bottom-set gillnet near Sh. Kanditheem on August 26, 1992. Four *N. ferrugineus* were caught by bottom-set longline and night handline during the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992). These ranged in length from 134 to 226 cm TL (the largest illustrated in Anderson *et al.*, 1992, p.25, plate 5).

• *N. ferrugineus* is used mainly for salt-dried meat production, but there was a small market for large, live individuals for stocking resort 'shark pools'. Five or ten years ago shark pools were something of a fashion, and about ten resorts each had one, but now only one or two remain. Old pools have been removed or filled in, and new ones are not being built. Because *N. ferrugineus* is somewhat more reef-associated than *Stegostomafasciatum*, it is seen more often by divers. It appears to be more vulnerable to night handlining, but was less vulnerable to the longlines used in the atoll basins during the reef fish resources survey.

WHALE SHARK *Rhincodon typus* Smith, 1829

Previously recorded from the Maldives by Compagno (1984) and MRS (1988). This massive, open water shark is well known to Maldivian fishermen who call it *fehurihi*. The Whale Shark feeds on plankton and small schooling fish, and, in the Maldives, appears to migrate seasonally to the

areas where such food supplies are most abundant. During the Northeast Monsoon season (December to April) the current flows from east to west. During the Southwest Monsoon season (May to November) the current flows from west to east. As the currents pass across the Maldives, there is considerable upwelling, mixing and stirring up of sediment. As a result there is a plankton bloom on the 'downstream' side of the Maldives. This appears to be particularly pronounced in the north and central Maldives where the double atoll chain may promote greater mixing, and where the monsoonal reversal is strongest (Anderson, 1992; Woodroffe, in press).

Figure 12 (see facing page) shows the seasonal distribution of Whale Shark in the Maldives as reported by fishermen in interviews and questionnaires. In the north and central Maldives, Whale Shark are seen most commonly on the eastern side of the Maldives (and the eastern side of western atolls) during the Southwest Monsoon. During the Northeast Monsoon, the opposite is true:

Season	% observations on 'west'	% observations on 'east'	No. obs.
SWMonsoon	10	90	30
NEMonsoon	78	22	36

In the south, there is no such obvious seasonal pattern. Fishermen invariably say that they see Whale Shark when bait (*i.e.* livebait for tuna pole-and-line fishing) is abundant. The most important single livebait species is the Silver Sprat or *rehi* (*Sprateioides gracilis*); this occurs most frequently on the western side of the Maldives during the Northeast Monsoon and on the eastern side during the Southwest Monsoon (Anderson and Hafiz, 1988).

SMALLTOOTH SANDTIGER *Odontaspis ferox* (Risso, 1810)

This shark has not been seen by us, but its jaws, with their spectacular teeth, are highly prized and often seen for sale in tourist shops. One set of jaws purchased from a Male shop (catalogue no. MRS-402-92) was reputed to be from B. Kendhoo (see photo, p. 21). Its dental formula is:

$$\frac{19-4-2-1-1-2-4-20}{20-2-1-22}$$

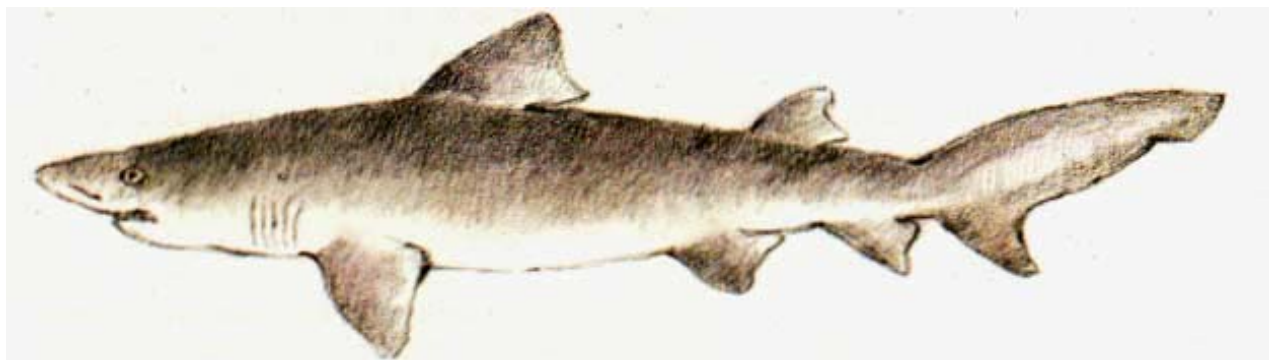
Five other jaws from the same source had dental counts within the following ranges:

$$\frac{17/19-4-2-1/2-1-2-4-18/19}{17/19-1-1-16/19}$$

Only one jaw had two upper symphyseal teeth on one side; in all other cases there was only one upper symphyseal tooth on each side. One set of jaws seen at A. Dungati had three, not four, rows of small intermediate teeth between the upper anterior and lateral tooth rows. Teeth appeared to have two, not three pairs of cusplets. Differentiation between lower anterior and lateral teeth was often unclear, so separate tooth counts were not made.

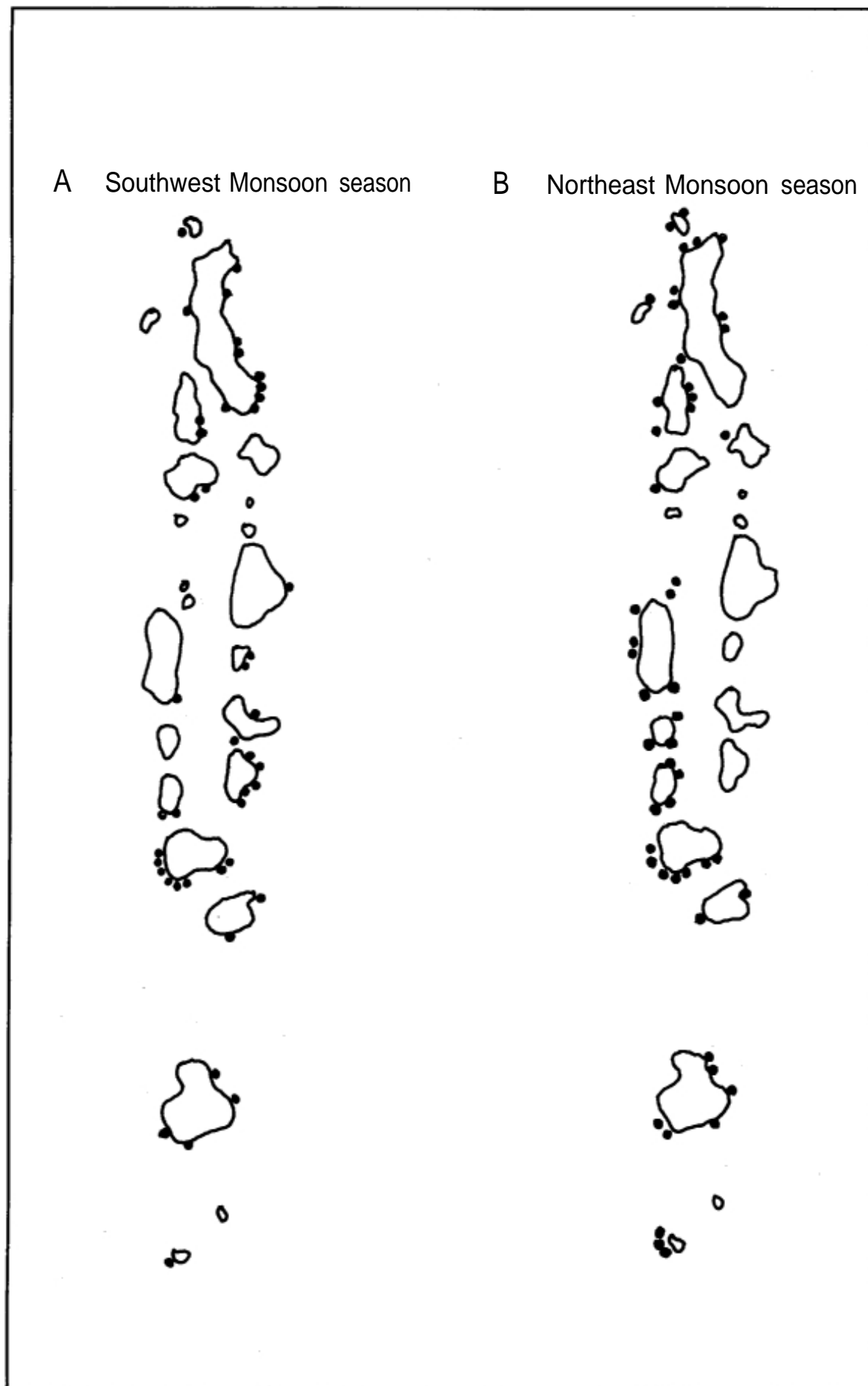
This shark is known locally as *theyo miyaru* (oil shark, on account of its large liver) and as *meedha miyaru* (rat shark, on account of its appearance). Fishermen report that this is a fat shark growing to at least 3m. It is plain coloured, without spots. Fishermen cannot recognize it from drawings in Compagno (1984) or Compagno *et al.* (1989).

O. ferox is reputedly caught on outer reef slopes from intermediate depths (about 100m) by bottomset gillnet. It may also be taken at somewhat greater depths as by-catch in the vertical longline fisheries for Sixgill Shark and Gulper Shark. This report is the first record of *O. ferox* for the Maldives and, apparently, in the central Indian Ocean.



Smalltooth Sandtiger

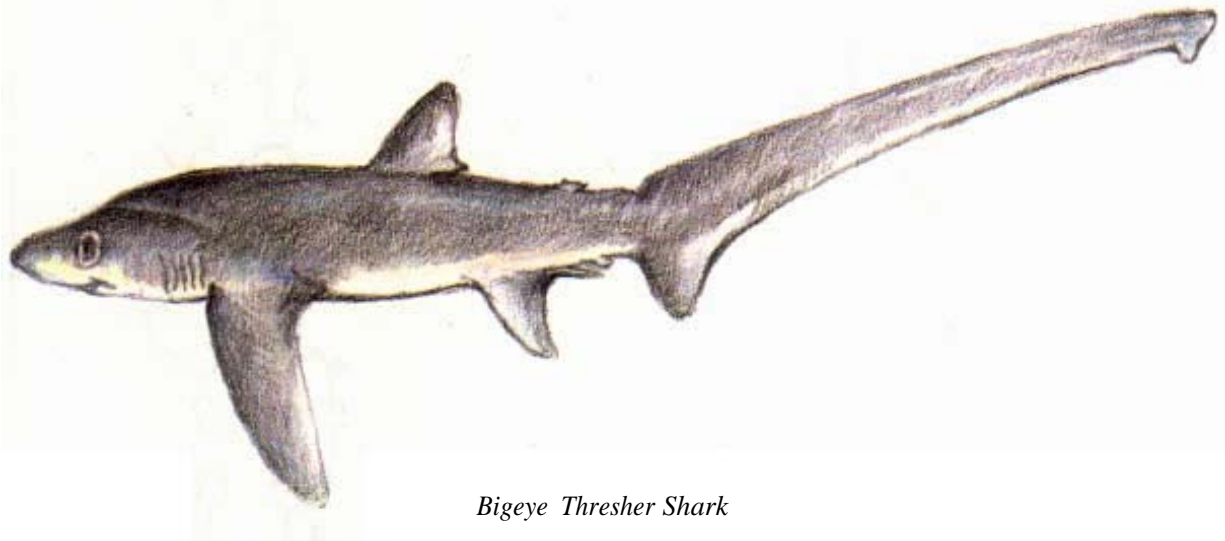
Fig. 12 Seasonal distribution of Whale Shark (*Rhincodon typus*) in the Maldives as reported by fishermen.



BIGEYE THRESHER SHARK *Alopias superciliosus* (Lowe, 1839)

Previously recorded from Maldivian waters by Gubanov (1978), as was *A. vulpinus*. Not seen by us, although we have seen dried Thresher tails. These two species are relatively common in Shri Lankan waters (R. Maldeniya, NARA, Colombo, and J. Moron, IPTP, Colombo, pers. comm.). They were also consistently identified by Maldivian fishermen from the colour drawings in Compagno *etal.* (1989). The third Thresher species, *A. pelagicus*, was not mentioned by Gubanov (1978). It is apparently not common in Shri Lankan waters and was never identified by Maldivian fishermen.

Thresher Shark are known in Dhivehi as *kandi miyaru* (Sword Shark). They are not especially common: none was taken during the exploratory offshore fishing survey (Anderson and Waheed, 1990). They do, nevertheless, appear to form a regular if infrequent component of pelagic shark longline catches. Fishermen from F. Feeali, however, report high catch rates of Thresher Shark in one area of the Alihuras Kandu (the 'inland sea' between the two rows of atolls in the central Maldives) during periods when the current is from the south.



Bigeye Thresher Shark

THRESHER SHARK *Alopias vulpinus* (Bonnaterre, 1788)

Previously recorded from the Maldives by Gubanov (1978) and Compagno (1984). See comments for *A. superciliosus* above.



Thresher Shark

SHORTFIN MAKO *Isurus oxyrinchus* Rafinesque, 1809

Previously recorded from the Maldives by Compagno (1984) and MRS (1988). A single female of 150 cm TL, weighing 22 kg, was caught by longlining during the exploratory offshore fishing survey (Anderson and Waheed, 1990). Maldivian fishermen know this species as *woshimas miyaru*. *Woshimas* is the Dogtooth Tuna, *Gymnosarda unicolor*. The strong, symmetrical tail of the Shortfin Mako is apparently reminiscent of that of the Dogtooth Tuna.

I. oxyrinchus is taken regularly but infrequently by pelagic longline. Its jaws are highly prized; large examples may sell for more than US \$ 1000 in Male, although US \$ 200-400 is a more usual price. This species is considered to be potentially dangerous by Maldivian fishermen.



Shortfin Mako

FAMILY PROSCYLLIIDAE

Anderson collected a male 565 mm TL proscylliid shark from R. Alifushi on October 4, 1990. It was taken in about 400m by vertical longline together with one *Hexanchus griseus* and three *Centrophorus* spp. It represents an undescribed genus and species, intermediate between *Gollum* and *Pseudotriakis* (L.J.V. Compagno, pers. comm., January 30, 1992, May 27, 1992). Two other western Indian Ocean specimens are known at present, in German and Russian collections (Compagno, pers. comm.).



Proscylliid Shark

STARSPOTTED SMOOIH-HOUND *Mustelus manazo* (Bleeker, 1854).

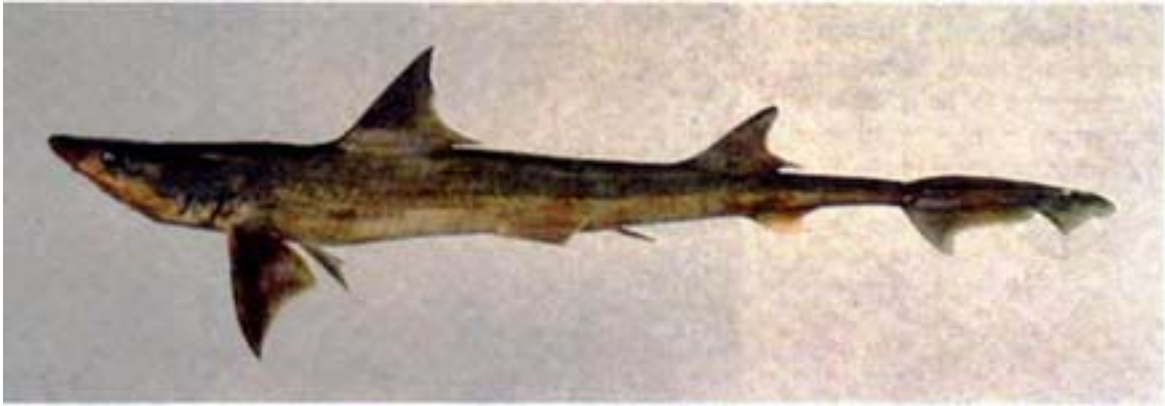
This species was recorded by MRS (1988) as *Mustelus mosis*, but a 71cm specimen from the Maldives has been identified by P.C. Heemstra (pers. comm. to J.E.Randall) as *M. manazo*. Heemstra noted that this specimen has an unusually large internarial space. Also, Maldivian specimens are not obviously white-spotted. During the reef fish resources survey, six specimens were caught, all by bottom longline set in 150-200m outside the atolls. Details are as follows:

Date	TL(cm)	Wt(kg)	Sex	Stomach	Depth	Location
23.11.87		2.5		?	150-200	K. Makunudhoo
23.11.87	96	2.9	F	Crab	150-200	K. Makunudhoo
23.11.87	117	5.7	F	Crab	150-200	K. Makunudhoo
14.3.91	71	1.1	F		180m	K. Giraavaru
15.7.91	101	4.0	F	Lobster	150m	L. Gaadhoo
16.7.91	85	1.9	F	Shrimp	190m	L. Gaadhoo

The 85cm TL specimen was noted to have the tips of its dorsal fins edged with black, those of the 'other fins' with white.

Only 'fork lengths' were recorded for the three specimens caught in November 1987. These have been converted to total-lengths based on the proportions of the three 1991 specimens.

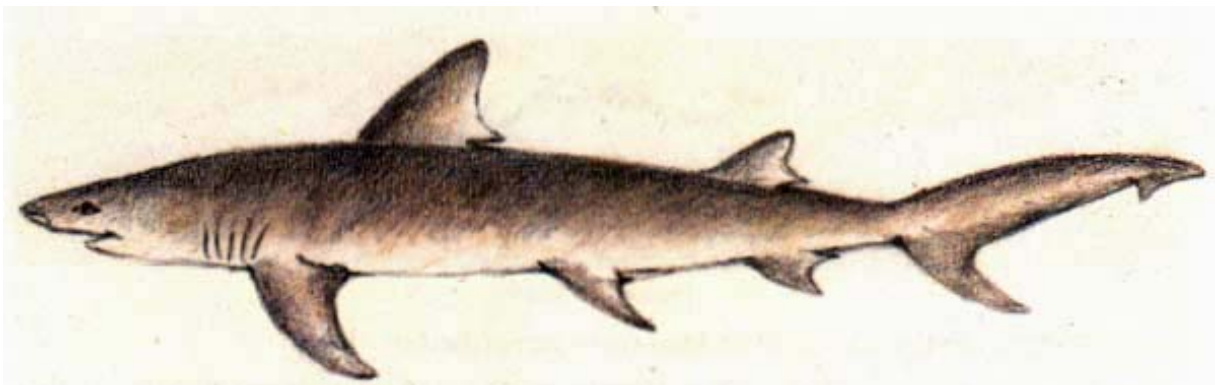
Note that all five specimens for which sex was recorded were females and all four specimens for which stomach contents were determined had eaten crustaceans.



Starspotted Smooth-Hound

SNAUGLETOOTH SHARK *Hemipristis elongatus* (Klunzinger, 1871)

A single set of jaws and the accompanying fin set were seen aboard a shark-netting *dhoni* from .R. Maduvariri, in Haa Dhaalu Atoll. The shark from which they came was caught by bottomset gillnet outside H.A. Baarah on August 23, 1992. It was reported to be about five feet (*i.e.* 1.5m) long (see photos on pages 21 and 27). The dental formula was: 14 - 14/17 - 17. This is within the range noted for *H. elongatus* by Bass *et al.* (1975). There was a toothless space at the midline of each jaw. The central upper teeth were very fine, hooked and not serrated. The lower teeth were serrated on the outer edge only, and had one or two cusps on each side. *H. elongatus* appears to be rare in the Maldives, this being the first record. The fishermen collected these jaws only because they had never seen this species before. Randall (1986) notes that this species is "not known from any oceanic islands".

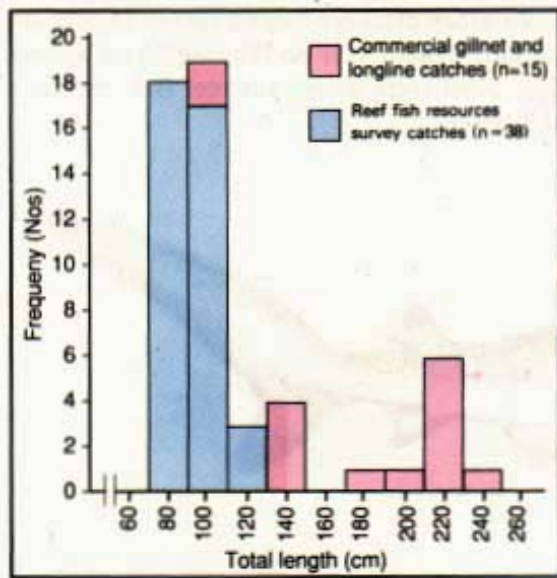


Snaggletooth Shark

SILVERTIP SHARK *Carcharhinus albimarginatus* (Ruppell, 1837),

This species appears to be widely distributed and relatively common throughout the Maldives. It has previously been recorded by MRS (1988). It is known locally as *kattafuihi miyaru*, a reference to the distinctive white edging of its fins (*kattafuihi* is the barred flagtail, *kuh!ia mugil*). It is taken by a variety of commercial gear including longline inside and outside the atolls, bottomset gillnet and handline. Only large individuals were caught offshore during the exploratory offshore fishing survey (Anderson and Waheed, 1990); six individuals were all between 205cm and 233cm TL. This is probably a true reflection of the absence of juveniles from offshore waters (Compagno, 1984). In contrast, only juveniles (74 to 125 cm TL) were caught during the reef fish resources survey (unpublished data, MRS). This demonstrates the abundance of juveniles in the atolls, but is probably not a true reflection of adult abundance. The light gear aimed at reef fish that was used during that survey was not suitable for catching large shark.

Fig. 13. Length Frequency Distribution for Silvertip Shark (*Carcharhinus albimarginatus*)



Large Silvertip Shark are caught adjacent to the atolls by Maldivian fishermen (including the Silvertip Shark listed in Table 9). Available length frequency data are summarized in Figure 13. There was no obvious seasonality in the occurrence of the smallest shark caught during the reef fish resources survey; juveniles of 74-80 cm TL were taken in February, March, May, June and November. The sex ratio of 57 juvenile Silvertips (74 to 125cm TL) was 0.51 ± 0.13 males: 0.49 ± 0.13 females: (Note that all sex ratios are presented as estimated frequencies \pm approximate 95 per cent confidence limits). Of 57 stomachs examined, 40 were empty, twelve contained remains of fish, three contained cephalopod remains, and four contained unidentified material reminiscent of tea leaves.



Silvertip Shark

BIGNOSE SHARK *Carcharhinus altimus* (Springer, 1950)

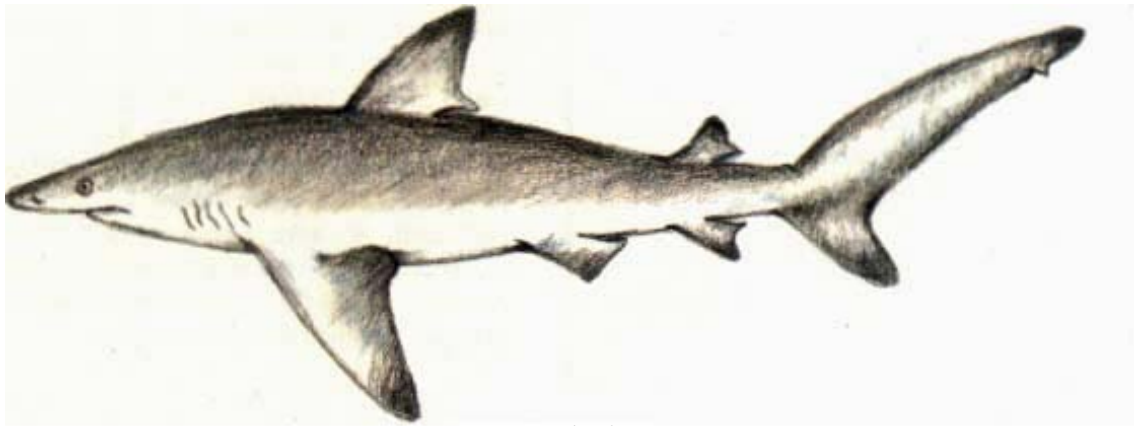
This species was identified from two sets of jaws from A. Ukulhas. These jaws (MRS-0380-92 and one set sent to the South African Museum, Capetown) constitute the first record of this species from the Maldives. Their respective dental formulae are:

$$\frac{14-1-16}{14-2-14} \quad \text{and} \quad \frac{15-1-15}{15-1-15}$$

A photograph of teeth from the MRS specimen is included on page 20. Maldivian fishermen report that *C. altimus* is taken almost exclusively by pelagic longline. This is surprising, as accounts of the biology of this species tend to categorize it as a bottom-dwelling shark found on the deeper parts of continental shelves and insular slopes, usually in 90m-430m (e.g. Bass *et al.*, 1973; Compagno, 1984; Randall, 1986).

Maldivian fishermen report that this species is only taken outside the atolls, and the areas where it is reported to be caught appear to be those where the bottom depth is of the order of 200m - 500m. For example, the two specimens from A. Ukulhas were taken north of A. Thoddoo where the bottom depth is about 300m. *C. altimus* is reported to be common in the Alihuras Kandu, i.e. the 'inland sea' between the two rows of atolls in the northern and central Maldives where the bottom depth is about 250m - 450m. It seems, therefore, that *C. altimus* may, in the Maldives at least, be a vertical migrator, moving from the bottom at 200m - 500m in the day, to nearer the surface at night. The most widely used Maldivian name for this species, *mendhan miyaru* or midnight shark, may be a reference to the time at which it is most likely to be caught. (Another widely used name, *theyo miyaru* or oil shark, is a reference to its large liver).

Both sets of jaws had (benthic?) stingray barbs embedded in their lower mandibles, although that from the MRS specimen is now lost. It may also be of significance to note that of the 429 shark caught between 30 nm and 100 nm offshore by the exploratory offshore fishing survey (Anderson and Waheed, 1990), not one was a Bignose Shark. Similarly, there were no Bignose Shark among 650 shark taken inside the atolls and on the immediate outer reefs during the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992).



Bignose Shark

GREY REEF SHARK *Carcharhinus amblyrhynchos* (Bleeker, 1856)

Previously recorded from the Maldives by Klauswitz (1958), Eibl-Eibesfeldt and Hass (1959), MRS (1988), Nahke and Wirtz (1991), and Randall (1992). We follow Randall (1986, 1992) in considering *C. wheeleri* to be a synonym of *C. amblyrhynchos*. The Grey Reef Shark is a very common reef-associated species in the Maldives. Its association with submerged reefs (*thila*), particularly in channels, gives this species one of its Dhivehi names (*thila miyaru*). The Grey Reef Shark forms a major part of catches by bottomset gillnet, bottomset longline and handline. During the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992) only juveniles were caught because of the light gear used. The sex ratio of 36 juveniles (71cm to 115cm TL) was 0.56 ± 0.16 males : 0.44 ± 0.16 females. Divers note that mature females are the shark seen most often at shark-watching dive sites (see p. 36). Divers also note that Grey Reef Shark show two types of seasonal movements.

The first type of movement is related to the seasonal changes in monsoon currents. Groups of shark congregate near the mouths of channels running into the atolls that are exposed to the prevailing currents. They therefore appear to be found in greatest numbers on the western sides of atolls during the Southwest Monsoon (May to November) and on the eastern sides during the Northeast Monsoon (December to April). The second type of movement is that of mature females which disappear from some sites for a few weeks every year between March and May. This is believed to be related to breeding. The only breeding data available is that of a 144cm TL female caught on August 24, 1992 in HA. Atoll which contained two embryos, of 48cm and 49cm TL. The smallest free-swimming individual recorded during the reef fish resources survey was one of 53.5cm TL, *i.e.* about 69cm TL (unpublished data, MRS).



Grey Reef Shark

SILKY SHARK *Carcharhinus falciformis* (Bibron, 1839)

The Silky Shark is an abundant offshore species. It has previously been recorded from the Maldives by MRS (1988). It was by far the most abundant species of shark taken during the exploratory offshore fishing survey, nearly 70 per cent of all shark taken being of this species (Anderson and Waheed, 1990). From that survey, carried out off the eastern side of the Maldives, the following information was obtained:

- Small Silky Shark (56cm - 130cm TL) were most abundant during the Northeast Monsoon. This is consistent with the experience of Maldivian fishermen who know that juvenile Silky Shark (*oivaali miyaru*) congregate under floating objects (*oivaali*) and drift with the prevailing currents.
- Large Silky Shark (170cm - 260cm TL) were most abundant during the Southwest Monsoon. This is also consistent with the experience of Maldivian fishermen who believe that adult Silky Shark (*ainumathi miyaru*) associate with free-swimming tuna schools (*ainu*) which swim into the current.
- Intermediate-sized Silky Shark (130cm - 170cm TL) were under-represented in survey catches, perhaps as a result of differential migration.
- The smallest Silky Shark taken (four individuals of 56cm-63cm TL) were all much smaller than the sizes at birth quoted by most authorities, *i.e.* 70cm to 87cm (Compagno, 1984; Randall, 1986). However, Branstetter (1987) noted that some Silky Shark in the Gulf of Mexico might be born as small as 55cm TL. Maldeniya and Suraweera (1991) too have recorded the presence of Silky Shark of about 60cm TL in Shri Lankan gillnet catches. The four small Maldivian shark were all caught in December 1987 and November 1988. Yet another small Silky Shark (60cm TL) was observed by Anderson in Male Market in December 1990. This suggests that there may be seasonal gestation, with a parturition peak in November to December. Further study, particularly from the west coast of the Maldives, will be required to test this suggestion.
- Sex ratio varied with size:

56-169cm TL (n = 101)	0.49 \pm 0.10	males: 0.51 \pm 0.10	females
170-239cm TL (n = 122)	0.68 \pm 0.08	males: 0.32 \pm 0.08	females
240-260cm TL (n = 11)	0.18 \pm 0.23	males: 0.82 \pm 0.23	females
56-260cm TL (n = 234)	0.58 \pm 0.06	males: 0.42 \pm 0.06	females

Sivasubramaniam (1969) also noted an excess of males in longline catches of *C. falciformis* in the north-central Indian Ocean.

- Catch rates for all gear were over three times higher off the north and central Maldives than off the southern Maldives. For shark longline the following catch rates were obtained:

North/Centre
in NE Monsoon: 2.9/100 hks

North/Centre
in SW Monsoon: 4.1/100 hks

South in
SW Monsoon : 1.0/100 hks

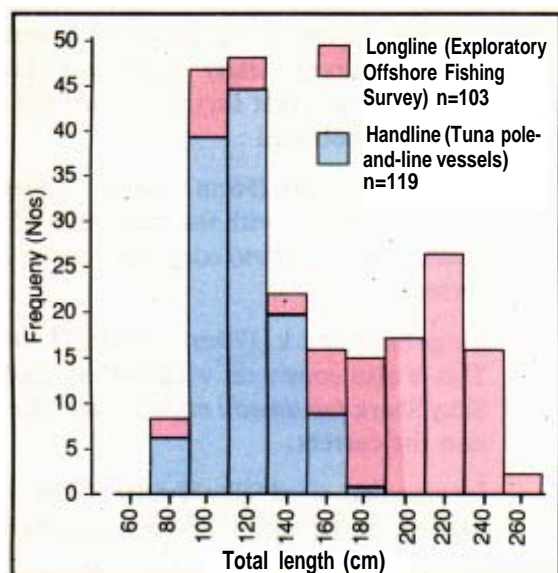
Average : 2.9/100 hks



*A MRS staff member measures juvenile Silky Shark
at R. Kandoludhoo*

There are two main commercial fisheries in Maldives for Silky Shark. These are pelagic longlining for large specimens, and seasonal fisheries for small individuals. As mentioned earlier, schools of juvenile Silky Shark are associated with floating objects (*oivaali*). These are carried to the Maldives by the monsoon currents, so tend to be found off the west coast in the SW Monsoon season, and off the east coast in the NE Monsoon season. Fishermen search out these drifting objects because tuna, especially Yellowfin Tuna (Anderson, 1985), and other fish aggregate underneath. It is reliably reported that juvenile Silky Shark are caught by hand after being attracted alongside the fishing boat with a dead tuna dangled overboard. They are also taken by handline. Length frequency histograms of samples from the two fisheries are presented in Figure 14.

Fig 14. Length Frequency Distribution for Silky Shark (*Carcharhinus falciformis*)



BLACKTIP SHARK *Carcharhinus limbatus* (Valenciennes, 1839)

The only record of *C. limbatus* from the Maldives is that of four specimens (77-111cm TL) all taken inside Laamu Atoll during the reef fish resources survey (Anderson *et al.*, 1992). All of them were noted to be remarkably active when landed on the boat. The depths of capture of all were about 40-50 m. These shark had black tips to their dorsal, pectoral and pelvic fins, but not on their anal fin or lower caudal lobe. The leading edge of the caudal fin was touched with black. There was an interdorsal ridge. The dental formula of a 82cm TL specimen was: 15 - 3 - 15 / 15 - 1 - 15.

It was noted that the 111 cm TL specimen had 14 rows of lateral teeth on each side of the upper jaw.



Blacktip Shark

OCEANIC WHITETIP SHARK *Carcharhinus longimanus* (Poey, 1861).

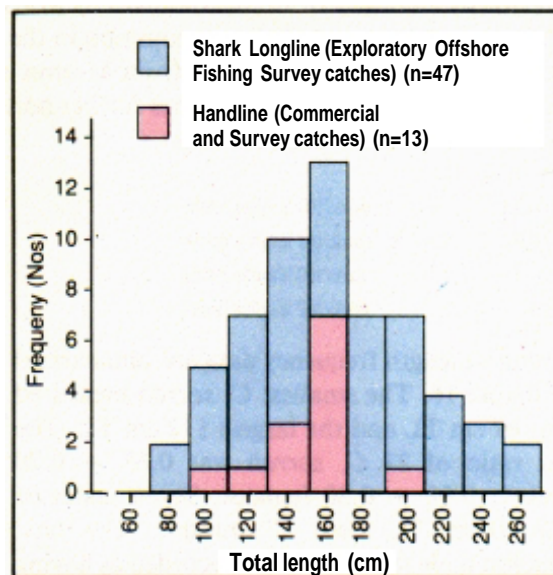
Previously recorded from the Maldives by Compagno (1984) and MRS (1988). During the exploratory offshore fishing survey, 23 per cent of all shark caught were of this species (Anderson and Waheed, 1990). That survey produced the following results:

- There was some evidence of vertical size segregation, with large individuals being caught deeper than small ones.
- There was some evidence of sexual segregation. The overall sex ratio was 0.42 \pm 0.11 males : 0.58 \pm 0.11 females (n = 74, size range 74-263cm TL). The excess of females was most noticeable within the length range 110-179cm TL, where the sex ratio was 0.29 \pm 0.14 males : 0.71 \pm 0.14 females, a significant departure from 1: 1.

- There was some evidence of geographic segregation, with Oceanic Whitetip Shark catch rates- being twice as high south of 3 degrees N as they were north of that line. This is the opposite of the situation with Silky Shark.

Oceanic Whitetip Shark are taken commercially by pelagic shark longliners and incidentally by tuna fishermen, using handlines, who happen to see them. Available length frequency data are summarized in Figure 15. The Oceanic Whitetip Shark has a large number of Maldivian names (see Appendix II), but most of them refer to the long and distinctive pectoral fins.

Fig. 15. Length Frequency Distribution for Oceanic Whitetip Shark (*Carcharhinus longimanus*)



Oceanic Whitetip Shark



Blacktip Reef Shark

BLACKTIP REEF SHARK *Carcharhinus melanopterus* (Quoy and Gaimard, 1824)

Previously recorded from the Maldives by Klauswitz (1958), Compagno (1984) and MRS (1988). This is not a deep-dwelling species, being found in shallow lagoons (*faihu*, hence one Maldivian name for this species, *faihu miyaru*) as well as on reefs from 0m to 30m or, sometimes, more. Its shallow water habitat means that it may be seen by snorkellers and by beachwalkers more commonly than any other shark. It is also taken more frequently by gillnets set in lagoons than other shark species (*e.g.* those specimens listed in Table 9). It is not common on deeper reefs or in the atoll basins. Only two of 650 sharks taken during the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992) were *C. melanopterus*. As with the Nurse Shark (see page 55) there was a very small market for live Blacktip Reef Shark to stock resort shark pools.

SPOTTAIL SHARK *Carcharhinus sorrah* (Valenciennes, 1839)

Previously recorded from the Maldives by MRS (1988) and Anderson *et al.* (1992, figure on p.23). This species appears to be more common in the south Maldives than in the north. It has been seen in commercial handline catches from Meemu Atoll and commercial longline catches from Thaa Atoll, but not in commercial catches further north. Catch rates by atoll during the reef fish resources survey were (MRS, unpubl. data):

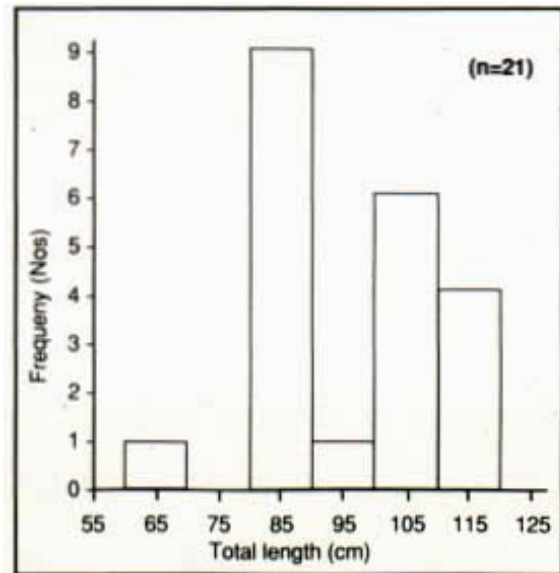
Shaviyani	0	shark/100 longline hooks
N. Male	0.01	shark/100 longline hooks
An	0.02	shark/100 longline hooks
Laainu	0.14	shark/100 longline hooks

Available length frequency data are summarized in Figure 16. The smallest *C. sorrah* measured was 69 cm TL and the largest 112 cm TL. The sex ratio of 21 *C. sorrah* was 0.67 ± 0.20 males : 0.33 ± 0.20 females. Seven males of 108-110 cm TL were all mature. The next smallest male (86 cm TL) was recorded as having “claspers starting to grow”. A female of 112 cm TL was recorded as having “developing embryos”. The tooth counts of three specimens were:

$$\frac{12 - 1 - 12}{11/12 - 1 - 11/12}$$

Six of 16 stomachs examined contained food.
Four contained fish, two crustaceans.

Fig. 16. Length Frequency Distribution for Spottail Shark (*Carcharhinus sorrah*)



Spottail Shark

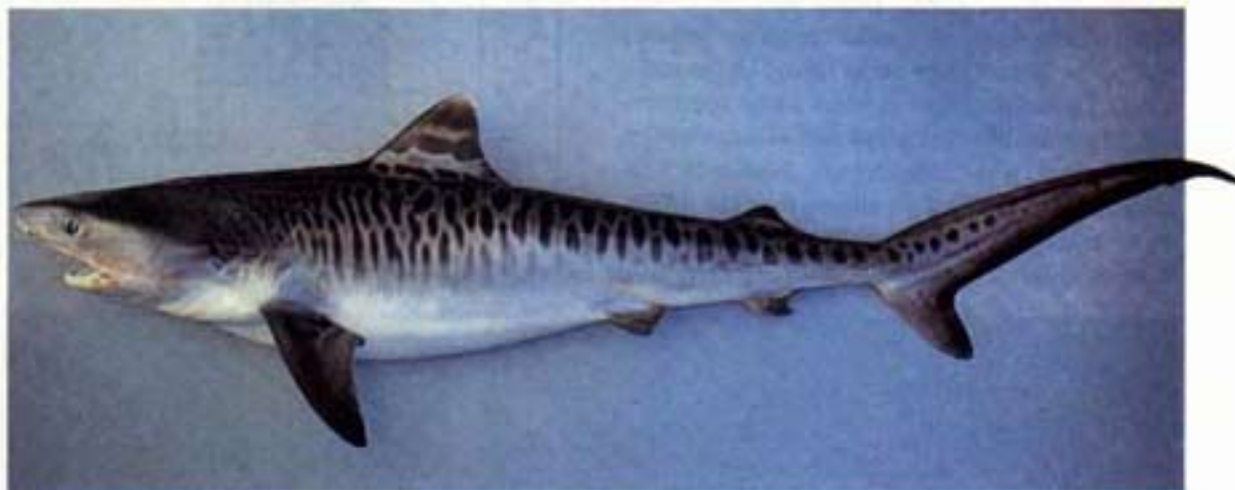
TIGER SHARK *Galeocerdo cuvier* (Peron and Lesueur, 1822).

Previously recorded from the Maldives by Compagno in Fischer and Bianchi (1984) and MRS (1988). The Tiger Shark is widespread throughout the Maldives, and well known to Maldivian fishermen, who call it *femunu*. Particularly large specimens which have lost their distinctive stripes and are uniform pale grey in colour are sometimes called *al higgaa miyaru*.

Large Tiger Shark have enormous livers, which yield substantial quantities of oil suitable for treating wooden *dhonis*. These shark have therefore been subject to a specialized fishery (*maa keyolhu kan*, see page 4) in the Maldives from ancient times. Reliable fishermen report that Tiger Shark about 6m long were sometimes taken by this fishery, although shark of 2-4m were more frequent. Randall (1992b) notes that the largest Tiger Shark actually measured appears to be one of 5.5m from Cuba, but that lengths of up to 6m are likely. During the exploratory offshore fishing survey, Tiger Shark of 2.1 - 3.0m were caught by pelagic longline over 30 nm offshore (Anderson and Waheed, 1990).

During the reef fish resources survey, nine Tiger Shark of 76 to 132cm TL were caught by light bottomset longlines within the atolls. Maldivian fishermen report that the best longline catches of Tiger Shark are made in the intermediate zone, outside the atolls but not too far offshore. Fishermen report that Tiger Shark and Bignose Shark (see page 61) are often caught together.

Four of six juveniles (83-132cm TL) caught had food in their stomachs. This included a Porcupinefish (*Diodontidae*), a Parrotfish (*Scaridae*), other unidentified fish, a Mantis Shrimp (*Stomatopoda*) and a chicken's foot and feathers. Cetaceans are known by Maldivian fishermen to be a favourite food of Tiger Shark. Dolphin were the preferred bait for *maa keyolhu kan*. In September 1992, fishermen from B. Kendhoo were reported to have caught 12 Tiger Shark that had been feeding on the rotten carcass of a whale drifting in the ocean outside Baa Atoll.



Tiger Shark

SLITEYE SHARK *Loxodon macrorhinus* (Muller and Henle, 1839).

Previously recorded from the Maldives by MRS (1988). This small shark was caught in large numbers in the atoll basins by bottomset longline during the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992). In fact, about 70 per Cent of all shark caught during that survey were of this species. Major findings were:

- *Loxodon macrorhinus* was caught exclusively in the atoll basins. It appears to be much more common in the north than in the south, if longline catch rates are an accurate indication:

Shaviyani	1.26 shark/100 longline hooks
N. Male	1.80 shark/100 longline hooks
Mi	0.52 shark/100 longline hooks
Laamu	0.09 shark/100 longline hooks

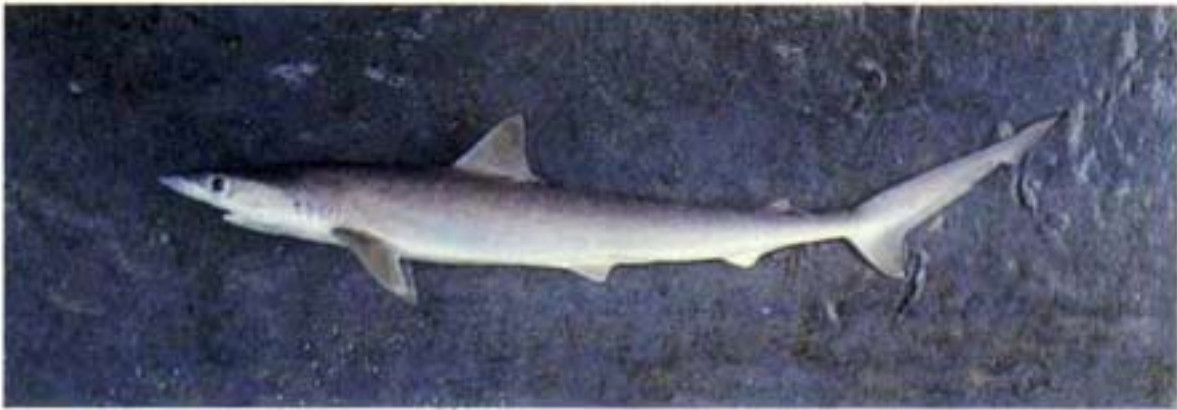
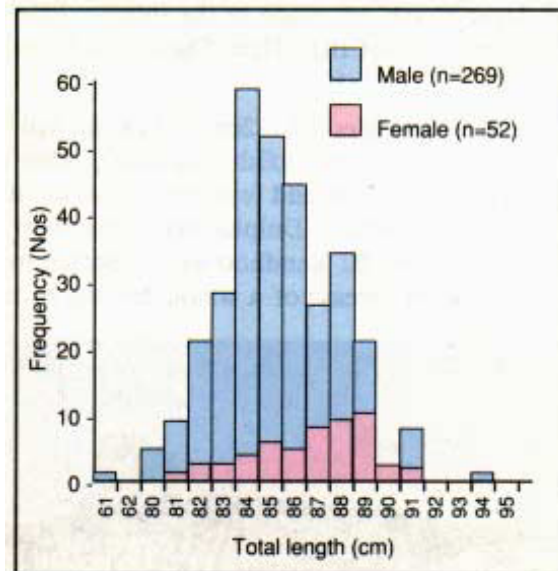
- *L. macrorhinus* shows remarkable sexual segregation. In Shaviyani, Ari and Laamu Atolls, only males were caught. There may be a seasonal component to this sexual segregation; most females were caught November- February, when much longlining was carried out in N. Male Atoll, but little in other atolls.
- *L. macrorhinus* shows remarkable size segregation. Only two specimens of less than 80cm TL were recorded. Length-frequency data are summarized in Figure 17 (overleaf). The largest specimens measured in each of four atolls were:

Shaviyani	91 cm TL (n = 123)
N. Male	94 cm TL (n = 144)
Ari	89cm TL (n = 49)
Laamu	84 cm TL (n = 5)

The previously recorded maximum length for this species appears to be 91cm TL (Wheeler, 1959; Springer, 1964; Compagno, 1984). Females tend to be larger than males (Figure 17), but the 94 cm specimen was a male. A 95 cm male was recorded from N. Male Atoll by MRS (1988); it was caught during initial trials for the reef fish resources survey (Van der Knaap *et al.*, 1991) and so was not included among the 144 specimens noted above.

In addition to the maximum size differences, Anderson *et al.*, (1992) noted that there were small differences in modal lengths between atolls, the largest sizes being found in the atolls where *L. macrorhinus* appears to be commonest. The possible biological significance of this correlation was considered. However, re examination of the data shows that the differences in lengths between atolls are much smaller than thought, and probably not significant.

Fig. 17. Length Frequency Distribution for Sliteye Shark (*Loxodon macrorhinus*)



Sliteye Shark

SICKLEFIN LEMON SHARK *Negaprion acutidens* (Ruppell, 1837)

Previously recorded from the Maldives by Compagno in Fischer and Bianchi (1984). This species appears to be widespread, but uncommon in the Maldives. One of its Maldivian names (*faihu femunu*, shallow lagoon Tiger Shark) reflects both its sometimes shallow habitat and its potentially dangerous nature. One set of jaws (catalogue no. MRS-375-92) has the following dentition: 14-2-13/14-1-13.

It is possible that some posterior lateral teeth were removed during the cleaning of these jaws. The 249cm TL female listed in Table 9 was caught by dropline just outside north An Atoll on September 15, 1992. It contained ten embryos of 58 to 63cm TL.



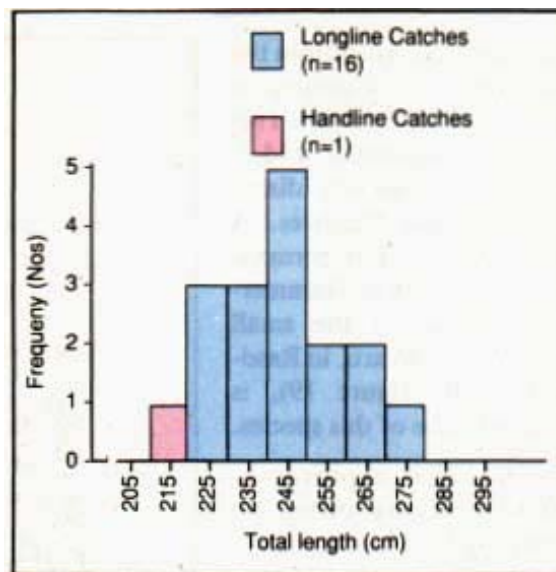
Sicklefin Lemon Shark

BLUE SHARK *Prionace glauca* (Linnaeus, 1758)

Previously recorded from the Maldives by Gubanov and Grigoryev (1975), Compagno (1984), MRS (1989), and Anderson and Waheed (1990). This is a large, offshore species, and is sometimes taken by pelagic longline. It does not appear to come very close to, or even inside, the atolls as *C. falciformis* and *C. longimanus* occasionally do. Most Blue Shark in Maldivian waters appear to be medium-sized males, according to two separate surveys

	Gubanov and Grigoryev (1975)	Anderson and Waheed (1990)
Mean length (cm)	232	244
Length range (cm)	190-273	219-273
Mean weight (kg)	50.7	56
Percentage male	96	94
Number	71	17

Fig. 18. Length Frequency Distribution for Blue Shark (*Prionace glauca*)



For both samples combined, the sex ratio is 0.95 \pm 0.04 males : 0.05 \pm 0.04 females. Figure 18 summarizes length frequency data from the exploratory offshore fishing survey (Anderson and Waheed, 1990).



Blue Shark

WHITETIP REEF SHARK *Triaenodon obesus* (Ruppell, 1837)

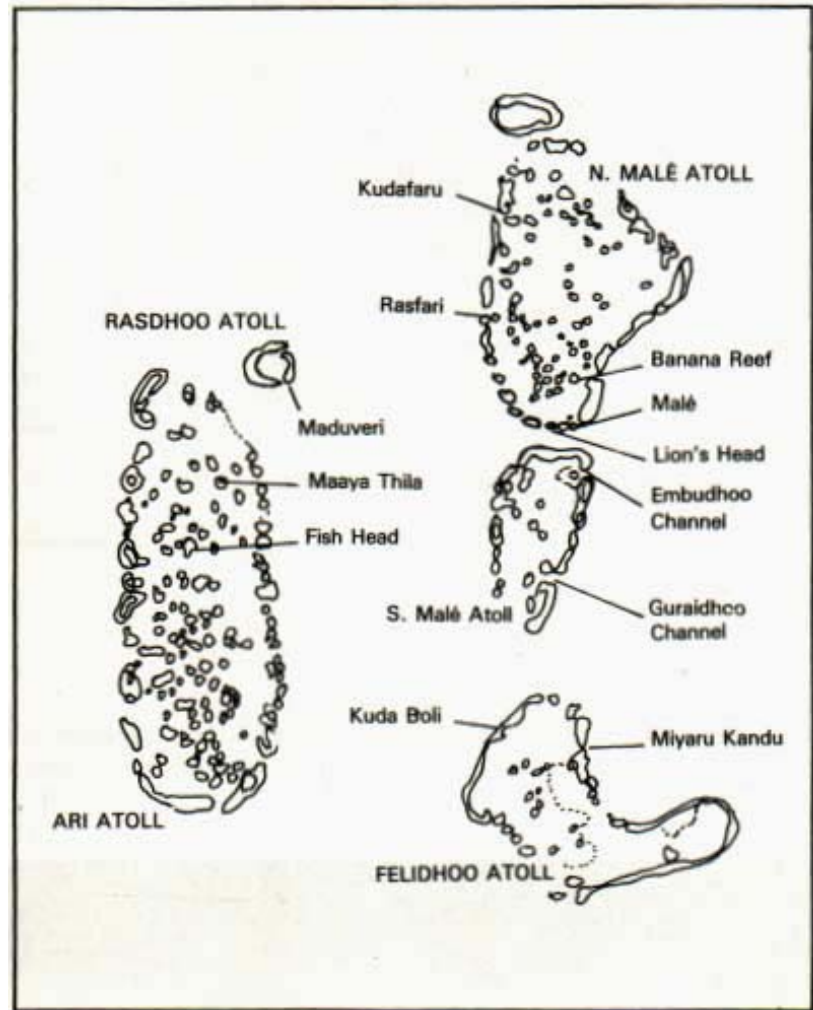
Previously recorded from the Maldives by Randall (1977, 1992), Compagno (1984), MRS (1988) and Nahke and Wirtz (1991). This is a common, reef-associated species. It is often seen underwater by divers and, to a lesser extent, by snorkellers. *T. obesus* is caught commercially by bottomset gillnets and night handlining. Only nine individuals, of 56-114 cm TL, were caught, mainly by night handlining, during the reef fish resources survey (Van der Knaap *et al.*, 1991; Anderson *et al.*, 1992). One female of 102 cm TL contained two embryos of 40.9 and 42.6 cm TL. One male of 97 cm TL was recorded as being mature. Both specimens were smaller than the sizes cited by most authorities as being those at which maturity is attained (Randall, 1977; Compagno, 1984).

SCALLOPED HAMMERHEAD SHARK *Sphyrna lewini* (Griffith and Smith, 1834).

Fig. 19 Locations of some major shark-watching dive sites

Previously recorded from the Maldives by Compagno (1984) and MRS (1988). This species is apparently widespread, but patchily distributed, in the Maldives. A large, more-or-less permanent aggregation of Hammerhead Shark off the small island of Madivaru, in Rasdhoo Atoll (Figure 19), is believed to be of this species.

During the exploratory offshore fishing survey no Scalloped Hammerhead Shark were caught offshore (Anderson and Waheed, 1990), but one 50.3cm TL male was caught inside Laamu Atoll by night hand-lining (MRS, 1988). During the reef fish resources survey (Van der Knaap et al., 1991; Anderson et al., 1992) only three Scalloped Hammerhead Shark, 111-168 cm TL, were caught. Two of these were taken in Laamu Atoll, the other in N. Maté Atoll. Two large females (232cm and 235cm TL) were landed at Maté on September 21, 1992, having been caught by pelagic longline outside S. Maté Atoll. The larger female contained twenty embryos of 30-35 cm TL (mean 34cm TL).



Scalloped Hammerhead Shark

GREAT HAMMERHEAD SHARK *Sphyrna mokarran* (Ruppell, 1837),

Not positively recorded from the Maldives. However, fishermen report occasional captures of very large Hammerhead. Fishermen on Sh. Kanditheem report catching in 1988 an enormous Hammerhead in a gillnet set inside a deep lagoon. The shark was so big that it was measured. It was reported to be 9 riyani 1 muh. long (*i.e.* 665 cms.). Allowing 10 per cent for measuring over the curvature of the body rather than straight this translates to almost 6m. This is close to the maximum reported length of *S. mokarran*; no other Hammerhead approaches this size (Compagno, 1984).