

Maldives Sharkwatch Report

2009 - 2010



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Summary

- The aim of Sharkwatch is to collect baseline data on the distribution and abundance of reef sharks throughout the Maldives and to monitor changes in populations following introduction of the reef shark fishing ban on 01 March 2009.
- Despite the ban, some shark fishing is still going on because the export ban is not yet fully implemented.
- Sharkwatch was launched in July 2009 by the Marine Research Centre as part of the Darwin Reef Fish Project. It is the second large scale underwater survey of sharks in Maldivian waters. A similar programme was launched by the Ministry of Tourism a few years ago, but for various reasons did not continue as planned.
- Sharkwatch uses the Roving Diver Technique in which all sharks seen during a dive of approximately 45 - 50 minutes are recorded.
- Fourteen Dive Centres participated in Sharkwatch over the period June 2009 – July 2010, covering Baa Atoll, South Male' Atoll, North Male' Atoll, Rasdhoo Atoll and Lhaviyan Atoll.
- A total of 1661 Sharkwatch surveys were carried out at 196 sites.
- Sharks were seen at 85% of sites surveyed. 44% of sites had an average of 1-2 sharks recorded per survey and only 3% of sites had an average of more than 10 sharks recorded per survey (Figure 2).
- The 'top site' for sharks had an average of over 27 sharks / survey (n= 4 surveys conducted) while the second best site had 21 sharks / survey (n= 5 surveys conducted). The other sites in the 'top twenty' had an average of between 5 – 10 sharks per survey.
- A total of 3630 sharks were recorded during the 12 month survey period from June 2009 - July 2010. The white tip reef shark was the most frequently-recorded species (2247 records), accounting for 62% of all sightings. The grey reef shark was the next most frequently-recorded (822), accounting for 23% of all sightings.
- An increased abundance of white-tip reef sharks was seen over the period from December 2009 – April 2010, with a peak in February. It remains to be seen whether this pattern is repeated in subsequent years – it was not seen in other species.

Cover photo: Nishan Thaufeeg, MRC

Introduction

Sharks are top predators that play an important ecological role on coral reefs. Due to their slow growth, late maturity and low fecundity, sharks are very vulnerable to over-exploitation. For the same reasons, depleted stocks are very slow to recover.

Initially, sharks were fished in the Maldives on a small scale for their liver oil. However, in the late 1970s the fishery intensified mainly because of the value of dried shark's fin and salted shark meat as export commodities. After 1975, the estimated annual shark catch of around 575 metric tonnes (MT) rose rapidly to 1500 MT and subsequently fluctuated between 1100 MT and 2000 MT annually until 1998 (MRC, 2008).

The shark fishery came into direct conflict with the tourism industry which places a considerable value on being able to see live sharks in the wild. In 1998, in an effort to minimize conflict, the government of Maldives declared a 10-year moratorium on all types of shark fishing inside and within 12 miles from the atoll rim of 7 major 'tourism' atolls in the Maldives (Baa, Lhaviyani, Kaafu, North Ari, South Ari, Vaavu and Addu).

However, this ban was not enforced and shark fishing continued. A survey of the fishery in 2003 revealed that shark fishing was being carried out in 22 islands and involved a total of 132 vessels and 528 fishermen, accounting for 3.5% of the total number of fishermen in the Maldives (MRC, 2008).

The effectiveness of the moratorium was reviewed towards the end of the 10-year moratorium. Declining shark numbers, as well as increasing pressure from the tourism sector, led the government to announce a ban on all reef shark fishing from the 1st March 2009. Under this legislation it was prohibited to kill, capture or extract any species of shark within 12 miles from the outer atoll rim of all Maldivian Atolls.

A total ban on all shark fishing, capture, killing or extraction from Maldivian waters was imposed from the 15th March 2010. The whale shark (*Rhincodon typus*) had already been declared a protected species in the Maldives since the 24th June 1995.

'Sharkwatch' was launched in July 2009 to collect baseline information and monitor the outcomes and effectiveness of the shark fishing ban. This is the first time that stock surveys have been attempted in the Maldives and the data collected will be invaluable in providing a better understanding of the current population of reef shark species and how they respond to the recently-introduced protection measures.

Sharkwatch methodology and data analysis

Sharkwatch uses the 'Roving Diver Technique (RDT)' which is a rapid and effective assessment technique that can be used by volunteers to collect fish data. Given the interest of the tourism industry in maintaining healthy populations of sharks on the Maldives reefs, it is appropriate that divers are playing a pivotal role in the monitoring programme.

During a Sharkwatch survey, the observer swims freely during an approximate period of 45 – 50 minutes recording the sharks he/she encounters. The method is employed during regular diving activities and the observer starts recording the number of sharks as soon as he/she enters the water. The 8 species of shark most likely to be encountered are included on the survey sheet. All are easy to identify. Additional species were counted under 'other'. Environmental data such as current strength, visibility and depth are also recorded.

The results of each Sharkwatch recording dive are entered into an excel spreadsheet and submitted monthly to MRC. Survey dives at sites where sharks are *not* sighted are included as these provide a vital 'zero' baseline against which recovery (if it occurs) can be monitored.

Participating Dive Centres

Twenty-seven resorts and dive centres in the Maldives expressed an interest in participating in Sharkwatch (Table 1 below). During the period July 2009 – June 2010, a total of 14 submitted data, as indicated in green.

	2009						2010					
	Jly	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jne
Adaaran Prestige Vadoo Island Resort												
Angsana - Velavaru												
Angsana Maldives - Ihuru												
Bandos Island Resort & Spa Maldives												
Banyan Tree - Vabbinfaru												
Baros Maldives												
Boduhithi Resort												
Cocoa Island Resort												
Embudu Village												
Eriyadu Island Resort												
Four Seasons Resort at Kuda Huraa												
Kuramathi												
Kuredu Island Resort												
Palm Beach Island												
Paradise Island Resort and Spa												
Ranveli Village Maldives												
Reethi Beach Resort												
Royal Island Resort and Spa												
Soneva Gili Resort (Ocean Paradise Maldives)												
Velassaru Resort												
Velidhu Island Resort												
Taj Exotica												
Sun Island												
W resort & spa												
Beach House Manafaru												
Anantara												
Four Seasons Resort at Landaa												

Table 1. Maldives resorts that have expressed support for Sharkwatch, with those submitting data shown in green.

Sites surveyed

Over the period June 2009 – July 2010, a total of 1,661 Sharkwatch surveys were carried out at 196 sites. In some cases the same dive site was surveyed by different Dive Centres and where this was the case the results have been amalgamated.

The list of sites which have been surveyed for Sharkwatch is shown in Appendix 1, together with maps to show the geographic spread of the surveys.

Survey effort varied according to the dive schedule of the resorts, and the popularity of different sites. This is illustrated in Figure 1 below where it can be seen that 126 surveys were carried out at the most popular site. The dive site names have been kept anonymous at the request of the Dive Centres.

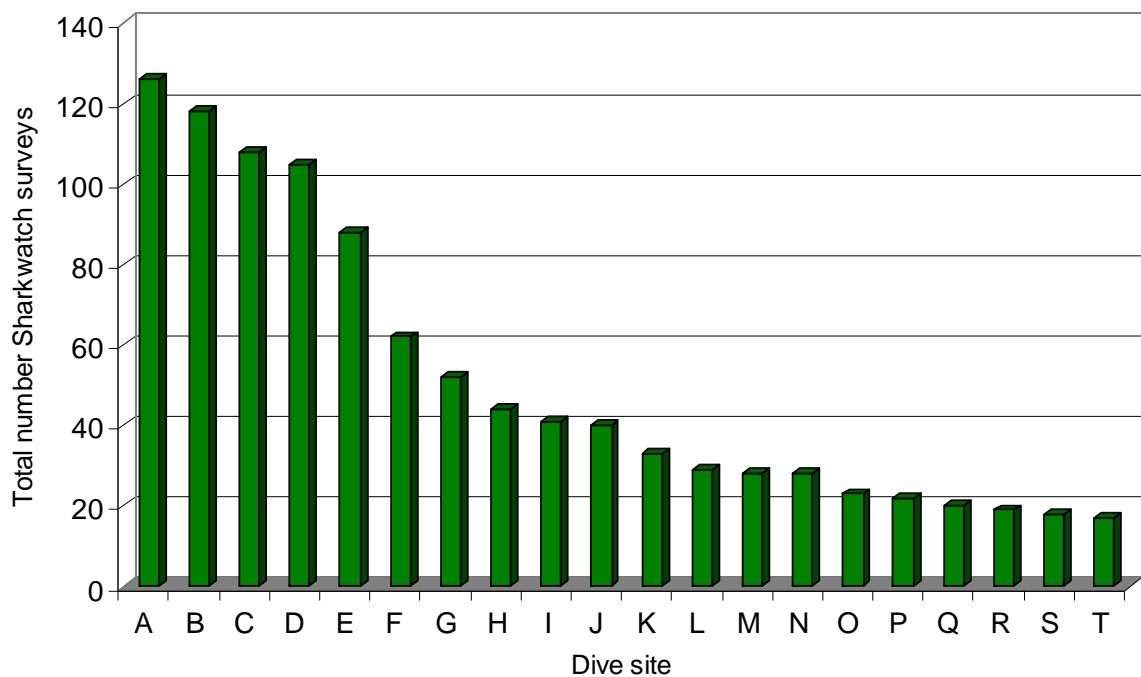
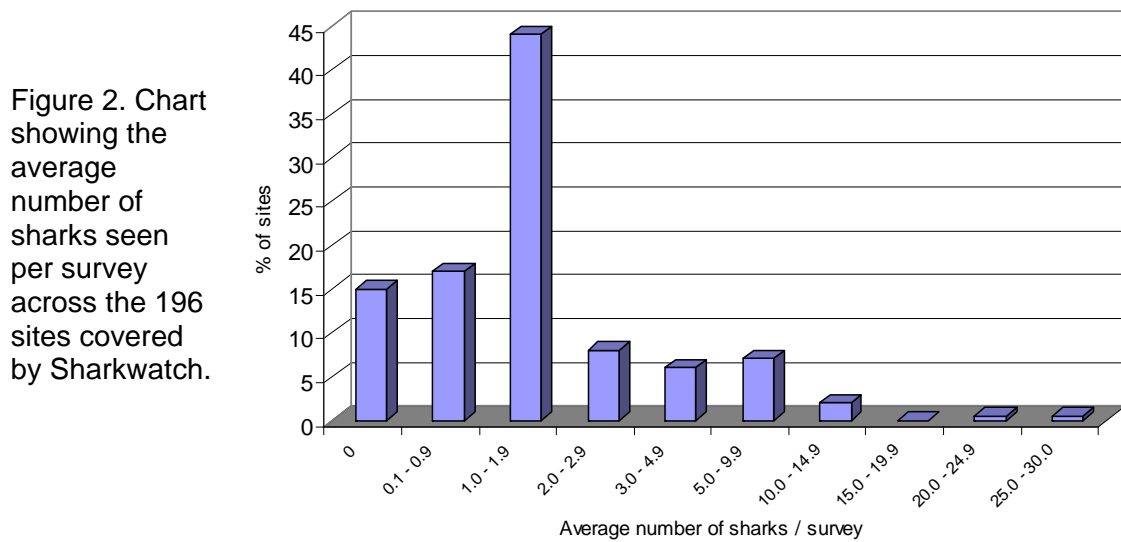


Figure 1. Chart showing the most frequently-surveyed sites during the period June 2009 - July 2010.

Average number of sharks recorded / survey

Sharks were seen at 85% of the 196 sites surveyed during the period June 2009 – July 2010.

44% of sites had an average of 1-2 sharks recorded per survey and only 3% of sites had an average of more than 10 sharks recorded per survey (Figure 2).



The ‘top site’ for sharks had an average of over 27 sharks / survey (n= 4 surveys conducted) while the second best site had 21 sharks / survey (n= 5 surveys conducted). The other sites in the ‘top twenty’ had an average of between 5 – 10 sharks per survey. The sites are not named as it was considered ill-advised to advertise these shark hot-spots and thereby possibly to encourage poaching.

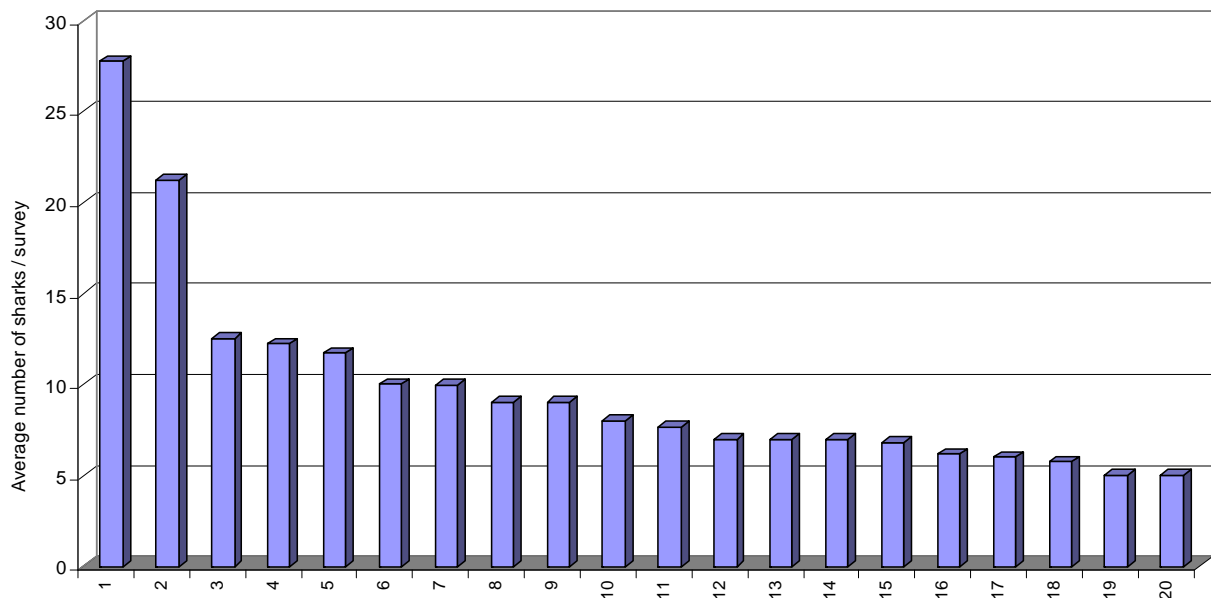


Figure 3
Ranking of the ‘top twenty’ sites surveyed to show those with the highest average number of sharks recorded per survey.

Frequency of occurrence of shark species

The 8 species of shark most likely to be encountered were included on the survey sheet; any unidentified species were included under 'other'.

BRS	Blacktip Reef Shark (<i>Carcharhinus melanopterus</i>)
WRS	Whitetip Reef Shark (<i>Triaenodon obesus</i>)
GRS	Grey Reef Shark (<i>Carcharhinus amblyrhynchos</i>)
SHS	Scalloped Hammerhead Shark (<i>Sphyrna lewini</i>)
SS	Silvertip Shark (<i>Carcharhinus albimarginatus</i>)
TNS	Tawny Nurse Shark (<i>Nebrius ferrungineus</i>)
VS	Variegated Shark (<i>Stegostoma fasciatum</i>)
WS	Whale Shark (<i>Rhinocon typus</i>)
OT	Other

A total of 3630 sharks were recorded during the 12 month survey period from June 2009 - July 2010. The white tip reef shark was the most frequently-recorded species (2247 records), accounting for 62% of all sightings. The grey reef shark was the next most frequently-recorded (822 records), accounting for 23% of all sightings.

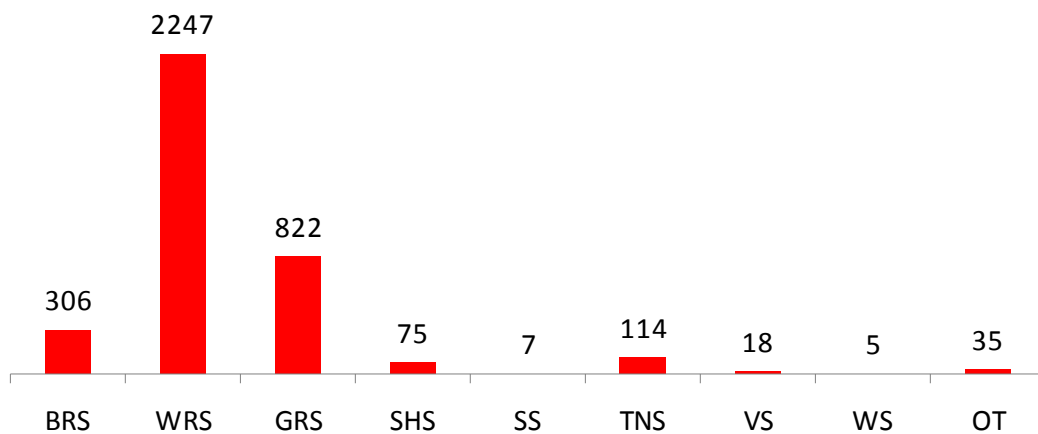


Figure 4. Total number of individual shark species recorded from June 2009 – July 2010.

Abundance by species and month

Analysis of the average number of shark species seen per 10 surveys shows an increased abundance of white-tip reef sharks over the period from December 2009 – April 2010, with a peak in February. It remains to be seen whether this pattern is repeated in subsequent years – it was not seen in other species.

The other notable feature of the monthly records is the high number of grey reef sharks recorded in July 2009. However, during this first month only 13 sites were surveyed and they happened to be ones where grey reefs sharks were abundant. In the following months many more sites were surveyed but no further records from the 'grey reef' sites were submitted after September 2009. Thus the high peak is probably a sampling anomaly rather than an indication of seasonal grey reef shark population fluctuations.

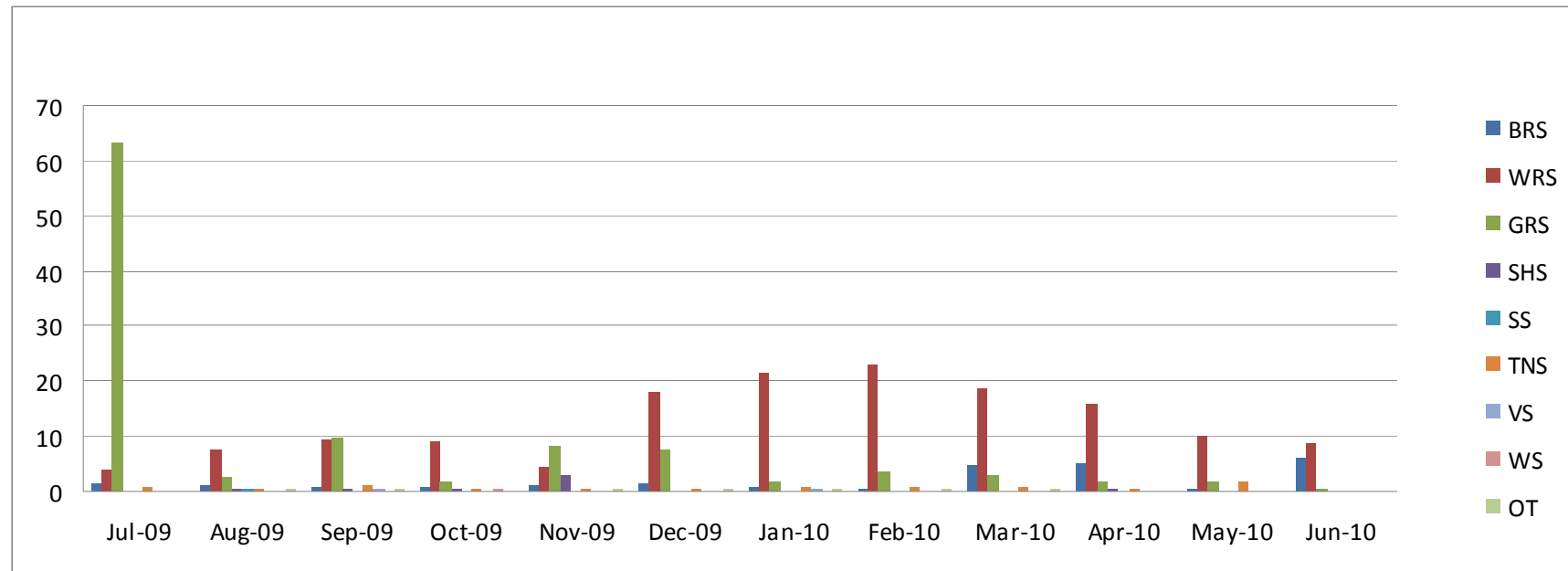
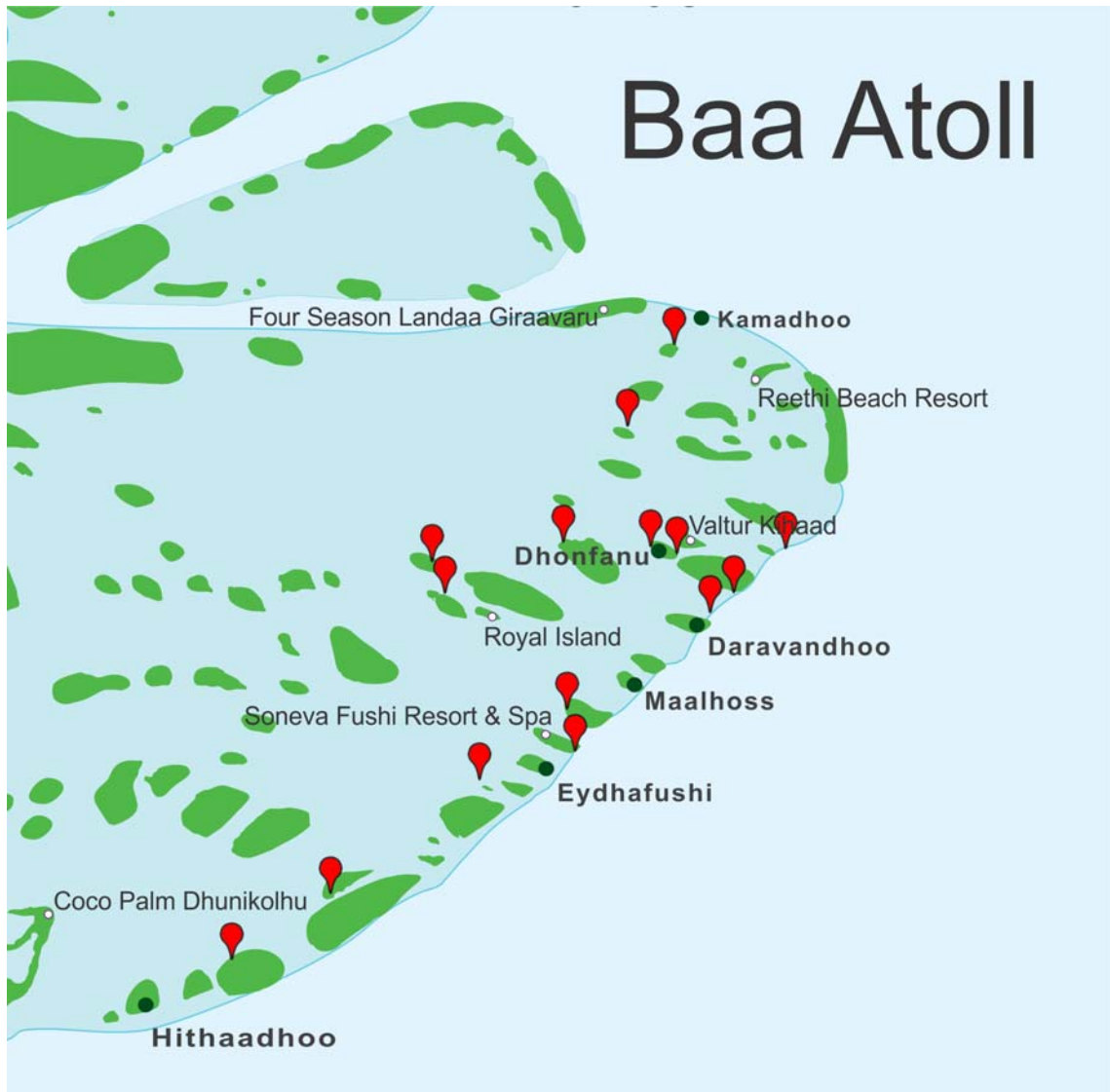


Figure 5. Average number of shark species seen per 10 surveys (all sites combined) on a monthly basis from June 2009 – July 2010

Appendix 1: Maps and list of dive sites surveyed



Aidhoo North
Anga Faru
Anga Thila
Daravandhoo
Dharavandhoo House Reef
Dharavandhoo Thila
Dhigali Giri
Dhigu Thila
Dhonfanu Thila (Baa)
Finolhos
Hanifaru Bay
Hanifaru Thila
Horubadhoo Thila

Kihaadhoofaru
Kihaadhoofaru Thila
Maadhoo Corner
Maadhoo Giri
Milaidhoo
Nelivaru Beru
Nelivaru Haa
Nelivaru Thila
Nerivaru Thila
Ohgali Haa
Pinnacles
Reethi Beach House Reef
Royal House Reef

South Male' Atoll



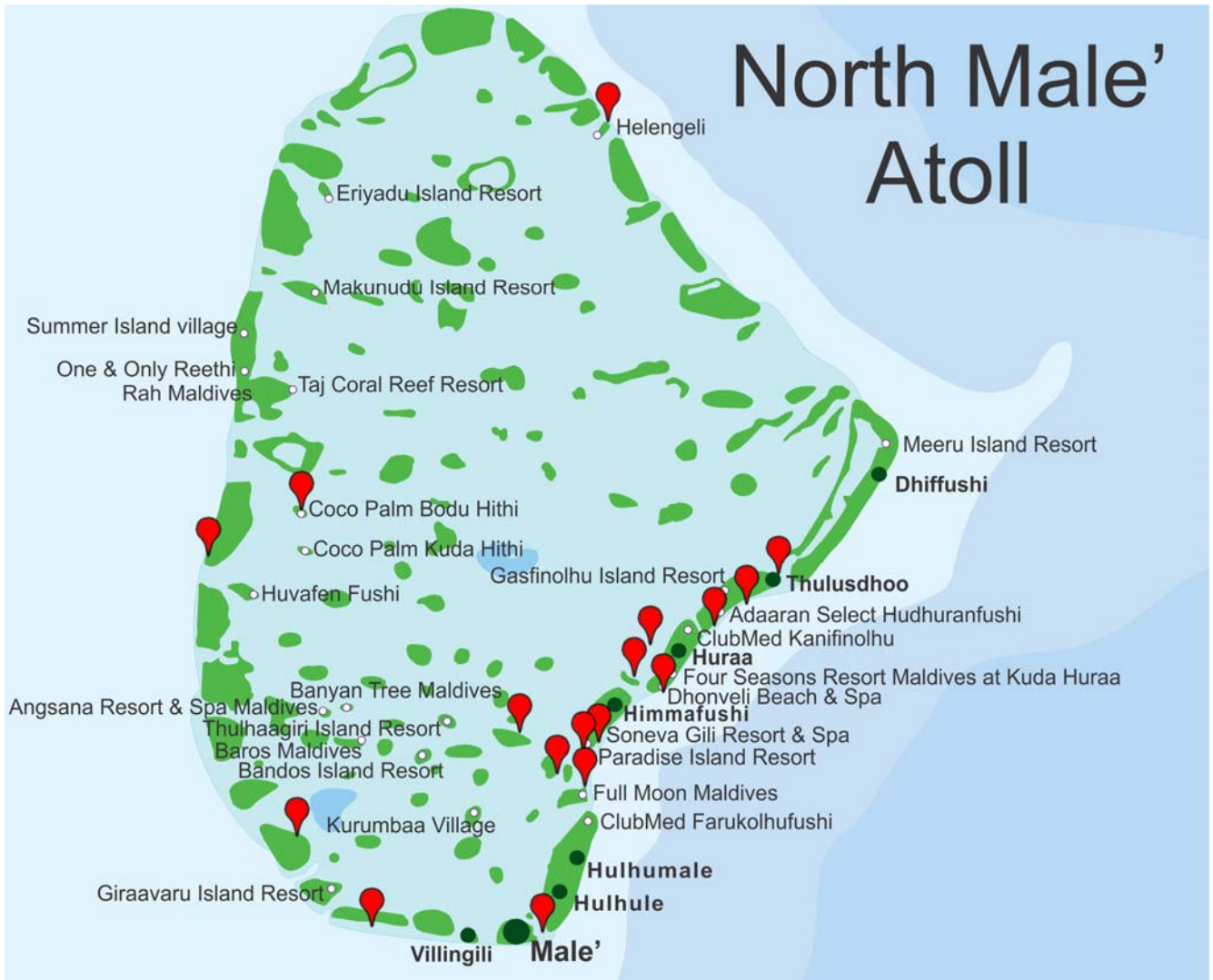
Back Cocoa
Back Guraidhoo
Back Kandooma
Back Maafushi
Barabaru Cave
Biyadhoo Giri
Bodu Faru
Bodu Faru North
Bodu Fushi
Bodu gaa Thila
Bodu Giri (S.M)
Bolifushi
Bolifushi Cave
Bolifushi Channel
Bolifushi Corner
Bolifushi Wreck
Bonsia Reef
Bushi Outside
Canyon
Cathedral
Cocoa Corner
Cocoa Giri
Cocoa Island House Reef

Cocoa Thila
Coral Ban
Dhonfanu Thila (S.M)
Digu Thilla
Dragon's Mouth
Embodhu Shark Point
Embudhoo thila
Embudu Bay
Embudu Cave
Embudu Channel
Embudu Coral Garden
Embudu Corner
Embudu Express
Embudu Finolhu Outside
Embudu Giri
Embudu House Reef
Embudu Mystic caves
Embudu Thilla
Embudu West
Emir Reef
Finolhu faru West
Fuseliers Reef

South Male sites continued

Gaa Faru
Gaa Faru Eest
Gaa Faru West
Gulhi Beyru
Gulhi Channel
Gulhi Outside
Guraidhoo Channel
Guraidhoo Corner
Hameed Reef
Helmut Reef
Huvala Thila
Kandhooma Thila
Kandooma Caves
Kandooma Thilla
Kihadhufaru Thila
Kuda Faru
Kuda Fushi
Kuda Giri Wreck & Cocoa Corner
Lemone Reef
Maafushi Caves
Maafushi Corner
Maafushi Thila
Madi Faru
Mas Thila
Medhu Faru
Miyaru Faru (S.M)
Muraka Faru
Mystery Caves
Potato Reef(kuda Giri)
Pudel's Place
Sand Dune
Sepp's Place
Shark Point (S.M)
Taj Cave
The wall
Tila Faru
Turtle Point
Turtle Reef

Vaadhoo Channel
Vaadhoo Coral Garden
Vadhoo
Vadhoo Caves
Vadhoo South
Vadoo House Reef
Veligandu Beru
Vella Cave
Vella Conner
Vellasaru Caves North
Vellasaru Caves South
Vellasaru Channel
Vellasaru Corner
Vellasaru Out
Vellassararu beru
Vellassararu Cave
Vellassararu Corner (Outer Reef)
Vellassararu Drop
Vellassararu kandu
Villingili Corner
Villivaru Giri
Wari Giri
Wog Giri



Alibaba Caves
Anemone Giri
Anemone Reef
Aquarium (Chicken Island) (kanduoiygiri)
Aquarium (N.M)
Baari Thilla
Back Faru/Faru Beru
Banana Reef
Bandos
Bandos Rock
Baros House Reef
Black Coral
Blue Cave
Bodu Gaa
Bodu hithi House Reef

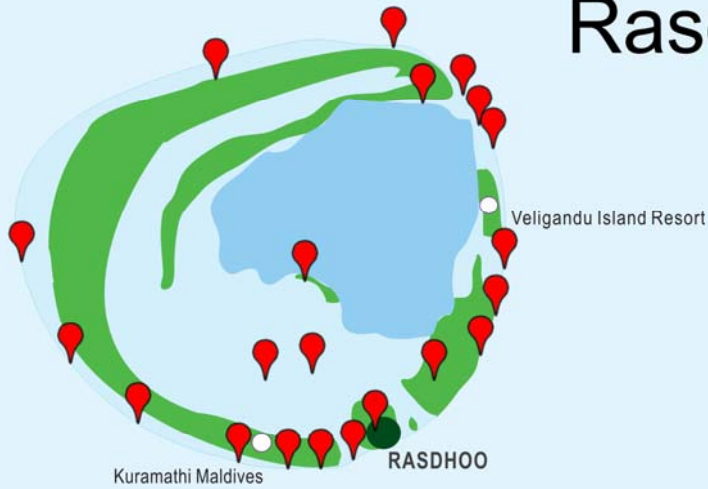
Bodu Huraa
Boduhithi Cave
Boduhithi Thila
Chicken Corner
Club Med
Club Med Corner
Colosseum
Coral Fram
Coral Garden (N.M)
Diving Faru
Farutholi Thila
Four Season House Reef
Full Moon
Furana North (beru)
Furana North (beru/thila)

North Male sites continued

Furana South
Furana Thila
Gamadhu
Giraavaru Caves
Giravaru Point
Girifushi Kandu, Thamburudhoo & Pasta Point
Hambadoo Wreck
Helengeli Thila
Himmafushi
Himmafushi Beru
HP Reef (Rainbow Reef)
Hudhuveli
Hulafushi
Hulhangu Kandu
Huravali Kandu
Huva faru
Kani conner
Kani Finolhu
Kani kandu & Aquarium
Kiki Reef
Koddiparu
Kuda Giri
Kuda Haa
Kuda Thila
Kulha Faru
kurubaa Thila
Lankan Beru
Lankan Caves
Lankan Out
Lankan Reef
Lhosfushi
Lion's Head
Lohifushi
Maagiri
Maagiri Cave
Maagiri Corner
Maagiri South

Madi Gaa
Madivaru beyru
Manta Point
Maska reef North
Maska reef South
Moon Valley
Nakatcha Giri
Nasiro Thilla
Nassimo Thila (Paradise Rock)(Blue Caves)
Ocean Side
Okkobe Thila
Old Shark Point
One Plam Reef
Paradise Lagoon
Peak (N.M)
Potato Reef
Potato Reef/Coral Garden
Potato Thila
Rainbow Reef
Rameez Place
Rasfari
Rasfari Corner
Saleembe Thila
Shallow Point (baros thila)
Sunlight Thila
Thin Giri
Thulusdhoo conner
Tree Palms
Victory
Washimas Thila

Rasdhoo Atoll



Bashalaa Maagakan Thilla
Bodu Ashey(Course Only)
Bodugaa
Caves
Fan Reef
Gangehi Pass
Hafza thilla
Hammerhead Shark Point
Himendho Faru
Hohola Thilla
Kuramathi House Reef
Lagoon
Maalhos Thila
Maaya thila
Madi Block(Manta Season Only)
Madivaru
Madivaru Finolhu

Miyaru Faru (N.Ari)
North Channel
North Corner(Manta Season Only)
Ory Faru
Rasdhoo
Rasdhoo Channel
Rasdhoo House Reef
Veligandhu East
Veligandhu North
Veligandu Thila
Vely Kandhu
Wreck(Kuramathi Queen)
Wreck(Reef Explorer)



Ahmed Thila
Anamon Thila
Anemone Thila
Aquarium (Lav)
Bodu Giri (Lav)
Bratz Thila
Christmas Rock
Coral Garden (Lav)
Davigandu
Fatima Caves
Fatima Kandu
Felivaru Kandu
Felivaru Outreef
Fun Giri
Fush kandu
Fushifaru Thila
Fushifaru Giri
Fushivaru Corner

Fushivaru Kandu
Fushivaru Thila
Hani Kandu
Hinnavaru Outreef
Ismails Thila
Kalhifushifaru Corner
Kanihura Corner
Kanuhura Corner
Kuda beru
Kuda Kandu
Kuredu Caves
Kuredu Express
Latheef Reef
Maa giri
Madan Thila
Madiriguraidoo Corner
Madivaru Outreef
Madivaru Thila

Mashura Outreef
Medadihura Outreef
Medufaru Outreef
Meyafushi Kandu
Naifaru Kandu
Nakohlu Giri
Orimas Thila
Peak (Lav)
Palm Beach Corner
Shipyard
Tinga Giri
Tinga Thila
Vavaru Outreef
Vihafaru Giri
Wall
Xmas Rock
Zafari