

# Chagos News

*The Periodical Newsletter of the  
Friends of the Chagos*

No.11

August 1998

## EDITORIAL

**Future Conservation.** There was a proposal written ten years ago to make Chagos a World Heritage Site. This was forwarded in 1988 to the Commissioner, BIOT who rejected it as being incompatible with the UK/US Agreement which puts the whole archipelago aside for the defence purposes of the two governments for an indefinite period. Nonetheless we put down the marker and this has been followed by much positive action since.

In the autumn of 1997 the Friends suddenly received a proposal from the World Wide Fund for Nature and the International Union for the Conservation of Nature to make Chagos a World Heritage Site! We have had meetings and exchanged views. Now we intend to make future conservation the theme of a Seminar after our Annual General Meeting at the Linnean Society of London on Tuesday 6 October. Come and join. An attendance form is enclosed.

**Publications.** Meanwhile our first two publications *The Sea Shores* and *Fishes of Chagos* continue to sell steadily, so that we are getting closer to the point when the income stream justifies printing the next two *Birds* and *Plants of Chagos*. The really Good News is that we have through the Linnean Society found a publisher

for a book on the 1996 Expedition scientific papers. Friends will be offered a reduced price.

**Contents.** Graham Niven who has just completed his year as Britrep has written us a really good article bringing the latest news from paradise. His relief, Peter White, is now in post.

There is also a fascinating and in part worrying article on Sharks or rather the shortage of sharks in Chagos.

This type of article is what makes Chagos News of interest not only to us as Friends but also to scientists, historians and many others. It creates a public record for international consultation of data that otherwise would often not be available.

Have you a contribution?

**Membership.** When we started Friends of the Chagos we never expected a large membership because few people have even heard of Chagos let alone visited. So we decided to go for quality of membership - people with a long term interest, discerning people who appreciate the beauty, value and importance of the archipelago. Please use the enclosed leaflet to recruit a like minded friend.

*John Topp*

**LIFE COULD NOT BE MORE INTERESTING OR SATISFYING**

by

**GRAHAM NIVEN**

I knew John Topp would apply gentle pressure to extract an article for the next edition of the Chagos Bulletin though to be truthful it is a pleasure to spread the word of life in paradise.

In the usual manner of things, I relieved Simon Jackson in July 1997 though I did so with some knowledge of the job, having visited Diego Garcia in 1988 as the Executive Officer of HMS EDINBURGH. I had little time to reflect on whether my memories of the island held true as my immediate task was to prepare for the visit of the Ocean Wave Task Group. This Group was the largest contingent of ships to visit for many years, certainly since the days of the US Carrier Battle Groups and probably the most RN units to visit at one time. Led by HMS ILLUSTRIOUS, the Group consisting of 8 units including 2 submarines, spent 2 days enjoying all that Diego Garcia has to offer. Their arrival almost doubled the island population and some 2000 sailors are now aware of the beauty of the island and of one of the best jobs in the Service: indeed two of them are now members of NP 1002!

The visit was also an excellent opportunity for the Commissioner, Bruce Dinwiddy, to pay a visit to his domain and I am glad I persuaded him to dress in his full regalia for the USN Commanding Officer's Change of Command Ceremony. Although we did not know it then, this was to be his last visit: Bruce is now the High Commissioner in Dar es Salaam. He has been relieved by Christopher Wilton, though it looks like his tenure will be short as the administration of the Territory is to move to a new department following the Dependent Territories review conducted by the FCO.

To return to my memories of the island, there have been a number of changes since 1988, some subtle some marked. Paul Baker, who was the Britrep in 1996, did a lot of work on the mapping and restoration of the plantation and set in train a plan for its preservation and restoration. I was extremely pleased to see that this has been continued and I have done my best to maintain the momentum. The FCO continues to fund 2 workers to maintain the facility and I am encouraged by the resurgence of the practice of individual groups accepting responsibility for areas of the island. The US authorities have published their Natural Resources Management Plan for the island and are keen to carry it forward.

Legislation is now in place to define the Restricted area which has been divided into the "Nature Reserve Area" and the "Strict Conservation Area". This now allows the BRITREP to enforce what has already largely been in practice with respect to access and activities within the areas.

The outer islands continue to flourish and expand. Unfortunately, as yet I have not had the opportunity of setting foot on these, though I have flown over them a number of times, as since November 1997 Diego Garcia has been playing host to a number of visitors in response to the crisis in the Gulf. Our population has risen by some 400 and we now have a rather full complement of aircraft on the ramps at the airfield. As ever with these sort of situations an end date is not clear and our guests are enjoying something of paradise and, I am pleased to say, contributing to its protection and conservation.

I have had one first and one unlikely situation to deal with in my time so far. The unlikely cropped up in my first week of office when I was required to register only the third birth on the island since the present agreement was signed. To say that it took all on the island by surprise is an understatement though I can report that mother and daughter were both well and now reside in the Philippines. The "first", which can be added to the twenty questions given to prospective BRITREPs was

"What do You do when an American Vessel reports it has a stowaway"

Admittedly this made me and the FCO put our thinking caps on but thankfully the ship entered DG less the stowaway as he had been landed at another location. There have been four weddings conducted on island and this is one of the most enjoyable functions of being a Magistrate. Regretably, I have also had to act as Coroner to preside over the death of a Merchant Navy Master.

It is a common phrase by all who leave the island "A year just flies past" and I must echo that sentiment. I have only six weeks remaining before I must hand over to Peter White. An adjective often misused, "unique", most certainly applies to the appointment as "Commissioner's Representative". As a serving Officer in the Royal Navy there is no other job that even comes close to being as diverse or satisfying. I shall be sorry to leave the island but glad that another of my colleagues will have the opportunity of enjoying this beautiful location. It is not just the physical beauty which makes it unforgettable : the island weaves a spell of tranquillity and bonhomie over all who spend time here.

I have thoroughly enjoyed being spellcast and will retain fond memories of the archipelago and its residents.

## **SHORTAGE OF SHARKS AT CHAGOS**

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## **INTRODUCTION**

Sharks are characteristic top predators of coral reef environments throughout the tropical oceans. They are abundant on pristine (unfished) reefs and are believed to play a key role in the reef ecosystem.

In recent years it has become increasingly obvious that fish stocks are not the boundless sources of riches that our ancestors believed them to be. Stocks of North Sea herring, Canadian cod and Mediterranean tuna, to name just a few, have all collapsed in recent times. What is not so widely appreciated is that sharks are even more liable to overfishing than such 'bony fishes'. Sharks grow slowly, are long-lived, mature late and have relatively few offspring. For example, the grey reef shark is thought to live for about 25 years, mature at about 7 years, and bear only 2-4 young at a time. All these factors mean that shark populations are very easily overfished. They also mean that once a population has been overfished it may take decades for it to recover.

In the 1970's during a series of three major diving expeditions to the Chagos Archipelago, (the 1972, 1975 and 1978-79 Joint Services Expeditions), divers encountered large numbers of reef sharks (Bellamy, 1979; Winterbottom, Emery and Holm, 1989; Sheppard, 1990). During the 1996 Chagos expedition, diving marine biologists again visited the Chagos, after a lapse of 17 years since the last similar expedition. It was expected that comparable numbers of sharks would be seen in 1996 as had been seen in the 1970's, but this was not the case.

The aim of this report is to document and, as far as possible, quantify a dramatic decline in reef shark abundance in the Chagos.

## **METHODS**

Qualitative information about shark abundance in Chagos waters during the 1970's was obtained from several expedition divers (see Acknowledgements). Charles Sheppard took part in the 1975 and 1978-79 expeditions, while Ron Crosby took part in the 1978-79 expedition. All four authors took part in the 1996 expedition.

Quantitative information about shark abundance in Chagos was obtained from divers' logbook records. Fairly consistent logbook records of shark sightings were kept during the 1975 expedition by Charles Sheppard and during the 1978-79 expedition by Ron Crosby. Although these data are not complete, records were kept of most shark sightings, of all sightings of large numbers of sharks, and of unusual occasions when no sharks were seen. It is assumed that one shark was seen on each dive for which shark numbers were not recorded. Complete records of shark sightings during dives were kept by Charles Anderson and Mark Spalding during the 1996 expedition.

## **RESULTS**

### **The Situation in the 1970's**

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Divers who visited the Chagos in the 1970's noted that reef sharks were very abundant. Sharks were seen on almost every dive, few (1-2) on reefs inside the atolls, more (5+) on outer atoll reefs, and most (50+) on some particular sites such as submerged banks. This abundance of sharks at the Chagos in the 1970's has been previously reported by Bellamy (1979) and Sheppard (1990). The sharks were sometimes over-inquisitive, and a number of precautions had to be taken when diving. At different times these included:

- Not free-swimming in midwater or at the surface over deep water.
- Not entering the water for several minutes after arriving at a dive site, in order to give time for sharks attracted by the sounds of the engine and anchor to disperse.
- Anchoring dive boats in shallow water so that divers could ascend from the bottom and exit the water quickly, spending as little time as possible in mid-water.
- Having a drop line from the anchored dive boats from which underwater cameras and other equipment could be hung in order to distract sharks while divers got out of the water.
- Having one diver in each party armed with a stick and assigned as a "shark guard" to ward off sharks that approached too closely.
- Taking particular care when diving in the late afternoon (when sharks were especially active and sometimes aggressive) and when diving on submerged banks (where sharks were especially abundant).

Logbook records of shark sightings maintained by Charles Sheppard and Ron Crosby are summarized in Table 1. Note that neither data set is complete. Records of shark sightings were not kept for over one third of all dives; most of these were on reefs within the atoll lagoons where shark sightings were less common than at other localities. It is assumed that an average of one shark was seen on each of these dives. This assumption may distort the estimate of true shark abundance, but if it results in an overestimation this will be of less than 0.4 sharks per dive at most. This assumption will also tend to reduce variance.

**Table 1. Summary of shark sightings by divers in the Chagos**

| Year                | 1975 | 1979 | Subtotal<br>1975&1979 | 1996 | 1996 | Subtotal 1996 |
|---------------------|------|------|-----------------------|------|------|---------------|
| Observer            | CRCS | RC   | CRCS &<br>RC          | RCA  | MDS  | RCA & MDS     |
| No. dives           | 67   | 140  | 207                   | 45   | 68   | 113           |
| No. sharks          | 281  | 593  | 874                   | 17   | 49   | 66            |
| No. sharks / dive   | 4.2  | 4.2  | 4.2                   | 0.4  | 0.7  | 0.6           |
| 1.96 SE (shks/dive) | 0.5  | 0.3  | 0.3                   | 0.2  | 0.2  | 0.1           |

### Findings in 1996

It very quickly became apparent that reef sharks were no longer abundant in the Chagos. On most dives none or only one or two sharks were seen. None of the "anti-shark" precautions used during the 1970's expeditions had to be employed. A total of 13 species of shark have been recorded from the Chagos to date (Winterbottom and

Anderson, 1997), of which five species of shark were positively identified during dives by the divers who kept records of shark sighting on the 1996 Chagos Expedition:

|                     |   |
|---------------------|---|
| Tawny nurse shark   | <i>Nebrius ferrugineus</i> (Lesson, 1830)                 |
| Silvertip shark     | <i>Carcharhinus albimarginatus</i> (Rüppell, 1837)        |
| Grey reef shark     | <i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856)         |
| Blacktip reef shark | <i>Carcharhinus melanopterus</i> (Quoy and Gaimard, 1824) |
| Whitetip reef shark | <i>Triaenodon obesus</i> (Rüppell, 1837)                  |

A summary of 1996 shark sightings is provided in Table 2. Sharks sightings in atoll channels are lumped in the 'outside' category. A single dive on Victory Bank by the senior author produced no shark sightings; the time spent (one hour) is lumped under Great Chagos Bank. Shark sighting rates (i.e. numbers of sharks seen per hour) by location and species are given in Table 3.

**Table 2. Summary of Chagos shark sightings (numbers) by divers in 1996**

|                          | Salomon<br>(inside) | Salomon<br>(outside) | Peros Ban.<br>(inside) | Peros Ban.<br>(outside) | Great<br>Chagos B. | Diego Gar<br>(outside) | Total |
|--------------------------|---------------------|----------------------|------------------------|-------------------------|--------------------|------------------------|-------|
| <i>N. ferrugineus</i>    | 0                   | 5                    | 2                      | 3                       | 5                  | 1                      | 16    |
| <i>C. albimarginatus</i> | 0                   | 2                    | 0                      | 2                       | 0                  | 0                      | 4     |
| <i>C. amblyrhynchos</i>  | 0                   | 16                   | 3                      | 12                      | 7                  | 0                      | 38    |
| <i>C. melanopterus</i>   | 1                   | 3                    | 2                      | 1                       | 0                  | 0                      | 7     |
| <i>T. obesus</i>         | 0                   | 1                    | 0                      | 0                       | 0                  | 0                      | 1     |
| Total                    | 1                   | 27                   | 7                      | 18                      | 12                 | 1                      | 66    |
| Time (hrs)               | 19                  | 29                   | 28                     | 22                      | 28                 | 1                      | 127   |

**Table 3. Summary of Chagos shark sighting rates (sharks per hour) by divers in 1996**

|                          | Salomon<br>(inside) | Salomon<br>(outside) | Peros Ban.<br>(inside) | Peros Ban.<br>(outside) | Great<br>Chagos B. | Diego Gar<br>(outside) | Total |
|--------------------------|---------------------|----------------------|------------------------|-------------------------|--------------------|------------------------|-------|
| <i>N. ferrugineus</i>    | 0                   | 0.17                 | 0.07                   | 0.14                    | 0.18               | 1.0                    | 0.13  |
| <i>C. albimarginatus</i> | 0                   | 0.07                 | 0                      | 0.09                    | 0                  | 0                      | 0.03  |
| <i>C. amblyrhynchos</i>  | 0                   | 0.55                 | 0.11                   | 0.55                    | 0.25               | 0                      | 0.30  |
| <i>C. melanopterus</i>   | 0.05                | 0.10                 | 0.07                   | 0.05                    | 0                  | 0                      | 0.06  |
| <i>T. obesus</i>         | 0                   | 0.03                 | 0                      | 0                       | 0                  | 0                      | 0.01  |
| Total                    | 0.05                | 0.93                 | 0.25                   | 0.82                    | 0.43               | 1.0                    | 0.52  |
| Time (hrs)               | 19                  | 29                   | 28                     | 22                      | 28                 | 1                      | 127   |

## DISCUSSION

From divers' logbook records, the shark sighting rate for the period 1975-79 is estimated at roughly  $4.2 \pm 0.3$  sharks per dive. In contrast, the shark sighting rate in 1996 was only  $0.6 \pm 0.1$  sharks per dive (Table 1; Fig. 1). If it is assumed that shark sightings are a reasonable index of shark abundance, then this suggests that shark

numbers in 1996 had been reduced to about one seventh (14%) of their numbers in the 1970's.

The data on which these results are based are subject to some difficulties of interpretation. In the three sample years, dives were not made at exactly the same locations (although they were made at the same season). This may have caused some slight error, although it is not believed to have caused any obvious bias. The assumptions made to account for incomplete data sets from the 1970's are noted above and are another potential source of error. However, the fact that the estimates of shark sighting rates by divers for 1975 and 1979 are in such good agreement does suggest that they are not without value. Furthermore, although these problems may affect the precise estimates of shark abundance, they do not disguise the fact that there has been a substantial decrease in shark sightings.

Two further potential sources of error relate to consistency of dive length and diver vigilance. For the former an overview of log-book records suggests that these were generally comparable between the three years. Similarly, it is the authors' opinion that diver vigilance would have been broadly comparable in all three years. All observations were made by experienced divers, all of whom had specific tasks to perform during most dives, but who nevertheless had sufficient time and interest to scan the surrounding waters at regular intervals.

Although only semi-quantitative, this brief study does show the potential value of selected diver logbook records as a means of gathering historical data. Divers regularly record sightings of large pelagics and other 'interesting' species. With strict assessment and control, this method could be used more widely to assess changes in abundance of some species where no other quantitative records are available.

The great decrease in shark sightings by divers between the 1970's and 1996 is believed to reflect a real decrease in shark numbers. This is almost certainly due to fishing. Prior to the 1980's there had been limited shark fishing in the Chagos (Sheppard, 1990). Since then, Mauritian reef fishermen have been allowed to operate in the archipelago under licence. These fishermen visit the Chagos during the rough season around Mauritius, i.e. in the middle of the year. They target finfish, but must also catch some sharks. In particular, they may have deliberately targeted sharks at new sites in order to reduce shark numbers, thereby reducing incidences of lost catch and lost gear. In addition, Sri Lankan fishermen visit the Chagos illegally. Two Sri Lankan fishing boats from Negombo were arrested by the British Indian Ocean Territory (BIOT) fisheries patrol vessel at the end of January 1996. Both had large catches of sharks on board (pers. obs.; McDonnell, 1996). The vessels were impounded. Fishing gear was seized from two other vessels (McDonnell, 1996). In Sri Lanka there is strong local demand for shark meat, and of course shark fins are much sought after as an export commodity.

Although all species of reef shark seem to have been affected by this fishing activity, they do not appear to have been affected equally. The silvertip shark, *Carcharhinus albimarginatus* was the most abundant reef shark seen in the 1970's (Winterbottom, Emery and Holm, 1989; R. Winterbottom, pers. comm., April 1996). In 1996 it had been reduced to fourth in order of abundance (Table 3). This disproportionate decrease in silvertip shark numbers might be a reflection of this species' more

inquisitive and/or aggressive nature (compared to the other common reef species at Chagos) making it more vulnerable to fishing mortality.

In most parts of the World, reef shark populations have been reduced to a fraction of their original sizes. There are very few locations where shark numbers remain high. Ironically, one of the few is Bikini Atoll in the Marshall Islands (Curtsinger, 1995) where fishing has not been carried out for 50 years following nuclear tests. At Bikini Atoll, numbers of reef sharks are presumably at a "natural" level that would have been the norm for most similar sites throughout the Indo-Pacific for millions of years until this century.

Until the 1996 Expedition it had been thought that the Chagos too had escaped the worst effects of the worldwide collapse of shark stocks, as a result of its isolation. However, it is clear that "isolated" is a relative term. For many modern Indian Ocean fishermen Chagos is no longer seen as a remote location, but rather as a prime fishing ground. It is also clear that if the coral reefs of the Chagos are to be preserved in a pristine condition, as many hope, greater efforts will have to be made to control fishing of the reefs' top predators.

#### **ACKNOWLEDGEMENTS**

The 1996 Chagos Expedition was organized by The Friends of the Chagos, London. We are most grateful to John Griffiths, Peter Ormerod, Don Phillips, Ralph Rayner, Ann Sheppard and Rick Winterbottom for providing anecdotal information about sharks in the Chagos during the 1970's.

This article originally appeared in the January 1998 issue of "Shark News", the newsletter of the IUCN Species Survival Commission's Shark Specialist Group. It is reproduced here (in a revised form) with the gracious permission of the editor, Sarah Fowler.

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