# Whale Shark records and conservation status in Venezuela

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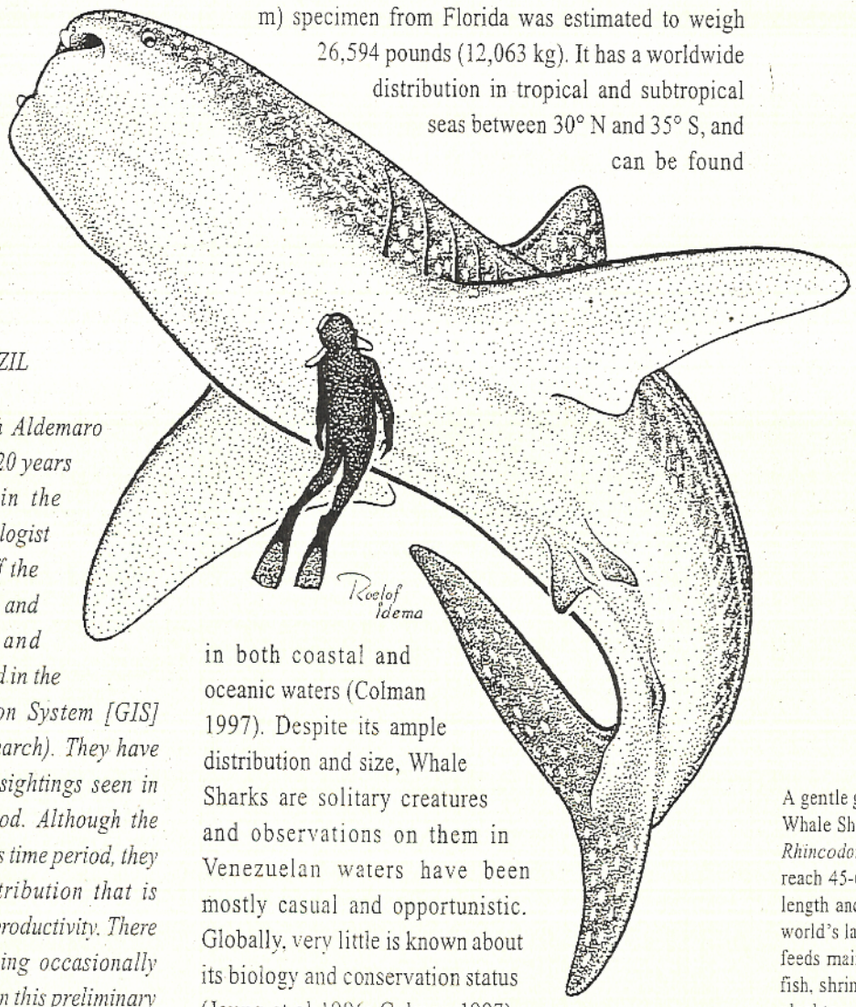
Biodiversity *welcomes this paper from Aldemaro Romero (an aquatic biologist with over 20 years of research experience, especially in the Caribbean area), A. Ignacio Agudo (a biologist who has been studying marine fauna off the coasts of Venezuela for the past 12 years), and Cristina Salazar (a biology and environmental studies graduate interested in the application of Geographic Information System [GIS] technology to conservation biology research). They have compiled the records of Whale Shark sightings seen in Venezuelan waters over a 51-year period. Although the sightings are relatively rare, only 20 in this time period, they appear to reflect a geographical distribution that is congruent with areas and periods of high productivity. There is also evidence that this species is being occasionally harpooned or accidentally netted. Based on this preliminary study and on the Precautionary Principle, the authors propose that the Whale Shark be classified as Vulnerable within Venezuelan waters. They also propose long-term population and behavioural studies to track individual animals to provide an accurate picture of the distribution and abundance of* Rhincodon typus.

The Whale Shark, *Rhincodon typus* Smith 1828, is the world's largest living species of fish, reaching lengths of 45 feet (13.7 m) with credible records of 60 feet (18.3 m) or more (Bigelow and Shroeder 1948). A 38-foot (11.6 m) specimen from Florida was estimated to weigh 26,594 pounds (12,063 kg). It has a worldwide distribution in tropical and subtropical seas between 30° N and 35° S, and can be found in both coastal and oceanic waters (Colman 1997). Despite its ample distribution and size, Whale Sharks are solitary creatures and observations on them in Venezuelan waters have been mostly casual and opportunistic. Globally, very little is known about its biology and conservation status (Joung et al 1996; Colman 1997), and even though it will require many years of sustained effort to collect more information, increasing concern is now being shown for the well being of this species.




A gentle giant, the Whale Shark, *Rhincodon typus*, can reach 45-60 feet in length and is the world's largest fish. It feeds mainly on small fish, shrimps and plankton.

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| RECORD # | LOCALITY | DATE | REPORT TYPE | SOURCE |
|---|---|---|---|---|
| 1 | 10°44'E - 63°09'E | 1978 | Sighting/Picture | Giuseppe Notarbartolo di Sciara, pers. comm. |
| 2 | 12°00'E - 63°37'E | 08/1965 | Sighting | Anonymous 1965 |
| 3 | 10°40'E - 64°19'E | 10/1977 | Sighting | Anonymous, 1977, Evans et al., 1979 |
| 4 | 10°35'E - 64°21'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 5 | 10°38'E - 64°21'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 6 | 10°37'E - 64°23'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 7 | 10°40'E - 64°23'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 8 | 10°33'E - 64°24'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 9 | 10°20'E - 64°28'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 10 | 10°26'E - 64°29'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 11 | 10°38'E - 64°32'E | 10/1977 | Sighting | Anonymous 1977, Evans et al., 1979 |
| 12 | 10°13'E - 64°42'E | ? | Harpooned | Anonymous 1976 |
| 13 | 10°17'E - 64°44'E | ? | Sighting | Anonymous 1977 |
| 14 | 10°18'E - 64°48'E | 1942 | Harpooned | Anonymous 1988 |
| 15 | 11°00'E - 65°20'E | 09/1995 | Sighting | Carlos Ferreira, pers. comm. |
| 16 | 10°38'E - 66°11'E | 01/1988 | Sighting | Anonymous 1988 |
| 17 | 10°55'E - 66°55'E | ? | Sighting | Lairet 1991 |
| 18 | 10°30'E - 67°00'E | 01/1993 | Accidentally netted | Trejo et al., 1993 |
| 19 | 10°37'E - 67°02'E | ? | Sighting | Anonymous 1988 |
| 20 | 11°54'E - 69°49'E | 02/1993 | Accidentally netted | Darío Bracho, pers. comm. |

Table 1
*R. typus* records for Venezuela
Note: All reports represent one individual Whale Shark.

Generally considered a rare species, it has—and continues to be—commercially hunted or accidentally captured around the world (Colman 1997). In addition, Whale Sharks are also the subject of major ecotourism ventures in Australia (Smith 2000) and are viewed for diversion in other countries such as the Philippines and Belize. Its large size, slow growth rate, late maturation (as long as 30 years), and extended longevity make it a species of limited recruitment and slow to recover from any overexploitation. Also, several populations of this species are decreasing in size (Taylor 1996; Chang et al 1997; Colman 1997). The Whale Shark is classified as "Data Deficient" by the World Conservation Union/ World Conservation Monitoring Centre's (IUCN/WCMC) *Red List* that can be found at http://www.wcmc.org.uk:80/species/animals/.

To learn more about the distribution and conservation of this elasmobranch, we studied geographic and temporal records for this species off the coast of Venezuela, in the southern Caribbean. Records for this species in this small part of the world are rare.

## MATERIAL AND METHODS

**Area Of Coverage**: We included sightings and records within all inland Venezuelan waters and any marine waters that fall within the territorial sea, namely the 670,000 km$^2$ of maritime space (Territorial Sea + Contiguous Zone + Inner Waters + Continental Margin + Continental Shelf +Exclusive Economic Zone) as defined by the Law of the Sea (Romero 1990).

**Data Compilation:** Data was compiled from both scientific and non-technical literature (Table 1). Included in the latter category were unpublished sightings by reliable observers (including those who took photographs) plus records of accidentally caught and intentionally captured animals. Although the observers are sometimes anonymous, we included only those reports that provided sufficient information, such as clear descriptions, drawings, or

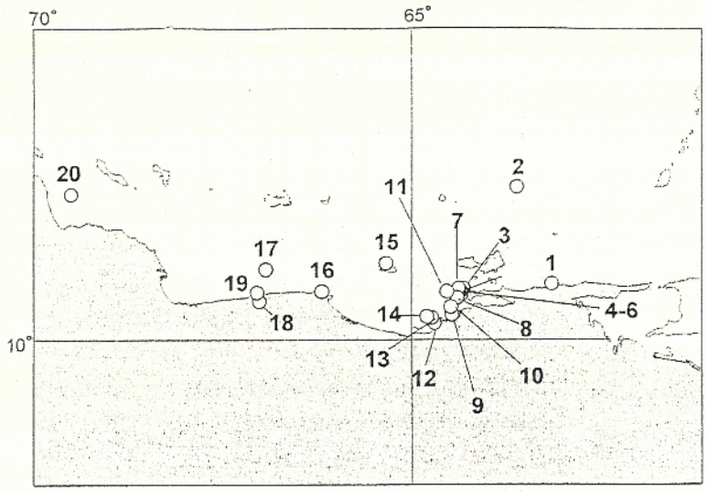


Figure 1
Spatial distribution of Whale Sharks off the coast of Venezuela

photographs, to permit unambiguous identification. The common names for this species in Venezuela include *Tiburón Ballena*, *Guatiporra*, and *Tintorera Gigante*, and so we used those terms as part of our documentary search.

**Distribution and Localities:** Records are ordered geographically from east to west. We used latitudes and longitudes to denote the exact geographic position of the records. Because of its implications for conservation, we report, when known, the method of capture.

## RESULTS

The results of data compilation are summarized in Table 1. Figure 1 shows the spatial distribution, and Figure 2 shows the temporal distribution of records for this species in Venezuelan waters.

## DISCUSSION

**Strengths and Weaknesses of the Records:** The records summarized here represent recorded occurrences by locality. As such, there is little meaningful analysis that can be performed since the records do not represent any kind of statistically valid sampling (such as an appropriate census or survey), and they are also certainly affected by a variety of biases, generally of unknown magnitude and direction. For example, biases could include the geographical and behavioural habits of this species, the geographical location of observers, the recognizability of the species, its propensity to be captured, the inclinations and capabilities of observers to describe and record, and so on. These biases all *independently* affect the likelihood of a record being produced, and in addition, there are undoubtedly strong interactions between these and other variables. These factors all combine to affect the presence or absence of records at different locations. While an abundance of sighting and capture records certainly indicates the presence of Whale Sharks in a certain locality, the absence of records from another location could just as well indicate an absence of fishing activity as of the species itself. For instance we note that the Venezuelan records, over this 51-year period, appear to coincide with the upwelling of food sources that, in turn, coincides with fishers going out to fish. Do the records then reflect the pattern of humans or the animal itself? Until further research is done, we will not know the answer.

Nevertheless, there are a few summary analyses that may be useful to compare with similar compilations of Whale Shark records in other areas affected by the same factors. These analyses need to be viewed with considerable caution, however, because the factors mentioned above may vary greatly by geographical location and ultimately affect the number of records produced. Of the 20 Venezuelan records, 16 correspond to sightings, 2 to harpooned individuals, and 2 to accidentally netted individuals.

**Spatial Distribution:** Any interpretation of geographical variation must be considered in light of the distribution of the common prey of Whale Sharks (i.e. plankton and small fish). Because there are seasonal variations in the abundance of plankton in various locations, these fluctuations can be expected to affect the seasonal location of their predators. For example, there is periodic

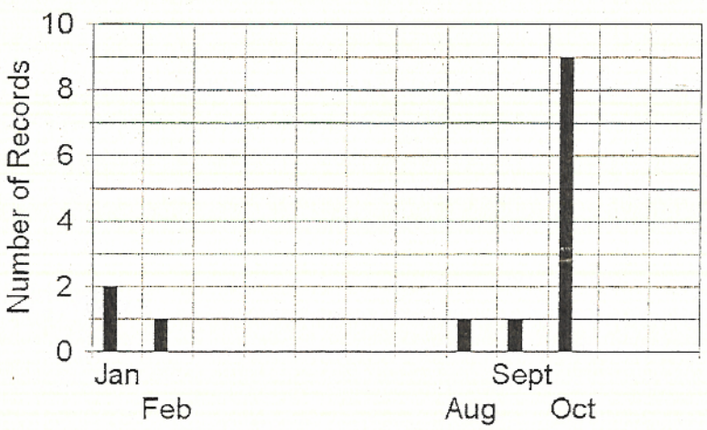


Figure 2
Temporal Distribution of Whale Sharks off the coast of Venezuela

enrichment in the eastern Caribbean that results from the presence of continental waters coming from the Orinoco delta. These waters enter through the passages between Trinidad and Venezuela and Trinidad and Tobago, and produce an upwelling of enriched waters at about 63°W. This is evident between July and October, the months of greatest discharge from the Orinoco river (Monente 1997).

This upwelling and its effects on fish abundance is reflected in the fact that 60% of the fishing catch occurs off the eastern coasts (from 63° to 66°W) of Venezuela (Gómez Gaspar 1996).

Whale Sharks have also been shown to have seasonal movements, possibly influenced by the same patterns of nutrient enrichment (Taylor 1996). Of the 20 records, 17 (85%) are from 63°09'W through 65°20'W, with the remainder tapering off to the east and to the west. This is consistent with: a) the high productivity of Venezuelan waters at this longitude, due largely to the influence of periodic enrichment mentioned above; and, b) the distribution of cetaceans for those waters that is also driven by the general oceanic productivity (Romero et al, in press). This comparison is meaningful since both cetaceans and Whale Sharks occupy the same position as apex predators in the marine ecosystem.

**Seasonal Variation:** Figure 2 reveals an uneven bimodal annual distribution of Whale Shark records in Venezuela. There is a peak of records for the month of October with records for January, February, August, and September. An intensive aerial cetacean survey during October is the main reason for so many records in those waters during that month. Yet we must note that those records, together with the ones for the two previous months of August and September, coincide with the months of greater marine productivity in that area (mentioned above).

The paucity of records for other times of the year reflects at least partial dependence on the amount of human activity. Once again, this illustrates the difficulty of interpreting "non-scientific" records of this kind unambiguously: Do they reflect the natural history of the animals or merely the biases of human reporting?

**Conservation Status**: Whale Sharks are not protected under Venezuelan law nor is there any conservation plan proposed for this species. Our records show that this species can be both harpooned and accidentally captured by fishers. Both intentional and accidental captures of marine mammals in Venezuela are common (Romero et al 1997). We agree with Diamond (1988) that, for conservation purposes, listing only those species that are threatened is a strategic mistake because it may mislead people into believing that others may be safely captured. Such a misconception applies particularly for Venezuela and for other areas where our knowledge of the population status of many marine species does not permit characterizing them as threatened. While they are not classified as threatened, it is extremely unlikely that they are abundant and thus, very likely, endangered.

Currently, *R. typus* is classified as DD (Data Deficient) by the International Union for Conservation of Nature (IUCN), meaning that the amount of information on this species is insufficient to make a determination of its current conservation status. In addition, on 18 April 2000, CITES rejected proposals to impose restrictions on trade in Whale Shark products (Murray 2000). Despite this ruling, the very placement of Whale Sharks on the CITES agenda shows there is concern for this species's status and the effect of fisheries and trade on its well being. It is heartening that Dr. Callum Roberts, University of York, UK has received a grant from the UK Darwin Initiative to work with the Belize Department of Fisheries, conservation organizations, and local communities on conservation strategies for migratory species such as the Whale Shark (Roberts 2000) but we are still concerned about its status, or rather its "lack of" status, on the IUCN list.

Given that we have provided evidence that this species is sometimes captured in Venezuelan waters, it continues to be fished in such countries as Taiwain and the Philippines, it is commonly considered rare by those authors who have examined its abundance (Taylor 1996; Chang et al 1997, Colman 1997), and it has a lengthy maturation period, we propose that this species should be considered vulnerable until more complete population studies may determine its precise condition both worldwide and for Venezuelan waters. In doing so, we favour the application of the Precautionary Principle (*cf.* Lauck et al 1998). Definitions of the different conservation categories according to IUCN can be found at http://www.wcmc.org.uk/species/data/species_sheets/

## CONCLUSIONS

Our results show that the number of Whale Shark records in Venezuelan waters reflect a geographical distribution for that species that is congruent with areas of high productivity. Long-term population and behavioural

studies tracking individual animals are needed to provide an accurate picture of the distribution and abundance of Whale Sharks not only in Venezuelan waters but worldwide. The results would also permit an evaluation of the efficacy of compiling and analyzing records, as we have done here, in fairly reflecting the actual spatial and temporal distribution and abundance of this fish species. Such results would permit evaluating the types of biases that are present in *ad hoc* records so that other similar compilations can be better interpreted.

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