

**Abstract**—Information on the seasonal abundance and distribution of whale sharks (*Rhincodon typus*) is largely unknown throughout range of the species. Between 1989 and 1998, three spatially and temporally intensive aerial surveys were conducted by the National Marine Fisheries Service, Mississippi Laboratories that provided information on seasonality, distribution, and aggregations of whale sharks in the northern Gulf of Mexico. Transects totaling 89,369 km were surveyed over the course of the study and a total of 119 whale sharks were counted during 81 sighting events. There was no statistical difference in the sightings per unit of effort (SPUE) of whale sharks between the eastern and western continental slope waters of the Gulf of Mexico. In the continental slope waters of the eastern Gulf of Mexico, whale sharks were more abundant during the summer than in the winter. In the western Gulf of Mexico, whale shark SPUE was significantly greater in the summer than during the fall or winter; there was no significant difference between summer and spring. There was also no significant difference in whale shark SPUE among spring, fall, and winter in the western Gulf of Mexico. Aggregations of whale sharks were seen only during the winter and summer, and there were significantly more individuals per aggregation during the summer. The largest aggregation of whale sharks observed during the study consisted of 23 individuals.

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## Abundance and distribution of whale sharks (*Rhincodon typus*) in the northern Gulf of Mexico

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Whale sharks (*Rhincodon typus*) are distributed in all tropical and subtropical marine waters of the world, with the exception of the Mediterranean Sea (Compagno, 1984). This species is considered vulnerable to extinction according to the World Conservation Union (IUCN)<sup>1</sup> partly because of a lack of information pertaining to its life history. Although the seasonality of whale sharks has been examined in two geographically discrete areas (Taylor, 1996; Duffy, 2002), no information exists for the seasonal distribution or relative seasonal abundance of this species over a broad spatial scale. The paucity of such information is probably attributable to logistical difficulties associated with collecting required data or to the expense of surveying large areas.

Whale sharks aggregate in areas of high biological productivity, and seasonal abundance of whale sharks could result from increased localized prey abundance. Whale sharks feed on a variety of organisms including invertebrates and teleosts (Compagno, 1984). Unlike basking (*Cetorhinus maximus*) and megamouth (*Megachasma pelagios*) sharks, which passively filter prey from the water column, whale sharks are capable of suction filter feeding (Colman, 1997). Although this feeding strategy enables whale sharks to capture a wider range of prey in terms of size, mobility, and diversity than other filter feeding elasmobranchs, this feeding strategy requires dense aggregations

of prey in order for whale sharks to meet their energetic demands (Compagno, 1984). Feeding aggregations of whale sharks have been reported in the Atlantic, Indian, and Pacific Oceans and specifically in the waters off Belize, Western Australia, the Galapagos Islands, Mexico, New Zealand, and Thailand (Taylor, 1996; Clark and Nelson, 1997; Colman, 1997; Eckert and Stewart, 2001; Heyman et al., 2001; Wilson et al., 2001; Duffy, 2002).

The whale shark was first described in 1828 from a type specimen collected off the coast of South Africa (Penrith, 1972). The first record of a whale shark in the western North Atlantic Ocean was not reported until 1902 and it was 1937 before this species was documented in the Gulf of Mexico (Gudger, 1939; Baughman and Springer, 1950; Breuer, 1954). Since 1937 several authors have reported sightings of whale sharks in the Gulf of Mexico (Gudger, 1939, 1941; Baughman, 1947, 1950, 1955; Gunter and Knapp, 1951; Breuer, 1954; Springer, 1957; Clark and von Schmidt, 1965; Hoffman et al., 1981; Hoffmayer et al., 2005). However, these reports are restricted to spatially discrete areas, and most are primarily anecdotal and largely based on isolated observations of few individuals. In the present study we report the seasonality, rela-

<sup>1</sup> The World Conservation Union. 2005. <http://www.redlist.org> [accessed 5 January, 2006].









