

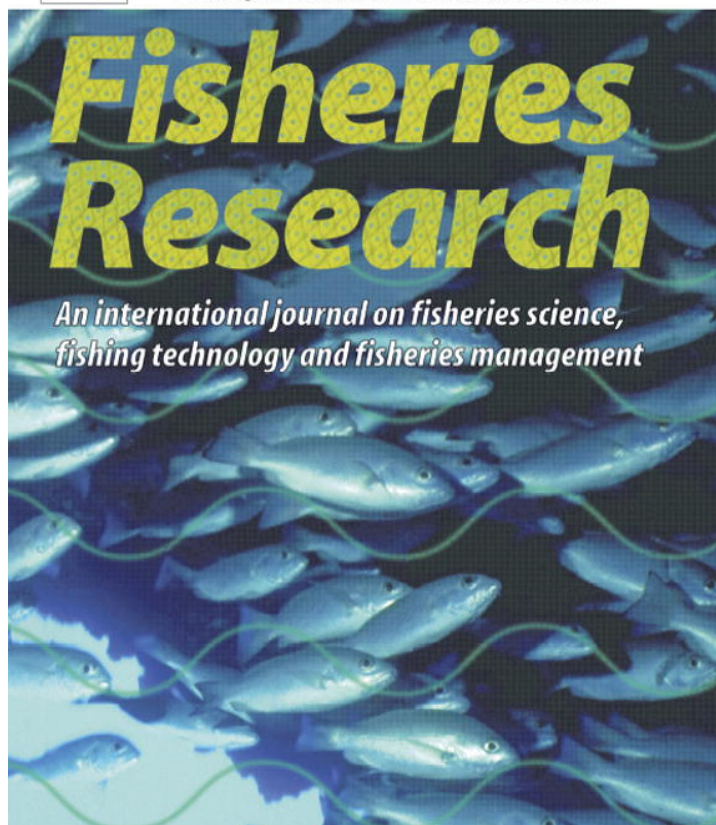
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Community-based management through ecotourism in Bahia de los Angeles, Mexico

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Abstract

In some places around the world, whale shark ecotourism has become an important economic activity. Specific cases are present in Mexico, the most important being Bahía de los Angeles, Baja California; Bahía de La Paz, Baja California Sur, both in the Sea of Cortes and near Holbox and Contoy Island, Quintana Roo in the Caribbean Sea. Observation and swimming activities with whale sharks in Bahía de los Angeles have been offered for approximately 14 years, although these activities have only recently become more popular. Several studies have been carried out, since 2001 to present economic alternatives for the people living in this coastal community based on whale shark aggregations. This bay is one of the very few known and accessible places around the world where whale sharks congregate on a regular and predictable basis. However, human-related activities, including tourism pressure may also affect the behavior of individual sharks and consequently, have a negative impact on the industry. The present study led to the implementation of a “Code of Conduct” for interaction activities with whale sharks so they could ensure a safe, enjoyable experience for participants and to prevent the animals from being harmed or disturbed. Also, it enabled the establishment of a continuous data set collected directly by the tour operators, which is updated each year in collaboration with independent researchers. The guidelines within this “Code of Conduct” have formed the basis of similar management practices in other places of Mexico, and are enforced to reduce the chance that the animals will be negatively affected through human interaction. It is concluded that community-based projects are important for long-term conservation.

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Keywords: Whale shark; Conservation; Management; Ecotourism

1. Introduction

Bahía de los Angeles is one of the few privileged places in the world where predictable aggregations of whale sharks (*Rhincodon typus*) can be observed for long periods. Bahía de los Angeles, open toward the Canal de Ballenas “Whales Channel” is considered one of the most biologically productive areas in the Gulf of California. Its localized upwelling, morphology of the bay, wind patterns and temperature of the water, make the perfect habitat for whale sharks to congregate seasonally for feeding (Eckert and Stewart, 2001; Enríquez-Andrade et al., 2003).

The high productivity of the area favors the presence of whale sharks for up to 7 months/year, from May to early December. Their presence appears to coincide with late summer increases

in zooplankton abundance (Nelson and Eckert, this volume). During the day, they can be observed feeding or looking for food near the surface of the water, very close to the coastline. They are also commonly found motionless near the surface while filtering large amounts of water.

The presence of whale sharks within the bay also represents an opportunity for the economic development of the local community. A small whale shark ecotourism industry has been developing in the last few years. Some local tour operators complement their sport fishing trips with whale shark observation. Nevertheless, the number of people interested in observing whale sharks is increasing and the current regulation schemes may be inadequate.

Due to their impressive size and docility, swimming aside a whale shark has become a coveted attraction for divers and ecotourists. Tourism involving whale sharks in Bahía de los Angeles has several advantages over other places in the world where their presence is more sporadic. Whale sharks are easily

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located near the coast using boats, avoiding the need for aerial surveillance.

Questions still remain as to where the whale sharks travel once they leave the Bay. By empirical knowledge and experience of some tour operators and fishermen of the coastal communities of the peninsula of Baja California, it is known that whale sharks congregate seasonally in different locations of the Gulf of California, such as San Luis Gonzaga Bay, Guadalupe Bay, Las Animas Bay, Loreto Bay, La Paz Bay, Cabo Pulmo and near Espiritu Santo Island. Although it is known that whale sharks follow some oceanographic patterns (physical and biological) inside the Gulf of California that are favorable for the availability of food (Nelson, unpublished), the reason why they congregate, the seasonality and density of these aggregations in the majority of these locations, is still unknown.

Whale shark conservation efforts were initiated by a group of local tour operators of Bahía de los Angeles, in response to a request for a marina. With a great vision and awareness of the potential negative impacts of the marina, the group requested a study of the current status of whale shark population from the Reserve of the Islands of the Gulf of California (RIGC),

from the Natural Protected Areas National Commission and the Autonomous University of Baja California (UABC).

In 2001, the UABC initiated a research program in Bahía de los Angeles in collaboration with the RIGC and a group of local tour operators. The basis of the study was scientific research and direct participation of local tour operators. The initial objective of the project was to present a proposal for the sustainable ecotourism of the whale shark resource; as a result a whale shark management program proposal with specific reference for Bahía de los Angeles was elaborated. These initial studies are ongoing with a focus on understanding abundance, distribution, feeding and conduct behavior and other aspects of whale sharks natural history. In addition, an analysis of the property right regime was performed (Rodríguez-Dowdell et al., this volume), in order to understand both the characteristics of the resource and the social context where it is used.

As part of the diagnosis for the management program proposal, the demand for the activity and its threats were identified. A Code of Conduct was developed and implemented in close collaboration with tour operators, with the main focus on avoiding potential damage to these animals and to increase the safety

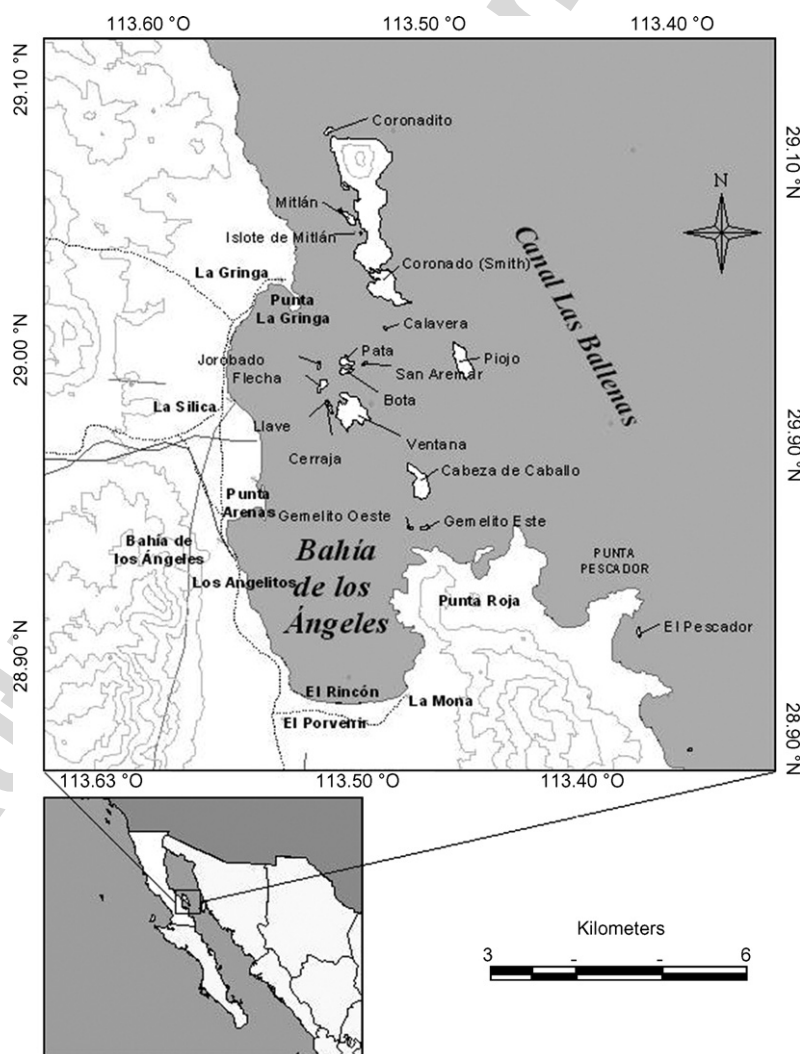


Fig. 1. Map of Bahía de los Angeles, Mexico.

of tourists. Research and conservation actions started in 2001 continues to date.

2. Methods

Bahia de los Angeles (29°00'N, 113°30'W) is located on the eastern coast of Baja California. It is surrounded by a series of small islands, located between the bay and the Canal de Ballenas "Whales Channel". The bay is 16 km long and 6.4 km at its widest point (Fig. 1).

2.1. Whale shark monitoring

Whale shark population parameters, such as relative abundance and temporal and spatial distribution were determined. Whale shark observations were made in small boats both by (1) following transects through the entire bay and after dividing the area in three major zones, and (2) navigating without following any predetermined direction but focusing most of the effort in El Rincon (southern part of the bay). Capture–recapture methods were utilized through photo-identification and the number of whale sharks was determined using Jolly-Seber estimator (Enríquez-Andrade et al., 2003). Part of the information was also provided by the tour operators during their whale shark interaction activities.

2.2. Code of Conduct and establishment of a fixed quota

To establish baseline information necessary for a Code of Conduct, an activity survey of local tour operators and field observation of ecotourism activities were performed during the 2001 season. In meetings with local stakeholders, Code of Conduct for whale shark interactions in other regions were reviewed and adapted to create a specific Code of Conduct for Bahia de los Angeles. After such meetings, tour operators made several changes to their activities and provided feedback. Two different sets of codes were developed: one for tourists and the other for tour operators or boat operators. In 2002, the Code of Conduct was implemented on an experimental level for evaluation and additional feedback.

2.3. Possible impacts presented by projected tourist developments in the bay

The main projects for tourism development (marinas and coastal infrastructure) for the region were identified. Interviews were performed to gather information on the local community's perception on such projects. A qualitative analysis of their possible impacts over the whale shark population was also performed and included the assessment of food availability for whale sharks.

2.4. Environmental education and communication

Parallel to the other parts of the project, several workshops, information meetings and visits to schools were conducted. Whale shark information was added to the environmental edu-

cation programs of the local Junior High and High School. The main topics covered included the ecology and biology of whale sharks, their conservation, management, threats and the new Code of Conduct for "best practice".

A webpage and some material for communication were also developed (<http://www.tiburonballena.com>).

3. Results

3.1. Monitoring

A minimum of 15–30 whale sharks congregate each year in Bahia de los Angeles, with an even proportion of males and females. The average size of sharks was 6 m, although sharks between 3 and 10 m were observed (Enríquez-Andrade et al., 2003).

Although sightings inside the bay are reported from May to December, they are more frequent and predictable from August to November. The spatial distribution of sightings is not homogeneous. The probability of finding a whale shark in or near the surface is much greater in four specific areas of the bay: El Rincón, Los Angelitos, south of Punta Arenas (in front of the town) and south of Punta la Gringa (Fig. 1). The probability of observing a whale shark was also greater near the coastline, the majority of the sightings (90%) are between the coast and 20 m depth (Enríquez-Andrade et al., 2003).

The size of the group also presents important inter-annual variations. Photo-identification studies carried out in the bay in 2003 and 2004 suggest that an important proportion of whale sharks returned in the latter year (Enríquez-Andrade, unpublished data). The opposite situation was presented in both 2001 and 2002, where only one shark identified in 2001 was seen in 2002 (2001: $n = 16$; 2002: $n = 12$, Enríquez-Andrade et al., 2003).

Between 2001 and 2004, an important variation in the duration of the seasons has been observed (Table 1).

3.2. Description of whale shark ecotourism activities

The activities that the tourist industry offers include whale shark observations aboard small boats, snorkeling, photography and video-recording. The time of contact with whale sharks depends on the preference and number of tourists, and whether the interaction involves snorkeling or observations from the boats. Whale shark observations are included in a multi-purpose tour, which includes sport fishing and visiting islands. The cost of the tour is US\$ 120.00 (1 USD = 10.5 mexican pesos).

Table 1
Duration of the seasons of *Rhincodon typus* in Bahía de los Ángeles (2001–2004)

Year	Duration of the seasons
2001	May–December
2002	June–September
2003	September–November
2004	August–November

Source: Enríquez-Andrade et al. (2003), Iñiguez-Hernández (unpublished) and Enríquez-Andrade (unpublished).

Most of the observation tours are conducted in the area locally known as El Rincon, approximately 15 min travel time from the tourist camps. This accessibility has led tourists to do the activity on their own boats or from kayaks. Although the demand for the activity is growing, there are a considerable number of tourists observing whale sharks independently in this way, without hiring local tour operators. Free access of the resource in this way can be eliminated by an alternative property rights strategy as analysed in Rodríguez-Dowdell et al. (this volume). This represents a significant benefit leakage, and is one of the main factors preventing proper regulation of the activity to date.

3.3. Establishment of the Code of Conduct and fixed quota

A Code of Conduct was produced following analysis of proposals offered by the local community and a detailed study of successful codes from other locations in the world. This code was formed with the objectives of preventing harm to the whale sharks, insuring their return to the bay and structuring ecotourism activity to ensure a safe and enjoyable experience for tourists. The Code of Conduct developed is as follows:

3.3.1. Code of Conduct for swimmers

- (1) Do not mount on the animal.
- (2) Do not touch its caudal fin or tail.
- (3) Do not restrict its normal movement or behavior.
- (4) Keep a distance of 1 m from its head or body and 2 m from its caudal fin or tail (Fig. 2).
- (5) Do not use your camera's flash while taking photographs.
- (6) Do not use propulsion motors to swim near the shark.
- (7) Try to slide carefully from the boat and not make a lot of noise when you enter the water.
- (8) Do not use jet sky in the area of El Rincón.
- (9) If your presence bothers the sharks, they will let you know when:
 - they speed up their swimming;

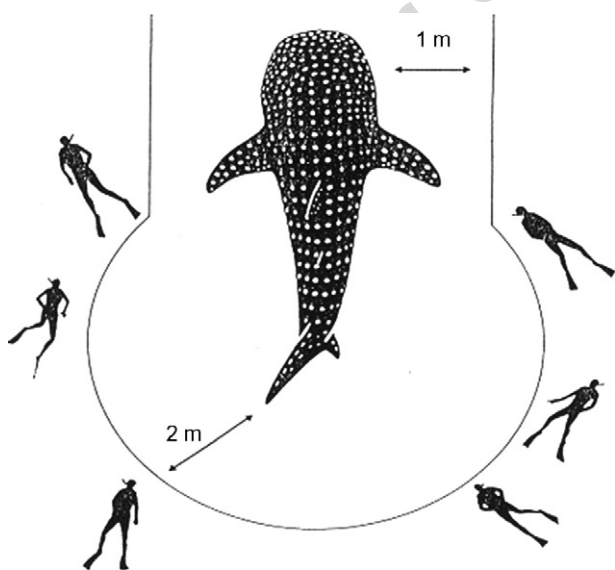


Fig. 2. Code of Conduct: safe swimming distance from whale sharks.

- they dive to greater depths;
- they move abruptly from the area.

3.3.2. Code of Conduct for tourist operators, owners and operators of boats

- (1) Observe a speed of 8 mph or lower, in the area where whale sharks are distributed.
- (2) Make sure that tourists know the recommended conduct codes.
- (3) Turn off your boat when you are at a distance of 5 m from the sharks and let the tourists swim up to them.
- (4) Do not restrict their free movement with your boat.
- (5) Only one boat is allowed per shark and four swimmers (two swimmers per side of the animal).
- (6) If in the area there is more than one boat, wait until the first one to arrive finishes its activities and give it a lapse of 15 min. During that time wait at a distance no less than 10 m or find another shark.

In general, industry and government accepted the application of the Code of Conduct well. In 2003, these codes were formally incorporated in the permits for 'non-extractable use of the species'.

Following the introduction of the fixed quota per tour (\$20 USD per person), tourist operators have been encouraged to exclude whale shark observation from the multi-purpose trips, so a net profit from the activity is being generated. However, the variation in the whale shark season has made it difficult to promote whale shark ecotourism and has reduced the economic benefit from the activity.

3.4. Threats

In Bahía de los Angeles, the main threat for whale sharks is lack of protection of their habitat (Rodríguez-Dowdell et al., 2003), which increases the vulnerability of the area to developments, such as the "Nautical Stairway of the Sea of Cortes" promoted by the Federal Government, that plans to build a nautical development in the region. This development has the potential to cause important modifications in the coastline, which may affect the current circulation and erosion of some areas, as well as pollution and an increase of boat traffic.

The "Sea of Cortes" project has previously proposed initiatives with a Nautical Center suitable for either 1000 boats (version, 2001) or a Nautical Scale for 100 boats (version, 2002) for Bahía de los Angeles. However, the official version of the project is still unknown. Until more information is available it would be difficult to predict the negative impacts that this project would cause to the bay and to the whale sharks. Although some regulation measures have been brought about, whale shark observation activities in Bahía de los Angeles is carried out practically without restrictions. In recent years, the number of foreign enterprises that offer trips to the bay to observe whale sharks has increased dramatically. In some instances, tourist vessels have been disguised as scientific research vessels. Foreign enterprises compete with local tour operators, taking a greater proportion of the benefits.

Consequences of the increase in tourists interested in observing the whale shark are already evident. Of the approximate 30 whale sharks observed through 2001–2004, more than 50% had fresh injuries or scars caused by their encounters with vessels, the most common being wounds caused by boats that sail at high speeds through out the feeding areas of the whale sharks.

4. Discussion

The strategy that has been implemented in Bahía de los Angeles, Mexico, has been positive to some extent, due to the participation of different sectors like the Government (Direction in Baja California of the Flora Protection Area and Fauna Islands of the Gulf of California), academic faculties (Faculty of Marine Sciences of the Autonomous University of Baja California) and the local users of the resource. These groups continue to work together to seek a proper regulation of the ecotourism activities focused on whale sharks.

At present, a Whale shark Management Program is being progressed on the national level. This program aims to regulate whale shark observation activities more effectively, both in Bahía de los Angeles and other regions in Mexico; answering key questions such as the capacity to charge tourists and operators and to determine specific whale shark observation areas. The program with specific reference to Bahía de los Angeles (Rodríguez-Dowdell et al., 2003), incorporates the Code of Conduct presented here, and has served as basis to actions carried out after the project ceased in December 2002. The Code of Conduct developed in this study has also been utilised by tour operators in other parts of the country.

From the information obtained during the first 2 years of field work and as a result of negotiations with the federal government, permits for non-extractable use of whale sharks were granted to local tour operators. Details of this permit allocation, and the national regulation program which resulted, are given in Rodríguez-Dowdell et al. (this volume).

After 3 years of continuous study by the Autonomous University of Baja California (UABC) and by the Reserve of the Islands of the Gulf of California (RIGC) in Bahía de los Angeles, the local group of tour operators dedicated to whale shark observation requested a subsidy from the federal government to implement a project in 2004. The local group will be the main body responsible for continued monitoring of the species, directly participating in such efforts. This project will continue for the 2005 and 2006 seasons.

As a result of these efforts, whale sharks are recognized as a conservation symbol in the proposal for a new Natural Protected Area in Mexico, which includes the marine area of Bahía de

los Angeles. This proposal is supported in the most part by the local community. To date, the proposal has been presented to the federal government and consequently to the general public for review, a step required prior to its final decree.

There are important challenges to overcome in order to insure that whale shark ecotourism in Mexico will be sustainable and beneficial for the local communities. The continued participation of local stakeholders, and their empowerment as a group, is a key element to achieve such objectives at a national level.

5. Conclusion

The direct participation, support and co-operation of local tour operators has been a key factor in the analysis of the possible impacts of human interaction to the whale sharks, the study of whale shark behavior, and the development of a suitable and practical Code of Conduct. In Bahía de los Angeles, there is active participation in whale shark ecotourism management and conservation of the species from a significant portion of the local stakeholders, as well as tourists that take part in data collection for whale shark identification.

The monitored and appropriately managed whale shark ecotourism industry in Bahía de los Angeles, Mexico, sets a precedent for other coastal communities in Baja California, which additionally benefit from conservation of the species.

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