

Belize—a last stronghold for manatees in the Caribbean

Thomas J. O'Shea and Charles A. 'Lex' Salisbury

Belize is a small country but it offers a safe haven for the largest number of manatees in the Caribbean. The authors' survey in 1989 revealed that there has been no apparent decline since the last study in 1977. However, there is no evidence for population growth either and as the Belize economy develops threats from fisheries, human pressure and declining habitat quality will increase. Recommendations are made to ensure that Belize safeguards its manatee populations.

Introduction

The West Indian manatee *Trichechus manatus* is listed as endangered by the US Fish and Wildlife Service and as vulnerable to extinction by the International Union for Conservation of Nature and Natural Resources (IUCN) (Thornback and Jenkins, 1982). A long-lived, slowly reproducing, herbivorous marine mammal, the West Indian manatee inhabits coastal waters and slow-moving rivers of the tropical and subtropical western Atlantic. This species first became known in Europe from records made in the Caribbean on the voyages of Christopher Columbus (Baughman, 1946). Estimating past manatee population sizes is impossible, but its relative abundance in many areas was undoubtedly once much higher than today. Historical accounts (including provisioning of manatee meat to privateers), archaeological records (McKillopp, 1985), and regional place-names including the word 'Manati' all support this assertion. Populations of West Indian manatees have been reduced, and the current distribution is now fragmented in most countries within the historical range, particularly in the greater Caribbean. The manatee's decline results largely from hunting pressure and incidental entanglement in gill-nets (Lefebvre *et al.*, 1989).

In this report we provide an update on the status of manatees in Belize. Belize is a small country and its Caribbean coastline is not

extensive (Figure 1): straight-line distance from the Rio Hondo at the northern border with Mexico to the Rio Sarstoon at the Guatemala boundary is about 290 km. However, studies reported 10–20 years ago suggested that manatee populations may have been high in Belize relative to other Caribbean-bordering countries (Charnock-Wilson, 1968, 1970; Charnock-Wilson *et al.*, 1974; Bengtson and Magor, 1979). Despite Belize's possible importance for manatees, additional status surveys have not been attempted there since 1977 (Bengtson and Magor, 1979). We made aerial counts of manatees over selected areas in May 1989, and discussed manatee status with locally knowledgeable residents. This report summarizes our findings, compares manatee status in Belize with status elsewhere in the Caribbean, and offers recommendations for manatee conservation.

Survey methods

Aerial surveys were flown in a small, four-seater helicopter. A total of 6.5 h was spent searching, concentrating over five areas where manatees were expected to occur based on local knowledge and the single 1977 survey by Bengtson and Magor (1979). These regions were: Four Mile Lagoon and the New River in northern Belize; the lower Belize River from Burrell Boom to Belize City; cays offshore near

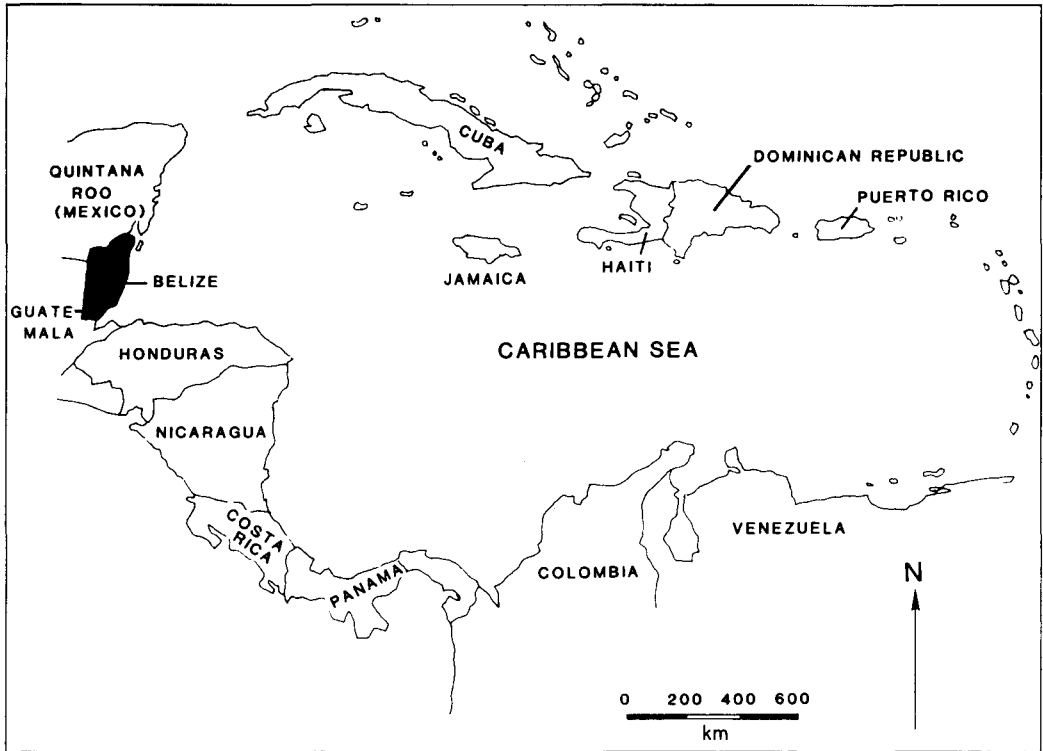


Figure 1. The Caribbean region. Belize is shaded. See Table 2 for a review of manatee survey results in other nations in this region.

Belize City; Northern and Southern Lagoons near the central coast; and the Placentia

Table 1. Aerial counts of manatees in Belize by water-body, May 1989 (this study) and September 1977 (Bengtson and Magor, 1979). See Figure 2 for general locations of these areas and text for cautionary remarks on comparing manatee survey data. c=small calves, NS= not surveyed

Area	May 1989	September 1977
Four Mile Lagoon (near Rio Hondo)	1	NS
Four Mile Lagoon and New River	7+1c	12
Belize River (Burrell Boom to Belize City)	16+2c	2
Offshore cays near Belize City	10+1c	12+2c
Placentia Lagoon region	8+1c	10+1c
Southern Lagoon	55	31+4c

Lagoon area on the south-central coast (Figure 2). Rivers were surveyed by flying directly above them, coastal areas and cays were flown about 0.5 to 1.0 km offshore, and open lagoons were flown along transect courses about 0.5 km apart. (Detailed maps of survey routes are on file with the authors, the Belize Center for Environmental Studies and the Belize Ministry of Agriculture, Forestry and Fisheries.) Manatees were noted as calves or adults, with calves defined as small individuals less than about 2 m in length closely associated with an adult. An altitude of 100 m and flight speeds of 100–130 km/h were maintained during searches. Speed and altitude were altered when manatees were initially sighted in attempts to count as many individuals present as possible. Two observers recorded sightings from each side of the aircraft. Although surveys were scheduled at the end of the dry season to avoid muddy run-off, we rated visibility conditions during our flight as ‘fair’: light

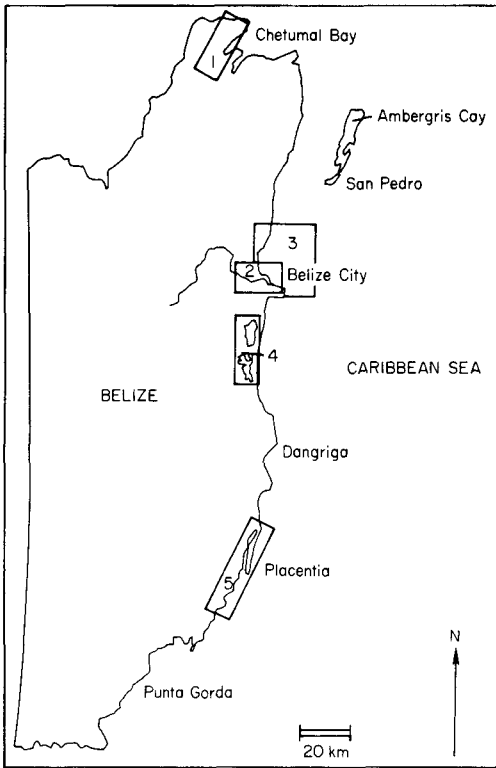


Figure 2. Map of Belize. Aerial survey regions correspond to numbered boxes as follows: (1) Four Mile Lagoon and lower New River, (2) lower Belize River, (3) waters and cays off Belize City, (4) Southern Lagoon, (5) Placencia Lagoon.

breezes predominated, with gusts to 18–33 km/h; water surface states varied from flat to a Beaufort scale of 3; and water was turbid in unsheltered expanses.

Unfortunately, acceptable techniques to derive statistically based population estimates from manatee aerial survey data have not yet been fully developed or applied anywhere in the world (Packard, 1985a; Packard *et al.*, 1985; O’Shea, 1988). In addition, the 1977 survey results are also not strictly comparable with the present findings because the latter study was flown in fixed-wing aircraft during the month of September, and included different observers working under different conditions (Bengtson and Magor, 1979). However, aerial counts are of value for qualitative assessment of manatee abundance and conservation needs, particularly if corroborated by informa-

tion from locally knowledgeable individuals. In addition to aerial surveys, we conducted interviews with residents and made boat trips to offshore cays, the lower Belize River, and Southern Lagoon for reconnaissance of manatee habitat.

High counts of manatees in selected areas

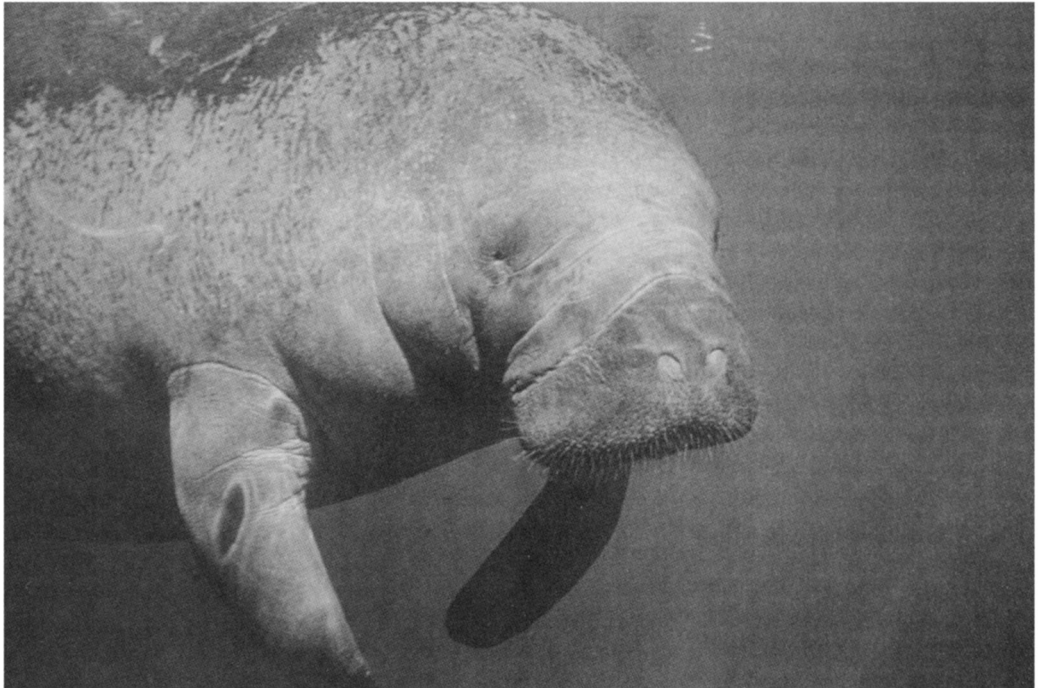
A total of 102 manatee sightings (including five calves) was made in 5.4 h of search time (Table 1), excluding a preliminary 1.1-h survey of Southern Lagoon, which we surveyed twice. By far the greatest concentration was in the area of Southern Lagoon, where we counted 55 manatees in a single survey despite less than optimal visibility. None was observed by air in nearby Northern Lagoon. Manatees were also observed in the channels between Southern Lagoon and the Caribbean, some apparently travelling in from the sea. Water turbidity and large mud plumes raised by adults may have obscured calves from view in Southern Lagoon, accounting for a lack of calf sightings in this body of water. Excluding counts from Southern Lagoon because of the probable strong visibility bias, five of 47 sightings (10.6 per cent) in Belize were calves. The frequency distribution of group sizes for all aerial observations was (number of observations in parentheses): one (43), two (9), three (6), five (2), six (1), and seven (1).

Status in Belize compared with other areas

The number of manatees observed in selected areas of Belize was the highest for any aerial survey conducted in the Caribbean region (Table 2). Comparison of numbers seen on our flights with those seen during the 1977 survey (Table 1) gives no evidence for any recent decline, although such comparisons are qualitative and provisional (due to differences in observers, aircraft, and other survey conditions). The proportion of calves we observed parallels the 7 per cent reported for a healthy,

Table 2. Maximum counts of West Indian manatees from various parts of the Caribbean region. Populations are thought to have been reduced from historical levels throughout the range. The Lesser Antilles are not thought to harbour resident populations and have not been surveyed by air

Country/region	Maximum count	Remarks	Reference
Belize	102	Maximum based on single surveys of five areas in 1989 that were not comprehensive for the entire country. Survey path approx. 375 km	This study
Colombia	None available	No aerial counts have been attempted. Sightings along the Caribbean are rare in comparison with reports from large rivers and their estuaries	Lefebvre <i>et al.</i> (1989)
Costa Rica	None available	No recent attempts at aerial counts. Although favourable habitat is present, the manatee is thought to be one of this country's rarest animals	Lefebvre <i>et al.</i> (1989)
Cuba	None available	Areas where manatees are thought to be locally abundant have been documented through status interviews, but no aerial surveys have been reported	Estrada and Ferrer (1987)
Dominican Republic	41	Maximum count based on six bimonthly entire coast aerial surveys in 1977. Survey path approx. 825 km	Belitsky and Belitsky (1980)
Guatemala	None available	No comprehensive aerial survey has been conducted. A sighting of one manatee was made during a 6-h aerial survey in 1976	Lefebvre <i>et al.</i> (1989)
Haiti	8	Maximum count based on one entire coast aerial survey in 1982. Survey path approx. 1100 km.	Rathbun <i>et al.</i> (1985)
Honduras	11	Maximum count during one entire coast aerial survey in 1979. Survey path approx 875 km.	Rathbun <i>et al.</i> (1983)
Jamaica	13	Maximum count based on 13 entire coast aerial surveys in 1981–82. Survey path approx. 675 km	Fairbairn and Haynes (1982)
Nicaragua	None available	No aerial counts have been completed, but excellent manatee habitat persists	Lefebvre <i>et al.</i> (1989)
Panama	24	Maximum count for separate river systems surveyed in 1987 in Bocas del Toro province, assuming no interchange and no duplicate counting. Panama Canal system not included. Caribbean coast surveyed to Ustupo. Survey path 1100 km	Mou-S. <i>et al.</i> (1990)
Puerto Rico	62	Maximum count based on 12 monthly entire coast aerial surveys in 1984–85. Survey path approx. 575 km	Rathbun <i>et al.</i> (1986)
Quintana Roo, Mexico (excluding Bahía de Chetumal near Belize border)	6	A total of 16 sightings were made in 22 hours of searching during eight separate surveys in 1987–88. Survey path approx. 800 km	Colmenero-R. <i>et al.</i> (1988)
Quintana Roo, Mexico: Bahía de Chetumal area	49	A total of 251 sightings were made in 21.5 hours of searching during seven separate surveys in 1987–88. Survey path approx. 250 km	Colmenero-R. <i>et al.</i> (1988)
Venezuela	0	None observed along entire Caribbean coast in one aerial survey in 1986; absence corroborated by status interviews. A few reports of sightings continue to come from Lake Maracaibo. Survey path approx. 1600 km	O'Shea <i>et al.</i> (1988)



The West Indian manatee (*Trichechus manatus*) (J. P. Reid/US Fish and Wildlife Service).

growing subpopulation in Florida's Crystal River (Rathbun *et al.*, 1990). From this we surmise that manatees in Belize have no apparent problems in reproduction and recruitment. None of the manatees we observed by air had any visible propeller scars, as are commonly observed in Florida. Seven manatees (including three calves) observed within 30 m by boat in the Belize River were also free of scars. Accounts of manatees being struck by boats are rare in Belize, and the effects of boat traffic on manatees in most areas of this country are not likely to be as serious as in Florida.

Manatee exploitation and protection in Belize

Manatees are fully protected in Belize under the Wildlife Protection Act No. 4, 1981, and were originally afforded such status during the colonial period with the Manatee Protection Ordinances, 1935–36 (McCarthy, 1986). Despite official protection, some illegal

killing continues. General knowledge of manatees being intentionally killed in the areas of Ambergris Cay, Dangriga and Punta Gorda was reported to us from several sources. Fishermen near Southern Lagoon were said to occasionally bludgeon manatees to death following incidental entanglement in fishing nets. Manatee meat is not openly sold but is at least occasionally available illicitly, as was reported for markets in Corozal. Pendants and scrimshaw made of manatee bone are sometimes sold to tourists on Ambergris Cay, but sellers claim bones are from manatees found dead. However, sale of such products may fall under the ban provided by Part II, Section 8 (1) of the Wildlife Protection Act No. 4, 1981.

The greatest potential economic value of manatees could lie in their tourist appeal. Tour groups have recently included nature trips to Southern Lagoon to observe manatees from small boats, and tourists sometimes visit the lower Belize River in search of manatees. Residents have fed wild manatees from their boats in the lower Belize River, suggesting that

without strong hunting pressure some manatees have lost their fear of man and have become relatively tame. In Florida, thousands of tourists visit manatee refuges to see relatively tame, free-ranging manatees each year. This tourist attraction contributes millions of dollars to local economies.

We encountered a high level of awareness about manatees and their protected status among residents of Belize. Perhaps this is because manatees are relatively common, but much credit may also be due to the education efforts of Belizean conservation groups including the Belize Audubon Society, Belize Center for Environmental Studies, and the Belize Zoo. The Zoo's manatee conservation education efforts are to our knowledge the strongest of any local organization in the Caribbean region.

Our survey resulted in the highest manatee count yet obtained anywhere in the Caribbean (Table 2). We believe this clearly demonstrates that Belize remains one of the last strongholds for this species in this part of the world. This

conclusion is bolstered by findings that in Mexico's Yucatan Peninsula recent counts of manatees were negligible except for the region near the Belize border (Table 2; Colmenero-R. *et al.*, 1988), and that our counts were surprisingly similar to those obtained during 1977 (Table 1). Despite uncertainties in comparing such data, we find no basis to suspect any drastic changes in manatee population status in Belize over the past 12 years. The proportion of sightings that were calves in areas exclusive of Southern Lagoon, a low level of reported illegal killing, and a common awareness of manatees as part of the local fauna also support this conclusion.

Habitat quality and low exploitation explain status

Why does Belize remain one of the last strongholds for manatees in the Caribbean? The answer lies in both the high quality of habitat and low level of killing. The promotion



Mangrove islands (cays) along nearshore areas of Belize provide sheltered habitat for manatees and sea-grass.

of these two factors would not only serve to maintain the positive status of manatees in this country, but would allow a source for natural repopulation of other countries in the Caribbean. The second longest coral reef in the world extends most of the length of the Caribbean shores of Belize. The shallow, sheltered waters between the mainland and the reef are dotted with mangrove islands and are well-vegetated by extensive sea-grass beds that serve as manatee forage. Along the mainland there is good access to a number of rivers, creeks and lagoons, which provide other plant species as forage and serve as sources of freshwater. Throughout their range manatees are most often encountered where freshwater is available, which they seek out to drink (Lefebvre *et al.*, 1989). Southern Lagoon has a well-known upwelling freshwater spring. Freshwater availability in the lower Belize River may also attract manatees.

The character of Belize's coastal habitat has also guided historical factors that have slowed the rate of exploitation of manatees and other natural resources. Lack of a deep-water port dampened economic expansion, export of resources, and human population growth. The low number of people living in Belize has resulted in maintenance of high quality habitat, a low level of intentional manatee hunting, and only a minor gill-net fishery. Gill-netting in rivers is illegal. We seldom saw gill-nets anywhere during our aerial surveys and boat trips in Belize. Incidental entanglement of manatees in gill-nets and their subsequent killing is a major factor impacting manatee populations elsewhere (Lefebvre *et al.*, 1989).

The need for future manatee conservation in Belize

The population status of manatees in Belize is unique to this region of the world, yet without vision for the future this current stronghold can easily be eroded. Although our survey gave no evidence for a decline since the 1970s, there is also no evidence of population growth. Manatee population dynamics are such that the intrinsic rate of increase is proba-

bly less than 5 per cent (Packard, 1985b). One calf is born every 2–5 years, and typical age at sexual maturity may be 7 or 8 years. These kinds of vital statistics indicate that any substantial increase in the current low level of take in Belize could result in a manatee population decline. Increased take could result from greater use of gill-nets, particularly in rivers and inshore or nearshore lagoons; increased settlement and human population growth in areas supporting manatee populations, particularly by immigrants from countries with a greater tradition of manatee hunting and use as food; and from decreases in habitat quality, particularly with respect to increased boat traffic and contamination. Without doubt, as Belize advances in development these factors will increase. We therefore offer the following recommendations as possible means to safeguard manatee populations in Belize.

1. *Maintain the West Indian manatee as a protected species as currently provided under the Wildlife Protection Act of 1981.* Legal protection undoubtedly contributes to the species's healthy survival in Belize. Removal of protection would be tragic because the manatee is in jeopardy everywhere else in the Caribbean where its status is known.

2. *Maintain and increase manatee conservation education efforts, and enforcement of laws regulating manatee hunting and gill-netting of fishes in rivers.* Continued enforcement of laws, maintenance of a developing manatee conservation philosophy, and restrictions on gill-netting (the largest source of manatee mortality elsewhere in the Caribbean) are imperative to perpetuating Belize as a last stronghold for this species.

3. *Designate areas known to be well-used by manatees as manatee protection reserves.* Specific areas well-used by manatees should be managed to benefit the species. Existing marine reserves do not encompass such areas. Settlement near shoreline, boating activity, and gill-netting should be strictly guarded against in manatee reserves, with law enforcement and manatee conservation education programmes targeting neighbouring communities. Small supervised nature tours, however,

should be encouraged. One of the most important candidates for a manatee reserve is the Southern Lagoon system. The upwelling of freshwater in Southern Lagoon may be a major resource for manatees, which probably travel into the lagoon from much wider areas along the coast. The number of manatees gathering in this lagoon may be unmatched anywhere in the Caribbean, Central or South America. Future research efforts should use radiotelemetry and additional aerial surveys to focus on how and why manatees use this area. Based on the manatees' ability to quickly travel long distances in Florida (Reid and O'Shea, 1989), it is likely that individuals using Belizean waters also travel to nearby countries, or are drawn to Belize from other areas because of favourable conditions. Research investigating this possibility would clarify just how critical Belize is as a last stronghold for this species in the greater Caribbean.

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- Thomas J. O'Shea. Sirenia Project, US Fish and Wildlife Service, National Ecology Research Center, 412 NE 16th Ave., Gainesville, Florida 32601, USA.
- Charles A. 'Lex' Salisbury, Lowry Park Zoological Garden, 7530 North Boulevard, Tampa, FL 33604, USA.