

PARTIAL SURVEY OF SEA TURTLE
NESTING SITES IN BELIZE

by

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METHODS

Using a local sailboat for the survey, provided at no cost by Jim Beveridge of the Belize Audobon Society's Reef Preservation Committee, known sea turtle nesting beaches throughout Belize as listed in Perkins, 1983 and Wats, 1984, were ground surveyed for nesting activity by volunteer workers with experience from the Sea Turtle Beach Patrols just concluded on Ambergris Caye. The survey was begun on 3rd September and ended on 24th September, having ground surveyed most known nesting beaches except for those in the Lighthouse Reef and Glovers Reef atolls. Fishermen, watchmen, and local residents were interviewed throughout this survey to gather information on possible nesting sites and general knowledge of sea turtles in Belize. Interviews were conducted informally without recordings or notes, to encourage openness, then written down later.

RESULTS

Fourteen sea turtle nesting sites surveyed were found to have nesting activity (see Table I). Ambergris Caye had the most nesting activity of the sites surveyed, with approximately 50 loggerhead nests, 8 green turtle nests and possibly one hawksbill nest. One other site surveyed showed evidence of green turtle nesting, but only two nests were observed. Loggerhead nesting was also only found at one other site, South Water Caye. However, it is possible that nesting by loggerheads had occurred, but was missed due to nesting having begun in May, while most sites were not surveyed until September. Hawksbill turtles were found to use all of the sites surveyed. Due to difficulty of finding hawksbill nests the total number of nests is uncertain. However, as the reports came from persons who were at the sites when the crawls occurred, it is believed that the number of nests reported, 67 - 69, is at least a reliable indication of numbers of crawls if not actual nests.

Ten of the sites were inhabited when surveyed and poaching of eggs and/or nesting turtles was observed or reported at all ten sites. The remaining four sites had evidence of use by campers, fishermen, coconut pickers, and picnickers, and had poor or fair beach quality with small nesting areas.

TABLE I

Sea Turtle Nesting Sites in Belize Confirmed
by Ground Survey 1989¹

<u>Site</u>	<u>Beach Quality</u>	<u>Human Activity</u>	<u>Sea Turtle Activity</u>
1. Ambergris Caye	Fair	Inhabited Poaching Beach Patrol ²	Green - 8 nests Loggerhead - 50 nests (2 disturbed) Hawksbill - 1 nest
2. Northern Bogue	Good	Inhabited Poaching	Green - 2 nests (both disturbed) Hawksbill seen on beach in past
3. Tobacco Caye	Good	Inhabited Poaching ³	Hawksbill - 1 nest (disturbed)
4. South Water Caye	Excellent	Inhabited Poaching ⁴	Loggerhead - 2-3 crawls/nests Hawksbill ⁵ - 4 crawls/nests
5. Long Coco Caye	Poor	Uninhabited Private property	Hawksbill - 24 false nests 1 nest
6. Queen Cayes (3) (Silk Cayes)	Excellent	Inhabited Campers/ fishermen	Hawksbill - 1-3 reported nests none observed
7. Round Caye	Fair	Usually uninhabited Campers/ fishermen	Hawksbill - 3 reported nests none observed
8. Pompion Caye (Pumpkin Caye)	Good	Inhabited Poaching ⁶	Hawksbill - 7 reported nests 4-7 body pits observed
9. Ranguana Caye	Excellent	Inhabited Poaching ⁷	Hawksbill - 10 reported nests 7-10 body pits observed
10. Northeast Caye	Poor	Often inhabited Campers/ picnickers	Hawksbill - 15 false nests 2 probable nests
11. Frank's Caye	Poor	Often inhabited Fishermen/ picnickers	Hawksbill - 34 false nests

Site	Beach Quality	Human Activity	Sea Turtle Activity
12. Nicolaus Caye	Good	Inhbitied Poaching	Hawksbill - 10 reported nests (most disturbed) 3-5 body pits observed
13. Hunting Caye	Excellent	Inhabited Poaching	Hawksbill - 14 reported nests (disturbed) 8-10 body pits observed egg shell found
14. Placencia peninsula (Placencia to Seine Bight)	Excellent	Inhabited Poaching	Hawksbill - 15 crawls, attempted poaching of many body pits observed

NOTES:

1. Ground surveys of Ambergris Caye were conducted between 1st April and 2nd September, 1989. All other surveys were conducted between 3rd and 24th September, 1989.
2. A daily beach patrol by volunteers to report and discourage poachers in the Robles Pt. and Rocky Pt. area was conducted from 14th May through 20th August.
3. It is possible this turtle was taken while nesting or immediately after.
4. Two loggerheads were turned by watchman but subsequently released by a tourist paying \$50 each.
5. One hawksbill fell into a well but was released the next day.
6. One female hawksbill was observed turned on the beach, probably caught immediately after nesting complete.
7. The shell of a hawksbill was found offshore Ranguana Caye which appeared to have been dumped there in August.
8. Turning of nesting turtles reported and slaughtered juvenile hawksbill observed in fisherman's dorey.

Interviewing local residents, primarily fishermen, provided unexpected and valuable information about sea turtles in Belize. Twenty-three interviews were conducted, primarily with fishermen from their early 20s to 80s (see Table II) who lived at the sites surveyed and knew many sites not surveyed.

TABLE II

List of Persons Interviewed

<u>Name</u>	<u>Age</u>	<u>Occupation</u>	<u>Location</u>
1. Two Silk Snapper	30-40 20-30	Fisherman	Northeast Turneffe
2. Two labourers	20-30	Watchman 30-40	Northern Bogue Pier builders
3. Watchman	50-60	Watchman Labourer	Calabash Caye Turneffe
4. Watchman	16-20	Watchman	Hattie Jones Bogue, Turneffe
5. Two fishermen diving	20-30 30-40	Fishermen	Hattie Jones Bogue, Turneffe
6. Wally (Garbutt?)	40-50	Fisherman	Northern Bogue, Turneffe
7. Nolan Jackson	60-70	Fisherman	Tobacco Caye
8. Lincoln Westby	50-60	Fisherman Tourist guide	South Water Caye
9. Watchman	50-60	Fisherman	South Water Caye
10. Junior (Westby?)	20-30	Fisherman Watchman Tourist guide	South Water Caye
11. Paul Westby	40-50	Fisherman	Pumpkin Caye (Pompion)
12. Lester Garbutt	60-70	Lighthouse Keeper Fisherman (turtle)	Hunting Caye
13. Mrs. Garbutt	50-60	Wife of fisherman (turtle) whose family is devel- oping Nicolaus Caye	Nicolaus Caye
14. Herbert Eiley ?	80s	Fisherman (turtle)	Placencia

<u>Name</u>	<u>Approx. Age</u>	<u>Occupation</u>	<u>Location</u>
15. Lawrence	20s	Fisherman? Egg poacher	Placencia
16. Watchman	50-60	Watchman	Placencia, Seine Right
17. Charlie Leslie	30-40	Tourist guide	Placencia
18. Lincoln Young	50-60	Fisherman	Placencia
19. Martin Leslie	20-30	Tourist guide Fisherman	San Pedro
20. Luce Guerrero	50-60	Tourist guide Fisherman	San Pedro
21. Severro Guerrero	20-30	Tourist guide Fisherman	San Pedro
22. Mr. Usher	50-60	Lighthouse keeper Customs Fisherman	English Caye
23. Pani Arceo	30-40	Tourist guide Fisherman	San Pedro

Fourteen nesting sites not ground surveyed were reported by fishermen during interviews (see Table III). All of the reported sites are believed to be, or have been, definite nesting sites as persons interviewed reported having personally seen nests or turtles and the same sites were repeatedly reported by different persons. Northern Two Cayes was described as having the most turtles nesting anywhere in Belize, mainly green turtles. Glovers Reef Cayes, mainly Northeast Caye, were described as an important loggerhead nesting area. The northern part of Placencia peninsula has many miles of excellent beach and reportedly has hawksbill using it. The coastal beach from Monkey River to south of Punta Negra is described as over 10 miles of excellent sea turtle nesting beach with possibly hundreds nesting, mainly loggerheads.

TABLE III

Sea Turtle Sites in Belize Reported by Local Fishermen
but not Ground Surveyed, 1989

<u>Location</u>	<u>I/U*</u>	<u>Comments</u>
1. Laughing Bird Caye	I	Hawksbill nesting. Poaching reported.
2. Tom Owens Caye	U usually	Hawksbill nesting. Very small caye.
3. Sapodilla Caye	U usually	Hawksbill nesting. Very small caye.
4. North Spot	U	Hawksbill nesting. Very small caye.
5. Lime Caye	I	Hawksbill nesting. Excellent nesting beach. Ten nests reportedly poached.
6. Northern Two Cayes	I	Green turtle nesting. Reported to have most nesting turtles in Belize.
7. Half Moon Caye	I	Green turtle nesting. Lighthouse Keeper reported 10 nests this season.
8. Long Caye, Lighthouse Reef	U	Green turtle nesting.
9. Northeast Caye Glovers Reef	?	Loggerhead. Definite nesting area but nests/season unclear.
10. Middle Caye Glovers Reef	?	Loggerhead nesting.
11. Bushy Caye Glovers Reef	?	Loggerhead, small sand bore.
12. Long Caye Glovers Reef	?	Loggerhead nesting.
13. Punta Negra	I	Loggerhead/green?/hawksbill? Definite nesting. Three nests reported in village near church. One loggerhead seen on beach. Total number unknown. Many miles of good beach.
14. Northern Placencia peninsula	I	Hawksbill.

* I/U = Inhabited/Uninhabited

The older fishermen were able to provide information about a turtle fishery in Belize for hawksbill, called oxbull then, in the 1800s until the early 1900s. The fishery was located mostly in the southern cayes.

Local fishermen would use nets placed at locations they had learned were good to catch turtles and called 'set spots' or 'sets'. Usually these spots were sleeping or resting rocks used by the turtles. Only the shells were sold, usually at Brodies, in exchange for goods at prices from \$10 to \$40 per lb., which at that time was very good money indeed. It was a large industry and supported at least two schooners based at Tobacco Caye: the Rankadora (spelling uncertain) 70' and another 60' schooner. One schooner was said to have been built on Tobacco Caye. The schooners would take local fishermen with 16 ft. cat boats on board and fish hawksbill turtles in Belize and possibly throughout the Caribbean.

Leather back are seldom seen in Belizean waters and not known to nest in Belize. Most persons interviewed called them '3 keels' or 'trunk' and none knew where they did nest. One person had once been given a 10" - 12" juvenile found near the shore.

Green turtles were usually referred to as 'turtle'. Some persons interviewed believed there were two types of green turtles seen in Belizean waters, while others made no distinction. One type was described as much bigger with green skin and called 'Mexican' turtle or 'Travelling' turtle. The other was smaller and had white skin. Green turtles were seen mating in Belizean waters on the front side of the reef and known to nest on Northern Two Cayes, Half Moon Caye and Ambergris Caye regularly, and occasionally on the southern cayes. Most green turtles in Belizean waters were believed to be migratory, arriving in November and departing in March.

Schools of 12 - 50 green turtles swimming together were reported by many persons, usually seen inside the reef, and one person reported once sighting a school of a thousand or more in the blue between Glovers and Lighthouse Reef migrating south about nine years ago. When the greens migrate in during the winter they concentrate on grassy banks about 18' deep near the Robinson Pt. area where one fisherman, Will Biley, was reported to catch 8 - 10 a week in nets. They also concentrate and are caught in the Monkey River area south toward Punta Gorda near the coast, but the numbers caught were not given. The

locations where they are caught are called 'sets' and are generally thought to be where the turtles gather to sleep during the night.

More than one type of loggerhead is also believed by some to live in Belizean waters, but considered to be the same type, only small, by others. The regular loggerhead is usually found on the front side of the reef and the 'mainland', river', or 'white eye' loggerhead is described as smaller, fatter, eating lots of conch, living near river mouths and close to the mainland, and biting or trying to bite. Loggerheads are seen mating in March through May along the outer reef and to nest at Glovers Reef, Ambergris Caye, the mainland near Punta Negra, and scattered through the cayes. They are in Belize year round, but larger numbers seem to migrate in during the mating and nesting season. Loggerheads are known to eat sponges and conch. Only medium to large loggerheads are seen in Belizean waters.

Hawksbill turtles are believed to be year round residents in Belizean waters, not migratory. They are seen mating at the same time as other sea turtles, March - May, along the outer reef and offshore some of the outer southern cayes. They nest July through September, mainly in the southern cayes nearest the reef, but also along mainland beaches. They are the most common sea turtle in Belize with many small ones on the reef and directly behind the reef. Glovers reef in particular was described as having lots of small hawksbill. The hawksbill was known to eat mainly sponges by most persons, but was also described as eating 'thimbles' in June and July when 'thimbles' became abundant.

The Kemp's Ridley was also known in Belize. One young fisherman said he had a book that helped him identify it, but he had only seen two. Many fishermen spoke of catching 'bastard' turtles and seeing mating between different species of turtles but didn't think of the 'bastard' turtle as a definite separate species.

Most fishermen thought that sea turtles nested two or three times because of seeing different stages of egg development when dressing them.

Behavioural differences were described based on differences in sleeping. The green turtles were described as sleeping together all at the same spot and crossing very shallow grass banks to reach preferred sleeping areas, called 'blue holes'. The hawksbill and loggerheads were described as sleeping alone. The hawksbill in particular was said to change its sleeping place often. One fisherman described the green turtle as sleeping with its head out ready to

escape while both the hawksbill and loggerheads were fools because they hid their heads under rocks when sleeping.

Most persons interviewed didn't see very small turtles, only dinner plate size hawksbill and greens and medium size loggerheads. Two reported having seen young turtles in drift lines of ocean weeds in the Bay of Honduras. A few also reported having seen very young turtles near mangroves at Turneffe, San Pedro and Hunting Caye.

One fisherman recalled the raising of young turtles at the primary school in San Pedro when he was a boy. He reported that some were released with tags when about 10" and that 12 years later one of those tagged turtles, a green, was caught at Glovers Reef and weighed about 40 lbs. at the time. Many fishermen had recalled the release of thousands of young green turtles in Belizean waters in the past and one man interviewed had actually participated in their release.

In the past nets had been the primary means of catching turtles, but most of the turtle fishermen had died off. A few people still used nets, but now fishermen mostly ran down turtles in their skiffs, chasing them until they tired then hooking them, caught them when diving for fish, conch and lobster, or harpooned them when they were easy to approach while mating, and both turtles could be taken if the female was the first caught.

In Placencia Village large turtles caught mainly by fishermen from Monkey River were dressed and sold locally from the beach early in the morning at \$1.00 - \$1.50 a pound. Two greens and a loggerhead were seen there upon the arrival of this survey. In San Pedro, however, large turtles are sold at \$3.50 - \$5.00 a pound mostly to restaurants for the increasing tourist trade. Small turtles, although illegal in size, are usually eaten by fishermen and are probably taken whenever possible.

One area that no one interviewed knew about was how long sea turtles lived or how old they had to be before they reproduced. Most were very surprised at the length of time when told.

The older fishermen reported definite changes in the numbers of sea turtles. Some who had been lighthouse keepers or grown up on Half Moon Caye remembered 8 - 10 nests a week, or maybe hundreds a season, or so many green turtles that they were digging up their own nests and coming up during the day. Northern Two Cayes was also thought to have had hundreds of greens nesting there then, and about 15 were seen on the beach there one night 15 or 20 years ago. The Sapodilla Cayes, especially Hunting, Niclaus and Lime, had had large numbers

of hawksbill nesting there, so many that they were also digging up each other's nests.

As the age of the fishermen decreased to 40 - 50, so did the numbers of turtles they remembered or expected to be nesting in an area. One estimate was that there were at least 100 hawksbill nests in the Pumpkin Caye, Ranguana, Sapodilla Caye area; another that there were maybe 60 on Nicolaus Caye alone.

The younger fishermen were less sure of any decrease in sea turtles. They usually would think there might be some.

When asked what they thought might be causing the decrease in number, one possible cause was mentioned repeatedly - the taking of small turtles by divers to eat. One fisherman, now a tourist guide, said he would notice a decrease in the numbers of young hawksbill on the reef after lobster season opened. Many persons thought the turtles were moving elsewhere, particularly to nest, because of the many divers and people. The taking of eggs was known to be harmful to the numbers of turtles. Even poachers who had been looking for the eggs would admit that.

More enforcement of the laws and protection of eggs, nesting turtles, and young was the only type of suggestion for stopping the decline. Few persons interviewed seemed willing to stop eating sea turtles, particularly the green turtles that migrated into Belize and didn't nest here. Two persons suggested that the Belize Defence Force should help Fisheries to protect and enforce the laws as soldiers are used to guard sea turtles in other countries like Mexico.

Throughout the survey the weather and visibility conditions were usually good for making sightings of sea turtles. Nine sightings were made during the 21 days and more than 325 miles travelled (see Table IV) but species identification was usually uncertain.

Of the twenty-five sites that were reported as nesting sites and surveyed (see Table V), ten sites had no indication of nesting activity. Four of these sites were believed unsuitable for nesting, possibly due to storm damage, and one was almost unapproachable due to sea walls, but the remaining five seemed well located with good beaches. Goff's and Sergeant's Cayes in particular looked suitable and only the presence of campers and picnickers could be found that might discourage mating.

One last finding of this survey was that hawksbill turtles were still actively nesting in September. At least five crawls were definitely made

TABLE IV

Sea Turtle Sightings During September 3 - 24
Nesting Site Survey

<u>Date</u>	<u>Location</u>	<u>Species</u>	<u>Size</u>	<u>Bottom Type</u>	<u>Water Depth</u>
1. 4 Sept.	Gallows Pt. area	?	Adult	Seagrass	8-10'
2. 5 Sept.	Cockroach Caye Bogue, Turneffe Cayes	Green?	Sub-adult	Seagrass	10-12'
3. 6 Sept.	North Bogue, Turneffe Cayes	Green?	Sub-adult	Seagrass	12-15'
4. 10 Sept.	Channel Caye area, Northeast Caye Range	?	Sub-adult	Coral and sand	8'
5. 11 Sept.	Channel Caye area, Northeast Caye Range	Loggerhead	Adult	?	100'
6. 14 Sept.	Pompion Caye area (Pumpkin Caye)	Hawksbill	Adult	Coral, sand and seagrass	30'
7. 17 Sept.	Northeast Caye of Sapodilla Cayes area	?	Sub-adult	Coral and sand	12'
8. 22 Sept.	Carrie Bow Caye area	Hawksbill or Green	Adult	Coral and sand	12'
9. 24 Sept.	Caye Caulker area	?	Adult	Seagrass near mangroves	8'

TABLE V

Reported Sea Turtle Nesting Sites in Belize, Surveyed September 3-24, 1989

Location	Description of Nesting Beach	Turtle Activity
1. Three Corner Caye	Low. Hard sand. Poor or impossible nesting site.	No crawls or nesting observed.
2. Cockroach Caye	Rocky, little sand. Poor but possible for one or two nests.	No crawls or nesting observed but reported by fisherman.
3. Cockroach Bogue	High, sandy. Good nesting site approximately 150' beach available.	No crawls or nesting observed but reported nesting by fisherman.
4. Grassy Cayes	Low, rocky, almost no sand. Unsuitable nesting site.	No crawls or nesting observed.
5. Northern Bogue	Inhabited. Sportfishing lodge, breakwater and buildings. High, sandy beach. Good nesting site but only about 300' of beach still available very close to buildings.	Two nests with broken eggs observed. Most likely green turtle eggs. One sighting of hawksbill on beach by staff. More nesting prior to development reported by local fisherman.
6. Blackbird Caye	Rocky, no sand. Unsuitable nesting site.	No crawls or nesting observed.
7. Small Bogue directly north of Hattie Jones	High, sandy, good nesting site. Approximately 300' of beach.	No crawls or nesting observed. Fisherman identified as past nesting area.
8. Calabash Caye	Inhabited. Building construction to begin soon at site. High, sandy beach. Good nesting site. 500' or more presently available.	No crawls or nesting observed but reported nesting by fishermen.
9. Sergeant's Caye	Picnickers present. Camping, picnic spot particularly on weekends. High, sandy beach. Excellent nesting site entire caye, but caye only about 200' long.	No crawls or nesting observed but previously known nesting site.
10. Goff's Caye	Campers present. Camping, picnic spot particularly on weekends. High, sandy beach. Excellent nesting site entire caye, but caye only about 200' long.	No crawls or nesting observed but previously known nesting site.

<u>Location</u>	<u>Description of Nesting Beach</u>	<u>Turtle Activity</u>
11. Tobacco Caye	Inhabited. Buildings on entire caye with most of beach protected by breakwaters. High, sandy beach but due to human development little beach available.	Local resident reported one hawksbill nest but eggs poached. Nest site observed.
12. South Water Caye	Inhabited. Blue Marlin Lodge. diving, sportfishing and private homes. North end of island is mostly protected by breakwater. High, sandy, excellent nesting area on south end.	Five to seven nests observed. Two turtles turned by watchman were purchased for release by tourists for \$150 each. Excavated hatched loggerhead nest. Hawksbill had nested on small beach at Blue Marlin Lodge in late August then fallen in well on return to ocean. Released by staff next day. Four nestings reported by staff at same site this season.
13. Carrie Bow Caye	Inhabited part year. Smithsonian Research Station. Very little beach available but possible nesting.	Nesting reported in past by research staff. No crawls or nesting observed.
14. Long Coco Caye	Private property sign. Low, much vegetation. Poor nesting area less than 100'.	One hawksbill nest found with two young still present. Twenty-four unsuccessful attempts at digging nest due to too hard sand, and many roots were observed.
15. Queen Cayes (3 cayes). Also called Silk Cayes	Campers on last caye. Used as camping/picnic and fisherman camp. Windward side rocky, leeward side high, sandy. Good for nesting. Middle caye and last caye most suitable, about 300' total nesting beach.	No crawls or nesting observed, but nesting reported by local fisherman. One to three hawksbill.
16. Round Caye	Windward side rocky. Small, sandy beach 30' on leeward side. Good for nesting.	No crawls or nests observed. Three hawksbill nests reported by local fisherman.
17. Pompion Caye (Locally called 'Pumpkin Caye')	Inhabited by fishermen (6-8). Cleared. Windward rocky, leeward sandy but coconut leaves piled along beach to hold erosion. High, sandy, good nesting site.	4-7 body pits observed. Fishermen reported 7 hawksbill nests, said did not disturb eggs. One hawksbill turned on beach waiting to become dinner.

<u>Location</u>	<u>Description of Nesting Beach</u>	<u>Turtle Activity</u>
18. Rangona Caye	Inhabited by fishermen (5-7). Island being cleared for Leslie family in Placencia. Rocky windward, leeward high and sandy. About 400' of excellent nesting beach.	Observed 7-10 body pits. Fisherman reported up to 10 hawksbill nests. Shell of mature hawksbill found in 6' of water Sept. 15. Estimate butchered 2-4 weeks previously.
19. Sapodilla Cayes, Northeast Caye	Rocky windward. Low, hard sand and roots leeward. Poor nesting beach about 300'.	Observed 2 probable hawksbill nests, one within 4 days and 15 or more abandoned nest cavities due to hard sand and too many roots.
20. Frank's Caye	Rocky windward, leeward low with hard sand and much vegetation. Poor nesting beach less than 100'.	Observed 34 attempts at digging nest cavity but no definite nests.
21. Nicolas Caye	Inhabited. Sixteen cabanas being constructed for tourist hotel. High, compact sandy beach, many coconut trees over 1000' of fair nesting beach but cabanas located very close to beach over entire island.	Observed 4 probable body pits. One undersize juvenile hawksbill observed in fisherman's dory. Ten hawksbill nests reported. Turning of nesting turtles and taking of eggs reported.
22. Sapodilla Cayes, Hunting Caye	Inhabited. Lighthouse keeper, police, British Forces (5), BDF (3), and many Guatemalan campers/picnickers, over 100 at time of visit. Excellent, high, sandy beach over 1000'.	Observed 8-10 body pits and egg shells at one pit. 14 hawksbill nests all poached reported by lighthouse keeper.
23. Lime Caye (Low Caye)	Inhabited. Fishermen (10), police officer, many campers and picnickers, mainly Guatemalan. Excellent, sandy beach for nesting.	Did not ground survey. Hawksbill had nested Sept. 15, probably turned by fishermen and eggs poached. About 10 nests, all hawksbill reported by lighthouse keeper.
24. Sapodilla Caye	Small, sandy caye. Excellent beach for nesting. Used by campers and picnickers.	Did not ground survey. Nesting reported by lighthouse keeper but number unknown.

25. Placencia peninsula	Inhabited villages, houses, hotels. Many miles high, sandy beach. Concentration of people in Placencia and Seine Bight.	Fifteen probable hawksbill crawls observed from Placencia Village to Seine Bight. Rest of peninsula not surveyed. Four crawls were fresh, being made on Sept. 19 and 20. The body pits of most nest cavities had been disturbed. A poacher told us he had tried to find the eggs but hadn't located them. Hawksbill were reported to nest along the peninsula further north of Seine Bight by another poacher who also said he hadn't found the eggs of the crawl he checked.
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CONCLUSIONS

The purpose of this survey was to learn more about the status of sea turtles in Belize, particularly about their nesting sites, which are vital to the maintenance of sea turtle populations and very vulnerable to poaching, predators and development.

No greater amount of nesting activity was found at any single site than that on Northern Ambergris Caye, but if the islands of the outer reef from Queen Caye to Sapodilla Caye are thought of as one nesting area for hawksbill turtles, then this area is as important. Also, four other areas with the possibility of similar importance were identified; they are Northern Two Cayes for green turtles, Glovers Reef for loggerheads, Placencia peninsula for hawksbill, and mainland beaches north and south of Punta Negra for loggerhead and hawksbill.

A very important fact, learned by this study, is that humans and sea turtles both prefer sandy beaches, resulting in almost all of the nesting sites being inhabited and having poaching of eggs, catching of nesting females, and/or decrease of nesting habitat through breakwaters and buildings. On Ambergris Caye beach patrols by volunteers were begun to discourage poachers this year, which proved successful, but the other inhabited nesting sites which are utilized primarily by hawksbill turtles suffered from poaching. The cayes utilized by the hawksbill are small and if inhabited by poachers almost no eggs or nesting females will escape. As the main nesting cayes are inhabited and poaching was reported

on them, it is possible that the turtles that nest there are endangered. Few nesting sites are known for hawksbill turtles in the Caribbean and therefore the importance of the hawksbill nesting sites found in the southern cays and mainland increases the need to protect these sites. Also, the fact that hawksbill turtles are believed to live in an area year round and not migrate means that Belize cannot expect replenishment of hawksbill from foreign stock, and this further increases the need to protect these nesting sites.

The hawksbill population in Belize is also threatened by the illegal capture of juveniles by fishermen, particularly lobster divers. With over 3,000 licenced fishermen in Belize and the lobster season lasting 8 months, it is very possible that large numbers of hawksbill are being taken.

The population of nesting green turtles has definitely declined on Half Moon Caye but it is possible that significant numbers still nest on Northern Two Cayes. This needs a ground survey, especially as development of a resort has recently begun there. Most of the green turtles in Belizean waters are believed to have nesting areas outside of Belize. These green turtles migrate into Belizean waters, usually arriving in November and departing in March. At this time schools of them are sometimes seen of from 6 to 50 swimming together. Some very large green turtles are caught during this time that are believed to originate from Mexico and are called 'Mexican' turtles.

The loggerheads are believed to be year round residents in Belizean waters but increases in their numbers are noted during the mating and nesting season. That they do migrate, however, is suggested by the capture of tagged loggereads. More invedestigation is needed into the possibility that two types of loggerheads are present. One possibility is that the smaller loggerheads could be Kemp's Ridleys.

Mating of all three species - hawksbill, green and loggerhead, occurs in Belizean waters, usually March, April and May, and at this time they can be easily approached and caught as the season does not close until June.

Hawksbill populations in Belize once supported a large fishery for their shell, but their numbers have declined significantly since then, although juvenile hawksbill are now the most commonly seen sea turtle along the barrier reef.

RECOMMENDATIONS

The major need evidenced by this study is the need for protection of mating and nesting sea turtles and their nesting sites. The laws now in effect do not adequately protect mating sea turtles in Belize, which were found to mate in March, April and May, when the turtle season is open and their natural fear of boats and man is disrupted by their mating drives. Sea turtles were also found to still have significant nesting activity in the case of hawksbill when the season opens in September. The closed season would need to be extended in order to protect mating and nesting sea turtles in Belize.

The laws do prohibit the taking of nesting sea turtles and their eggs but it was found that their violation was a serious threat to sea turtles in most places where sea turtles nest. Education of the people living at the sites where the turtles nest is vital in conjunction with patrols to ensure that nesting turtles and their eggs are not disturbed. Such patrols might be conducted by volunteers on Placencia Peninsula and in the Sapodilla Cayes, particularly Nicolaus, Hunting, Lime and Sapodilla Cayes. Patrols by police officers and BDF forces presently there could be encouraged.

The Sapodilla Cayes in particular are excellent nesting sites for the hawksbill but receive a great deal of use by campers and picnickers, a great many of them from Guatemala. Presently there are no steps being taken to ensure that these campers do not camp on the nesting beaches, which will certainly deter nesting turtles from those sites. Formation of a Marine Reserve to regulate the use of the Sapodilla Cayes in a manner that allows continued use by sea turtles and visitors is needed. Created with the concept of a 'Peace Park' to ensure use to Belizeans and all foreign visitors alike, a Marine Reserve could have good effects for the nesting sea turtles and Belize's relations with its neighbours.

Further surveys are also needed to determine the importance of fourteen nesting sites not ground surveyed but reported by local fishermen to be nesting sites, particularly Northern Two Cayes.

How to deal with the problem of illegal taking of juvenile hawksbill is not clear. Greater enforcement of the laws will help but would require many more enforcement officers. Education of the public, particularly fishermen, about the status of the sea turtles (particularly hawksbill) would help, but it is a long-term and slow solution.

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