Whale Shark *news*

Funded by the UK Darwin Initiative

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Research and conservation of whale sharks and reef fish spawning aggregation in Belize

Following the discovery in 1998 that whale sharks visit Gladden Spit every spring to feast on snapper spawn, The University of York teamed up with the Nature Conservancy, the University of South Carolina and the Department of Fisheries to investigate the biology and ecology of whale sharks and reef fish spawning aggregations off the Belize Barrier Reef. The UK Darwin Initiative is co-funding a project which aims to:

- Estimate the population structure, abundance and variability of whale sharks occurring on the Belize Barrier Reef
- Determine site fidelity and migratory patterns of whale sharks in Belize in the context of fish spawning aggregations
- Elucidate whale shark foraging behaviour
- Provide useful information for whale shark management and conservation

Our progress to date includes:

Video capture of whale shark spot patterns for individual identification

- 47 individuals identified through spot patterns on dorsal and tail fins.
- 63 sharks tagged with numbered markers. We know that tagged sharks return to Gladden, and venture as far as Turneffe Atoll, the Bay Islands (Honduras) and even go close to Cancun in Mexico, over 650 km away from Gladden Spit!

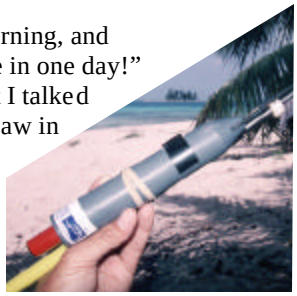
Dog snappers spawning at Gladden Spit

- 22 sharks have been tagged with acoustic "pinger" tags. These show that whale sharks return to Gladden every month during the snapper spawning season to feed on this important food source.
- 11 sharks have been tagged with satellite pop-off tags that tell you where the shark has been. This is the first time these have been used on whale sharks and as a result we now know that whale sharks dive to over 700m (2,300 feet).

As a result of this research general awareness about the whale shark has increased considerably both in and out of Belize. This has been achieved through talks given at meetings and conferences, and through articles and radio interviews. We have highlighted the importance of Gladden Spit and so strengthened the case for its designation as a Marine Reserve.

Tag Talk!

"I saw two whale sharks this morning, and three this afternoon – Wow, five in one day!" exclaimed an enthusiastic tourist I talked to in May. "Were the ones you saw in the afternoon the same ones you saw in the morning?" I asked. " I don't know, one seemed different with a chunk out of its tail, but I don't remember the rest…" To most people whale sharks all look alike - very big, with lots of white spots. Even if you spend hours studying whale sharks they can still be difficult to distinguish.



Acoustic or "pinger" tag

To keep track of whale sharks we try to tag each individual that visits the Gladden Spit area, and do this with a

(Continued on page 4)

UK Darwin Initiative: who we are and what we do

The UK Darwin Initiative for the Survival of Species is a small grants scheme run by the British Government to promote biodiversity, conservation and sustainable use of resources in less developed countries. It was set up in June 1992 in response to the Earth Summit in Rio de Janeiro. All projects work collaboratively with local institutions and, or communities in the host country. Their aim is to produce excellent science that can be used for conservation purposes.

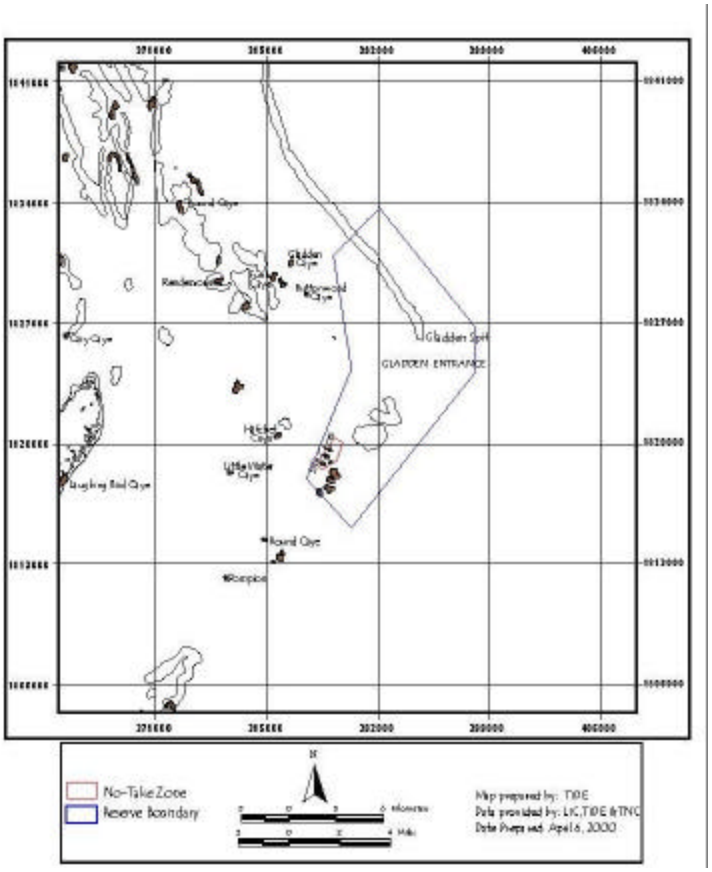
Inside this issue:

Gladden Spit: 1st marine reserve designed to protect whale sharks and spawning fish

Two years of research by The Nature Conservancy, University of South Carolina and University of York, reveal that Gladden Spit is an area of global importance. It is the only place in the world where whale sharks are known to form feeding aggregations on snapper spawn. Few other places can also boast of having at least 25 fish species that reproduce in one area. To protect Gladden Spit and ensure that whale shark tourism is managed sustainably, Gladden Spit and the three silk Cayes were declared a marine reserve on May 18th 2000 (Statutory Instrument no. 68 of 2000). Dan Silva, Minister of Agriculture and Fisheries and Beverly Wade, Administrator for the Belize Department of Fisheries led the signing on Middle Silk Caye in the presence of local fishermen, tour-guides, researchers and the press.

The marine reserve establishes a general use "whale shark conservation zone" covering about 10,523 hectares that encompass the Gladden Spit "elbow" (see map) and contains one no-fishing zone extending a quarter of a mile around the three Silk Cayes. Regulations governing whale shark tours have been drafted but are still pending further consultations with stakeholders. The marine reserve opening provided an excellent opportunity for everyone involved to mix and mingle and for fishers to exchange views with the Minister and Fisheries administrator. The forthcoming community consultations will provide further opportunities for discussion and will also cover general issues such as enforcement and the management of Gladden Spit fisheries.

Minister Dan Silva officially declaring Gladden Spit & the Silk Cayes a marine reserve 18th of May 2000.



Reward $$$

For the return of a whale shark satellite-tag if found floating in the sea or washed up on shore.

Please contact R. Graham to arrange return and collect reward.
61 Front Street
Punta Gorda, Belize
Tel: +501 7 22678 -Email: rtg@btl.net

Conservation Dive Courses

Two conservation dive courses have helped train 19 young fishers and 5 non-governmental organization staff in SCUBA skills in 2000 & 2001. Such courses provide opportunities for diversification from fishing and enable flexibility of research in marine environments, and promotes good conservation ethics amongst participants. Thanks to The Nature Conservancy for spearheading this initiative in collaboration with the Friends of Laughing Bird Caye, Rum Point Divers, Aquatic Adventures and Seahorse Dive Shop & UK Darwin.

Graduates of the conservation dive course with their instructors.

Working Towards Sustainable Management of Nassau Groupers in Belize

by Jill Hepp

The Nassau grouper fishery is the second most important commercial fishery in Belize but is widely believed to be at risk of collapse due to over-fishing of the species' spawning aggregations. The Nassau grouper is particularly vulnerable to over-fishing because it is long lived and reaches sexual maturity later than many other species of fish. During the full moons of December and January, large numbers of Nassau groupers aggregate to spawn. Fisherman familiar with these sites often target these vulnerable spawning aggregations, capturing large numbers of the groupers, often before these have had a chance to reproduce. Recognizing that this species needs immediate protection, Green Reef developed a Nassau Grouper Research and Advocacy Campaign as part of its efforts to promote responsible and sustainable use of Belize's marine resources.

There are four primary components to the grouper project: research, education, economic-alternative training, and advocacy. In order to better understand the state of the Nassau grouper populations in Belize, Green Reef coordinated video surveys at eight sites during the spawning period in January 2001. This survey found that several of the sites still possess viable numbers of aggregating Nassau groupers but the majority of the sites had greatly reduced numbers in relation to historical figures. Green Reef is spearheading an educational program designed to raise awareness about Nassau groupers with fishermen, community members, policy makers and other stakeholders. Plans are also afoot to train interested persons in SCUBA and fly-fishing as alternative sources of income to fishing groupers. Green Reef and the Belize Fisheries Department will be holding a national workshop at the end of July 2001 to disseminate data and provide a forum to discuss management and protection of the Nassau grouper.

Nassau grouper fitted with an acoustic tag to determine degree of attachment to spawning site

> The Nassau grouper is particularly vulnerable to over-fishing because it is long lived and reaches sexual maturity later than many other species of fish.

Following the workshop, Green Reef will conduct a nationwide advocacy campaign to provide support for new management measures.

Nassau grouper seen during the national grouper census organized by GreenReef in January 2001

Several agencies and organizations have been extremely generous in donating their time and resources to further this important project. In addition to recognizing the important assistance that the funding of the UNDP/GEF and the Oak Foundation provides, Green Reef wishes to acknowledge the essential contributions made by the Belize Fisheries Department, Bacalar Chico National Park and Marine Reserve, Hol Chan Marine Reserve, The Nature Conservancy, University of York/UK Darwin Initiative, Wildlife Conservation Society, Toledo Institute for Development and Environment (TIDE) and the Belize Audubon Society.

For more information please contact GreenReef at <greenreef@smu.edu.bz> or 026-33254.

Belize's 1st whale shark tourism and conservation course

How do you attract a whale shark? How do you make sure that it comes back another day? What is a whale shark and what are they dong at Gladden anyway? How can tourism and fishers coexist in a small site? What are the new regulations governing whale shark tourism on the reef? These were some of questions asked at Belize's first Whale Shark Tourism and Conservation Course held in Placencia and Gladden Spit this spring. Run by the Friends of Laughing Bird Caye and funded primarily by PADIs Project Aware Foundation this course enabled people to share their knowledge of whale sharks and snapper spawning aggregations. One of the best parts was a field trip that allowed 16 tour guides to practice their whale shark dive briefings under the critical eyes of fellow students and trainers. All passed with flying colors and the event was captured on video. It is hoped that a second course will soon be available to train a further 16 whale shark tour-guides.

Our thanks to Rum Point and Seahorse for co-sponsoring the course. Congratulations to all on an excellent course!

Course participants and trainers at Gladden Spit

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Edited by R. Graham, Julie Hawkins and Callum Roberts
For more information on the UK Darwin Initiative or the whale shark project, please visit UK Darwin's web page at:
www.nbu.ac.uk/darwin *or the Belize project web page*
www.york.ac.uk/environment/darwin
Or email us at rtg@btl.net; 61 Front St., Punta Gorda, Belize

(Tag Talk! Continued from page 1)

Conventional marker tag

combination of different markers. We use conventional tags that look like large flat plastic cards about 10cm wide and 17cm long (4"x7") that are numbered. They are attached to a whale shark near the first dorsal fin (see picture of whale shark anatomy) and allow us to estimate the population size of the sharks at Gladden. They also help us find out if the same sharks are sighted on a daily, monthly or yearly basis. These tags can also help us discover where else whale sharks go in the Caribbean. Tagged sharks have been seen near the Bay Islands, Turneffe Atoll, Sapodilla Cayes and even as far away as Cancun, Mexico!


Satellite pop-off tag.—this instrument records temperature, depth and light levels while attached to the whale shark.

So conventional marker tags provide information on population sizes, site fidelity (how attached a whale shark is to a site), and the distances that sharks move. However this is all dependent on resighting tagged sharks. Because we can't be on the reef all the time and because we sometimes fail to spot passing whale sharks we also use acoustic tags in addition to conventional markers. Acoustic tags tell us when a shark comes into the Gladden area and also when it leaves. An acoustic tag, also known as a pinger, is a gray cylindrical tag either 8cm (3") or 20cm (8") long (different sizes due to the number of batteries in them) which is attached to the whale shark by a dart. Each one emits a series of unique sound pulses that are used to identify individual animals. These pulses are picked up either by a hydrophone attached to a boat-based acoustic receiver or by an underwater hydrophone that we have attached to the reef. The advantage of the boat-based receiver is that we can go anywhere, throw the hydrophone over the side and check the area for whale sharks. The disadvantage is that we can't check for whale sharks when the weather is rough. Fortunately the underwater receiver does allow us to do this. This instrument will "listen" for whale sharks day and night, in rough or calm weather, and will do so for years. However because the underwater receiver cannot be moved and its maximum range is only 1km (.6miles), it needs to be in a spot where it can catch the maximum number of passing whale sharks. If a shark goes beyond the range of the receiver and no one is there to see where it heads, or how deep it dives we need the help of our state-of-the art, pop-off, satellite tags to reveal the whale sharks secrets.


Eloy Cuevas looking for a whale shark to tag

Satellite tags ("sat-tags") are cylindrical mini-computers encased in dense foam with an antenna at one end. Every minute that they are attached to a whale shark they record measurements of depth, temperature and light levels. At a pre-set time, a tag will detach from the shark and float to the surface, antenna-side up. The tag then transmits all its data to several specialized satellites. The satellites then send the data to a processing center which forwards it to us for analysis. Using this technology we have discovered that whale sharks can dive to over 700m (2,300ft) deep and for short periods can withstand temperatures lower than 8°C.

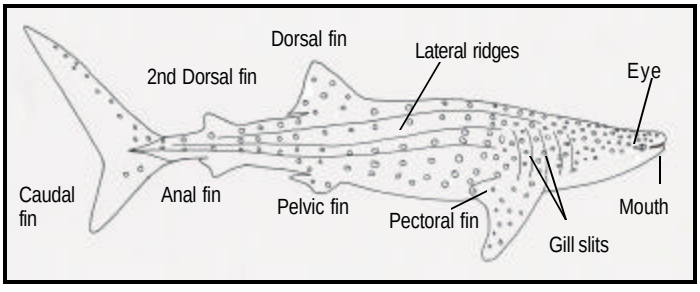

Whale shark with a satellite tag attached

We are still waiting for the results of this year's 6 sat-tags which will pop-off between late July and December 2001. And next year, we look forward to seeing which whale sharks return to Gladden!

Are Gladden Spit's whale sharks resident or migratory?

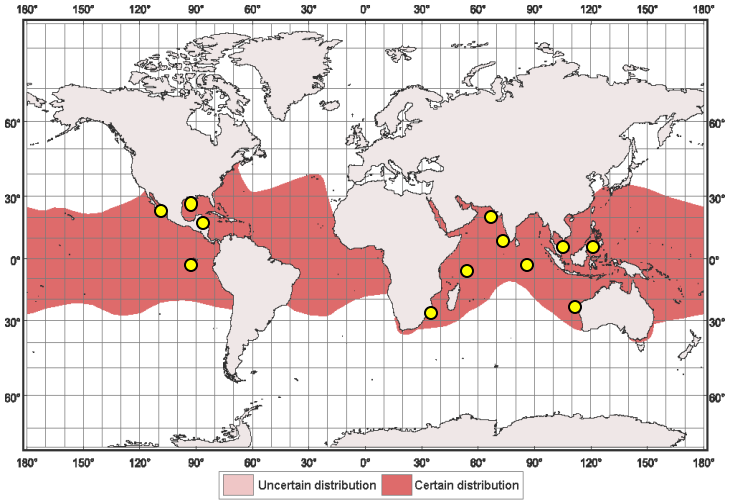
Are whale sharks entirely resident around Gladden Spit or do they migrate to other places for part of the year? This is a question that is driving our research, but one for which we don't yet have a clear answer.

So far our results indicate that most whale sharks visit Gladden during the peak Cubera and Dog snapper spawning season which lasts from April to June. After this, the majority leaves the area and we have little idea where they go between snapper spawning seasons. Acoustic tags told us that one individual stayed close to Gladden visiting every full moon for at least 6 months. Whale sharks have been seen along other areas on the barrier reef, close the Sapodilla Cayes, Ambergris Caye and near Turneffe Atoll, often feeding on little fish associated with schools of tuna. Some sharks appear to migrate south, over to the Bay Islands in Honduras, and some move north, all the way to the tip of the Yucatan Peninsula, ranging over 750km (450 miles). Where they go after that remains to be seen. We do know that certain individuals such as "Arca" or "Chop" named for their distinctive characteristics come back to Gladden every year to feast on the spawn. It appears that on the whole, whale sharks visiting Gladden are highly migratory. We certainly hope that satellite tags deployed during this past spring will reveal more about whale sharks movements over the long term, many months after Gladden's peak snapper spawning season.



Tracking whale sharks in the Caribbean & beyond: the importance of collaborations

Whale sharks move beyond political boundaries and range entire seas, traveling over 13,000 km according to recent research in the Pacific. In the Atlantic, threats to whale sharks include boats, nets and other sharks (to young). Yet in the Pacific, a dedicated fishery for this species exists: over 600 whale sharks were fished off a small portion of the western coast of India last year. To monitor their movements and eventually manage and protect their populations, collaborations between countries are essential. With this in mind, the UK Darwin project is now collaborating with researchers in Mexico, Cuba, Honduras and the USA. Whale sharks have been sighted in all of these countries with whale sharks tagged in Belize sighted off of the Mexican and Honduran coasts. The objective of the collaboration is to help researchers elsewhere set up their own whale shark research program by providing technical assistance in the research project design, data collection and analysis. It is hoped that through the exchange of information on whale sharks visiting each site, we can piece together a regional picture of this species' foraging and migratory behaviour. We are expanding this collaboration to other countries in the region and worldwide. In July, we will be working with the Marine Conservation Society of the Seychelles in the Indian Ocean to kick-off their whale shark population and migratory study with the deployment of conventional, acoustic and satellite tags. We look forward to raising awareness of whale sharks as a charismatic species of sustainable economic importance and as a flagship species for marine conservation through such local, regional and global collaborations. We hope that all 34 whale shark range states will support and push for their protection during the next meeting of the Convention for the International Trade in Endangered Species (CITES) in spring 2002.



The whale shark distribution throughout the tropics. Its range include at least 34 states. Yellow dots indicate areas of predictable sightings. Map courtesy of the United Nations Food and Agriculture Organization.

Profile on the Darwin projects' partners

Teamwork is an important ingredient for any research group and the Belize-UK Darwin project benefits from teamwork galore. A whole variety of individuals and organizations are participating in the project's study on whale shark ecology, helping us to decide how findings can best be used to conserve these species. Key institutional partners include The Department of Fisheries, Friends of Laughing Bird Caye, Toledo Institute for Development and Environment, GreenReef and Belize Audubon. On a day to day basis we work with local fishers and tour-guides—who spend most of their time at sea and provide us with invaluable eyes for spotting whale sharks and spawning fish.

University of Belize Students accompanied by UB professor Ed Boles came out to learn about project research. Since 2000, several UB students have participated in the tourism, fisheries and whale shark research.

We extend a very warm and sincere thanks to our many partners. Your help and enthusiasm in this research has been superb!

- Department of Fisheries
- Coastal Zone Management Authority
- Belize Tourist Board
- Placencia Tourism Center
- Tour-Operators Monkey River, Placencia, Mango Creek, Independence, Seine Bight and Hopkins
- Fishermen from Monkey River, Placencia, Mango Creek, Independence, Seine Bight and Hopkins
- Friends of Laughing Bird Caye
- Toledo Institute for Development and Environment
- The Nature Conservancy
- World Wildlife Fund
- GreenReef & Hol Chan Marine Reserve
- Little Water Caye Resort & Turneffe Island Lodge Resort
- Glovers Reef Marine Research Station
- Belize Audubon Society
- University of Belize
- British Army Helicopter Unit & Lighthawk
- Richard & Carol Foster, Andy Stockbridge—Film makers
- Wildlife Computers, Argos, Vemco & Floy Tag

Fisheries Officer Athen Marin working with fisherman Percy Leslie to record mutton snapper fishery landings data

University or York/UK Darwin Initiative
61 Front Street
Punta Gorda
Belize

A bird's eye view of whale sharks and spawning fish

Aerial over flights of study areas are crucial to capturing a wider picture of a site, witnessing a phenomenon from the air or assessing populations of large marine animals. Thanks to the support of Lighthawk and the British Army Helicopter Unit, we have been fortunate enough to fly over key research sites such as reef promontories along the barrier reef and view the phenomenon of whale sharks feeding on the snapper spawn clouds from the air.

The "Elbow "at Gladden Spit as seen from a Lighthawk plane.

We are always concerned about safety while working on the reef, 42 km from the mainland, sometimes in difficult conditions. To ensure that we could safely evacuate a person from the area we organized a helicopter casualty evacuation simulation with the British Army and Karl Kohlbecker, owner of Little Water Caye Resort – one of the closest cayes to Gladden Spit. Our thanks to the British Army and Karl for making this simulation a success and adding to the safety of those visiting Gladden Spit.

A British Army Gazelle Helicopter simulating the casualty evacuation maneuver from Little Water Caye.