







Pictured on the right is one of the few lucky hatchlings that survives the frequent territorial aggression between adults, most likely exacerbated by the increased exposure of crocodiles to one another after the vegetation is removed.



Turneffe's littoral forests and brackish lagoons support amphibians, such as the giant marine toad; reptiles, such as the green tree snake, which is a sub-species endemic to Turneffe that includes some individuals with a brilliant blue coloration.

At least 60 species of birds may be found at Turneffe during the height of the migratory season, including 18 species of nesting birds. Endangered and threatened nesting species include the least tern, roseate tern and the white crowned pigeon, which also feeds in the littoral forest. The lack of protection for the natural forest and clearing for developments presents the greatest threat to the survival of all terrestrial wildlife on Turneffe.

## **Rich Mosaic of Interspersed Habitats**

The picture below shows an aerial photograph along the Eastern shore of Turneffe at Calabash Caye. Littoral forest along a sandy beach cove is bordered by fringing red mangroves along other sections of the shoreline and channels along lagoons.



Interspersed seagrass, algal meadows and white sandy patches are visible along the

seaward margin, followed by a wave defined reef crest and magnificent shallow coral buttresses, followed by a deeper platform and reef rim on the outer reef drop-off (lower right corner of picture above).

# Red Mangrove: The Cradle of Life on Turneffe

Red mangrove is the most common plant species found on Turneffe. This picture shows a single specimen growing 10 yards from the shore in water approximately 20 inches deep.

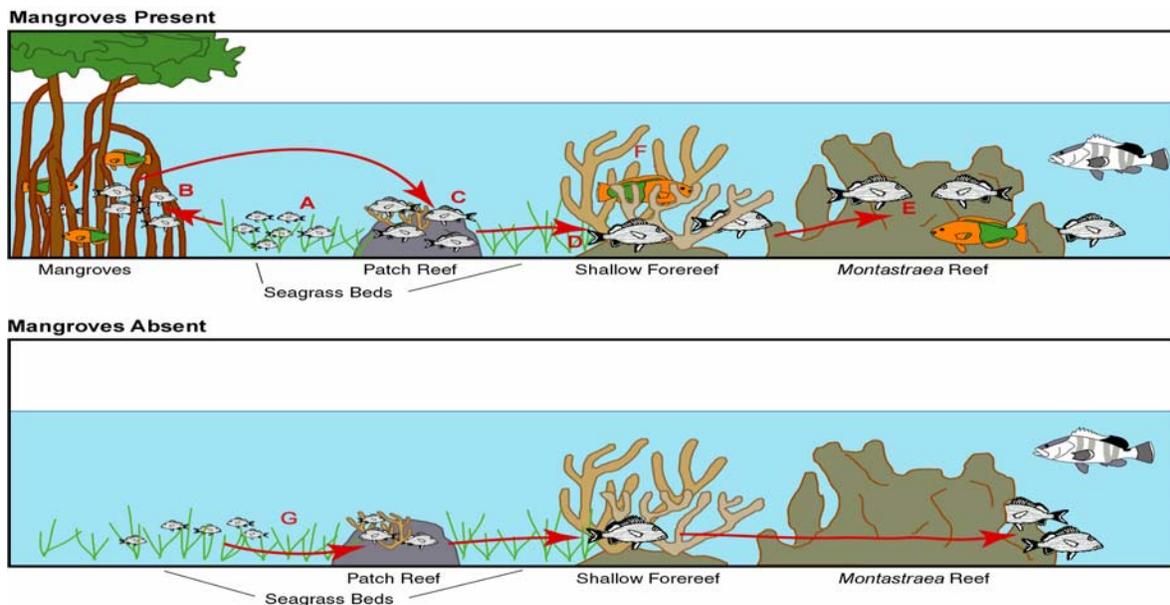


Red mangrove is easily recognized in the field by its characteristic prop roots, which help to anchor the tree in the ground and provide shelter to a myriad of marine life. Approximately 25% of the Belize's offshore mangroves, and 10% of its total mangroves, are found in Turneffe.

Research has demonstrated that reefs located in close proximity to mangroves have higher numbers of commercially important fish. For instance, schoolmaster snappers show an increase of 737%, and yellowtail snappers 116%.

Rainbow parrotfish — the largest herbivorous fish in the Atlantic Ocean — are totally dependent on mangrove nursery areas and are becoming locally extinct in some locations (such as Glover's Reef) due to mangrove clearance. The resultant reduction in herbivory can have negative consequences for reef health, through algal overgrowth on reefs.

The graphic below illustrates the enhanced abundance of fishes that are found on reefs in close proximity to mangroves. Approximately 50% of Belize's mangroves that occur in close proximity (2.5km) to reefs are located on Turneffe Atoll.



## Historical Uses of Turneffe

Turneffe's cultural heritage dates back to at least Mayan times, when the islands were likely used to harvest marine resources and served as a trading post along the trading route between the Yucatan Peninsula and the Bay Islands. Preferred species of the original inhabitants in the region probably included manatee, turtles, fish and conch, which were used for food resources, as well as shells; and sting ray spines and shark teeth, which were used as currency and for ritual purposes. Mayan settlements have been identified on Calabash Caye and Grand Bogue Point, although little archeological excavation has been conducted on the atoll.

Turneffe was known to Spanish and English mariners in the 16<sup>th</sup> and 17<sup>th</sup> centuries. Various early names for the area have been found on different maps, with the first reference to "Terre Neuf" dating back to 1698. By 1800, Caye Bokel and Mauger Caye had also been identified.

Approximately a century ago, many of the high ground coastal areas on the eastern side of Turneffe were planted with coconut palms. Hurricanes and disease have destroyed the economic viability of the coconut plantations, and there is no meaningful commercial cultivation these days. In the early part of the 20<sup>th</sup> century, parts of the lagoon system were used for commercial sponge cultivation, but this enterprise also suffered from a massive disease outbreak and was abandoned.

## Tourism

Sports fishing scuba diving and snorkeling are the prime attractions on Turneffe today. Tourists coming through Belize City, Caye Caulker, San Pedro and other locations, as well as the live-aboard dive boats, visit the atoll. The rich habitats for valuable sportfish, such as bonefish and permit, are unmatched.

A recent study in the Florida Keys found the lifetime value of one bonefish averages \$57,000. No economic evaluations are available for Turneffe, but tourism is likely to be the primary value of the atoll, followed closely by fishing. There are three operational lodges on the atoll, with at least two or three more in some stage of development. Irreversible damage is occurring from the destruction of critical habitats due to vegetation clearance for real estate speculation, although no new construction has yet taken place (other than the existing lodges – of which Turneffe Flats has the best environmental record and commitment).

Existing lodges can also inflict serious damage as seen in this photo (below) of a dredging and beach creation project of a resort located on southern Turneffe (not the one where we will be staying). The silt is clearly visible from both the dredge pit and receiving beach, with the siltation affecting the Caye Bokel (Elbow) spawning site. The close proximity of Turneffe's islands to the reef also makes issues of solid and liquid waste disposal of particular concern.

WWF provided technical assistance for the development of the Turneffe Islands Development Guidelines, which were commissioned by the Coastal Zone Management Authority and Institute (CZMA/I). Turneffe was the first of nine planning areas to complete its guidelines, which include strict recommendations for waste control, no mechanical dredging, and the designation of core conservation sites. The guidelines, unfortunately, have been shelved due to the lack of leadership and government commitment for the CZMA/I. WWF continues to participate with the Turneffe Islands Coastal Advisory Committee partners in conservation planning on Turneffe, although the formal committee has not met due to the virtual disintegration of the CZMA/I over the past year and a half.

A limited amount of cruise ship based diving does occur on the western side of Turneffe, but the distance from the cruise terminal, unpredictability of the seas/weather, and high fuel cost, seem to be deterrents, so far.



## Fishing

Traditional artisanal fishing is an important economic and cultural activity on Turneffe. There are 25 to 30 seasonal and permanent fishermen’s camps on the Atoll. Most commercial fishermen at Turneffe are from Belize City and Sarteneja, and their camps are on land leased from the Government of Belize.

Turneffe is one of the leading areas for lobster production in Belize, with fishing primarily by traps set inside the central lagoon – one of the most sustainable fishing methods. Traditional ‘fishing territories’ established through trap fishing foster a sense of stewardship among fishermen, and provide an incentive for the creation of fishing concessions. Conch and finfish are also taken from Turneffe, although site-specific catch data are lacking for all of Belize, thus making quantitative comparisons among different regions impossible. This lack of data for key indicators is one of the key challenges facing the Healthy Reef Initiative.

Fisheries remain an important contributor to the national economy, accounting for approximately 5% of the GDP. One of Turneffe’s Nassau grouper spawning sites (Mauger Caye) is open to fishing. Fish size and egg production data collected at this site in January 2003 clearly demonstrated that larger fish produce more eggs. These grouper





can be sustained on the Atoll without adversely affecting the overall health of the ecosystem. The Healthy Reefs Initiative can play an important role in helping to define these parameters and testing their effectiveness over the long-term as components of the atoll management plan are implemented.

WWF and others are encouraging the Belizean government to use the upcoming Tulum+8 Summit meeting in December 2005 to make a public declaration of its commitment to Turneffe and their plan to declare more protection for the atoll, possibly including its nomination as a UNESCO biosphere reserve.

Turneffe is unique but highly threatened. From its different strains of coral zooxanthellae, which may promote a natural defense from coral bleaching, to its unusual wealth of charismatic mega fauna and endemic crypto fauna, it truly stands in a class on its own. The cooperation and existing alliances among tourism, fisheries, and research stakeholders can create a positive environment to test the application of the Healthy Reefs Initiative through adaptive management looking at the Atoll as a whole ecosystem.