

## ***BAY ISLANDS 2000 PROJECT***

### **CORAL CAY CONSERVATION SUMMARY REPORT FROM UTILA, HONDURAS**



- Edited by -

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***This report summarises a series of technical documents detailing  
CCC's science programme in Utila (1999-2000).***

***The series of technical reports is available on the CD-Rom attached to  
this document.***

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## EXECUTIVE SUMMARY

- ?? The coral reefs of Honduras are of vital national and international importance, both ecologically and economically, but are threatened because of rapid economic and population growth.
- ?? During work on Utila between 1999 and 2000 (the 'Bay Islands 2000' project), Coral Cay Conservation developed a programme of surveys, training and conservation education aimed at assessing the status of local reefs and improving environmental awareness amongst neighbouring communities.
- ?? Research focused on gathering data from around the whole of Utila using: transects for habitat mapping; Reef Check surveys to assess current reef health; continuation of monitoring sites to assess changes in reef health; fish and coral biodiversity assessments; and dive school surveys to assess diving pressure. Results for each component are presented in a series of technical documents, summarised by this report.
- ?? The 'Bay Islands 2000' project showed a range of detrimental anthropogenic influences to be present in Utila. These effects have been exacerbated by the mass coral bleaching events in early 1995 and 1998 and Hurricane Mitch in 1998. There was evidence that these impacts reduce the attractiveness of the reefs to divers.
- ?? A data clearly showed the greater abundance and diversity of fish in coral rich areas.
- ?? The habitat map produced by the project, showed that there is only approximately 27 km<sup>2</sup> of reef habitats around Utila. Furthermore, the most coral rich areas cover only approximately 4 km<sup>2</sup> (15%), highlighting the need to conserve remaining coral rich areas.
- ?? Highly prized fishery species were rare, highlighting the level of fishing pressure around Utila. However, several small, commercially important species showed an increase in abundance, which may be caused by the reduction of fishing pressure on local reefs in recent years and / or the efficacy of the Turtle Harbour Wildlife Refuge. These results are encouraging and show that additional marine reserves would further increase fish populations.
- ?? A total of 201 species of fish 48 species of corals were recorded, including several species considered uncommon or rare in the Western Caribbean
- ?? Diving pressure around Utila appeared to be high, with an estimated 342 dives per day that during August and September 2000, with 25% being for training of novices. The diving schools appear to be acting in a responsible manner by favouring sandy areas for training and using the system of mooring buoys but eight sites may be overused since they receive more than 6,000 dives per year.
- ?? Marine reserves are important since they: conserve biodiversity; increase fish abundances within the reserve and provide 'spill-over' into surrounding areas; facilitate reef recovery; separate conflicting uses; serve as a centre for public education and attract sustainable tourist revenue.
- ?? A series of 29 recommendations have been made relating to the conservation and sustainable management of the reefs in Utila, which are intended for discussion among stakeholders in Utila. If all the stakeholders wish to establish further marine reserves, four priority areas are proposed.

## RECOMMENDATIONS SUMMARY

Each of the six reports from Coral Cay Conservation's (CCC's) fieldwork in Utila contains a series of recommendations, which are summarised and categorised here. Readers are referred to the original technical reports for further information on the justification of each recommendation. Hence, for each recommendation shown here, the numbers in parentheses show the particular report(s) for further reference:

1. Harborne, A.R., S. Evans, D.C. Afzal, M.J. Andrews, and P.S. Raines. Summary of Coral Cay Conservation's habitat mapping data from Utila, Honduras.
2. Cadbury, S., A.R. Harborne and P.S. Raines. Summary of Coral Cay Conservation's oceanography, climate and anthropogenic impact data from Utila, Honduras.
3. Young, S., A.R. Harborne and P.S. Raines. Summary of Coral Cay Conservation's Reef Check data from Utila, Honduras.
4. Afzal, D.C., A.R. Harborne and P.S. Raines. Summary of Coral Cay Conservation's monitoring data from Utila, Honduras.
5. Afzal, D.C., A.R. Harborne and P.S. Raines. Summary of Coral Cay Conservation's fish and coral species lists compiled In Utila, Honduras.
6. Cadbury, S., A.R. Harborne and P.S. Raines. Summary of Coral Cay Conservation's dive school survey data from Utila, Honduras.

Note that the recommendations are not listed in order of priority.

### 1. Protective measures

1. Continue to aim to establish one or more additional multiple use marine protected areas around Utila, with an integrated monitoring programme to measure their efficacy, and strengthen the enforcement of regulations in the Turtle Harbour Wildlife Sanctuary. Establish regulations, and enforce existing legislation, to minimise the detrimental effects of coastal development on reef health. (1, 2, 3, 4, 5, 6)
2. Additional marine reserves in Utila should integrate factors such as the preference of many fish species for coral rich habitats and the protection of areas incorporating a range of habitat types, including mangroves and seagrass beds, in order to allow for nursery areas, ontogenetic shifts and species that rely on non-coral rich habitats. The corollary of the preference of fish species for coral rich habitats is to protect coral cover within the reserves. (1)
3. Consider the use of species-specific management practices to preserve species survival and genetic exchange. (5)
4. The 'Black Hills' reef (east of Utila) appears to be an appropriate site for a marine reserve because of its attractiveness to divers and anthropogenic impacts are limited. (2, 6)
5. The reef on the south coast of Utila appears to be a good candidate for protection because it is relatively sheltered from storm and hurricane damage. (1)
6. A marine reserve along the south coast would also help to maintain the health of this heavily used reef area and should be situated to the west to minimise influences from Utila Town and other coastal developments. (2)

7. The reef at the 'Cabañas' appears to be an excellent candidate for protection because of its high coral cover in shallow water, its popularity with divers and having the highest conservation index. (3)
8. The reef close to the 'Cabañas' sites (on the south coast of Utila) appears to be a good candidate for protection because it is relatively sheltered from storm and hurricane damage. (4)
9. The reef at the 'Flight Path' (south-east Utila) appears to be an excellent candidate for protection because of its high coral cover and species richness, abundance of staghorn coral and high conservation index. (3)
10. The concept of establishing a reserve at Raggedy Cay should be continued since this area has reasonable coral cover, has a high conservation index and compliments other putative reserves via its location to the west of Utila. (3)

## **2. Reduction of anthropogenic impacts**

1. Establish a standard environmental awareness briefing for all divers that can be used by dive schools on Utila. Such a briefing could be developed using the PADI AWARE programme. (6)
2. Establish a code of practise for people living and working on Utila regarding sewage and waste disposal. Provide a standard environmental awareness briefing for all visitors to the dive resorts. (2, 3)
3. Diving schools should be encouraged to distribute their diving, particularly for trainees, more evenly across all available dive sites. (2, 6)
4. Maintain and extend the excellent system of mooring buoys to minimise anchor damage. (2)
5. Extend the system of mooring buoys to place them at dive sites where they are currently absent. (6)
6. Instigate a code of practice for the interaction of tourists and whale sharks. (5)

## **3. Reef monitoring**

1. One or more agencies should continue to collect monitoring data from some or all of the survey sites used by the Reef Check and monitoring studies as the basis of a monitoring programme of reef health around Utila. This could include an amalgamation of the monitoring methodology with Reef Check protocols. (3, 4)
2. Hondurans, from either Utila or UNAH, who have been trained to dive and conduct surveys by CCC could undertake the necessary monitoring work. CCC could provide additional training if required. (3, 4)

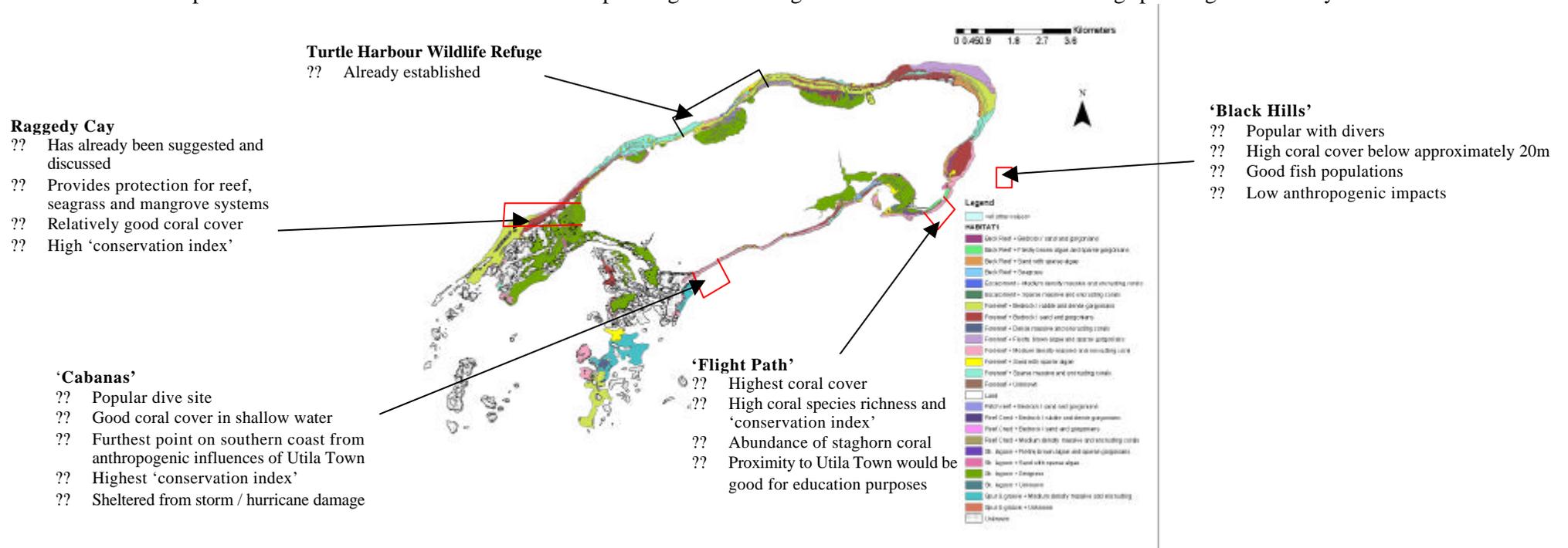
## **4. Further data requirements**

1. One or more agencies should collect additional ground-truthing data from around Utila to facilitate both classification of currently 'Unknown' polygons and an accuracy assessment of the map. (1)
2. Establish an integrated GIS and associated meta-database for Utila, including data from the *Bay Islands 2000* project. (1)
3. Examine the potential of using data collected by the *Bay Islands 2000* project as the basis of national habitat classification scheme and subsequent national habitat map. (2)

4. One or more agencies should continue to collect basic oceanographic, climatic and impacts data to monitor temporal changes. (2)
5. The oceanographic data, particularly for currents, should be extended to allow analysis of how coral and fish larvae are entrained and circulated around the island. (2)
6. Data on water visibility (turbidity) should be extended to include studies researching the impacts of sedimentation on reef health. (2)
7. There should be further study of the biodiversity of Utila to fully document the species present in order to facilitate effective management of biodiversity. (5)
8. There should be further study of the natural history of commercially important species, for example their spawning grounds and migration patterns, to facilitate effective management of biodiversity. (5)
9. Facilitate further research of the whale shark population of Central America. (5)
10. Continue questionnaires to dive schools in order to assess diving pressure (training and recreational) but extend the research to cover the whole year. Completing daily or weekly questionnaires could be made obligatory for dive schools. (6)
11. Research should be conducted to investigate the impacts that divers are having on the reefs via mechanical damage. (6)

### 5. Proposed system of marine reserves

- ?? If stakeholders in Utila wish to create additional marine reserves, CCC’s recommendations relating to protective measures would suggest that the four areas shown in Figure 1 appear to be priorities. Ideally, fishing, which is currently limited in these areas, would be stopped in the reserve(s).
- ?? This system provides a network of reserves covering a range of reef types and susceptibility to coral bleaching events and hurricanes. Although data on fish and coral larval movements around the island are not available, this system of reserves is likely to provide protection for at least some ‘source’ sites of these larvae. The four additional reserves also appear to incorporate most of the habitat types found around Utila, which is important for conservation.
- ?? Additional protection should also be considered for fish spawning sites. Fishing of these areas can be limited during spawning seasons only.



**Figure 1.** CCC’s four priority areas (red), overlaid on the habitat map, if new marine reserves were to be created around Utila. An overview of the rationale for each reserve is also shown. ‘Conservation index’ calculated from ‘Reef Check’ data. Note that the reserve boundaries are schematic but CCC can supply location co-ordinates if required.

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## REPORT SUMMARIES

### 1. Summary of habitat mapping data report

- ?? This summary report provides an overview of the habitat mapping data collected by the *Bay Islands 2000* project.
- ?? Data were collected within individual 'study areas', to facilitate analysis at a range of spatial scales, and utilised the CCC standard baseline survey technique for the rapid assessment of the characteristics of reef communities. The surveys, therefore, utilised a series of transects, perpendicular to the reef.
- ?? Baseline transects discriminated nine benthic and six geomorphological classes which indicates Utila has a high habitat diversity. Habitat diversity is important since the number of habitat types has been shown to be a good representation of species biodiversity.
- ?? The nine benthic classes that were distinguished were all relatively coral poor because of a suite of relatively long-term local and regional factors, exacerbated by the combination of Hurricane Mitch and coral bleaching in 1995 and 1998.
- ?? Damselfish were the most abundant reef associated fish recorded during baseline transect surveys. Commercially important fish were less abundant than would normally be expected in unfished systems.
- ?? A recurring pattern in the baseline transect data was the greater abundance and diversity of fish in coral rich classes. However, although the link between fish abundance and coral cover was clear, not all species were necessarily most abundant in the most coral rich areas.
- ?? Invertebrates were generally uncommon, partly because of fishing pressure, and the abundances of many invertebrate taxa were correlated with coral cover.
- ?? A habitat map is presented within this report as an indication of the distribution of habitat types around Utila.
- ?? Using the map, estimates of areal extents of each benthic class and habitat type are instructive. For example, there is only approximately 27 km<sup>2</sup> of reefal habitats around Utila. Furthermore, the area supporting the most coral rich benthic classes is only approximately 4 km<sup>2</sup> (15%). These statistics both highlight the damage caused by the bleaching event and Hurricane Mitch and other anthropogenic impacts and the need to conserve remaining coral rich areas.
- ?? If further reserves were to be created, it would be important to try to protect a range of reef and habitat types. For this reason, it appears that the Turtle Harbour Wildlife Refuge is well placed since this area includes a wide range of habitat types. However, placement of reserves in Utila should favour relatively coral rich habitats over sand dominated areas.

## 2. Summary of oceanography, climate and anthropogenic impact data report

- ?? This summary report provides an overview of the oceanographic, climate and anthropogenic data collected by the *Bay Islands 2000* project.
- ?? Data were collected during standard transects and were divided into individual 'study areas' to facilitate data analysis at a range of spatial scales.
- ?? Data were collected on: temperature, salinity, wind, currents, visibility, natural and anthropogenic impacts, boat activity and biological and aesthetic impressions.
- ?? CCC survey teams completed a total of approximately 600 dives (169 individual transects) from around the whole of Utila.
- ?? The data collected during this study were generally qualitative and, therefore, it is not possible to discern detailed trends and patterns. However, the data can be used to show gross patterns amongst the variables that were monitored.
- ?? Oceanographic and climatic parameters showed conditions to be generally typical during this study: sea surface temperatures were approximately 28.5°C and peaked during the warm wet season (May to September); prevailing winds were easterly and there was some evidence of counter-clockwise current flow.
- ?? Surface salinity showed the expected trend of decreasing significantly during the wet season although the mean value (25.2‰) was lower than expected, but this is almost certainly partly caused by equipment inaccuracies.
- ?? Water visibility (a measure of suspended material in the water column) is a key influence on coral health. Visibilities varied around the island and were generally lower close to Utila Town, possibly indicating anthropogenic influences and threats to coral health, and higher to the north and on offshore banks.
- ?? Surface litter, which is aesthetically unpleasant and can affect a range of animals, was present on 15.7% of surveys. Other surface impacts were uncommon.
- ?? Underwater impacts were generally uncommon but there was generic 'coral damage' on 11.1% of surveys. Evidence of reef sedimentation was found close to human populations. There was only limited evidence of coral bleaching and disease.
- ?? Boat activity was higher along the southern side of Utila, with numerous dive boats at popular dive sites. Fishing boats were commonest to the south-west, where fisherman living on the Utila Cays fish on the south-west banks.
- ?? The 'Black Hills' area (an offshore bank) had the highest dive quality rating. Areas along the south coast, which are heavily used by the dive industry, were generally attractive to divers. Ratings were surprisingly low in the Turtle Harbour Wildlife Refuge. Topographically complex escarpments and spur and groove areas were of most interest to divers.

### 3. Summary of Reef Check data report

- ?? This summary report provides an overview of the 'Reef Check' data collected by the *Bay Islands 2000* project to assess reef health. Reef Check is an internationally recognised protocol used to generate standard parameters of reef health.
- ?? Seven Reef Check sites, evenly distributed around Utila, were surveyed during 2000. Reef Check collects data from a shallow transect (3-6 m) and a mid-depth transect (6-10 m).
- ?? Data were collected on: impacts (presumed and observed) affecting each site; the percentage cover of each component of the benthic community (e.g. coral species, algae and sponges) and substratum categories (e.g. sand and rubble); number of indicator fish taxa (e.g. Nassau grouper) and number of indicator invertebrate taxa (e.g. lobster).
- ?? Each of the seven sites surveyed during this study appeared to be exposed to generally low anthropogenic impacts when assessed using the criteria of Reef Check. However, the reefs are also known to have been significantly impacted by major bleaching events in 1995 and 1998 and Hurricane Mitch in 1998 and the mass mortality of *Diadema* urchins in the early 1980s.
- ?? Total coral cover was highest (42.7%) on the mid-depth transect at the 'Flight Path' site (to the south-east of Utila) and the second highest coral species richness, possibly because of intermediate levels of disturbance. The mid-depth transect at the 'Turtle Harbour' site had a lower coral cover (28.1%) but had the highest diversity and species richness (16).
- ?? Exposed sites on the east coast had the lowest coral cover and mid-depth transects generally had higher coral cover than shallow transects because of the reduced impacts of bleaching and hurricane disturbances.
- ?? Abundances of dead coral were partly linked to live coral cover since coral rich areas will have more dead colonies after major disturbances. Dead coral was also high at the 'Silver Gardens' site (southern coast of Utila), possibly linked to pollution and dredging.
- ?? Where coral was low, but there was exposed hard substratum, there was a higher coverage of algae. High algal cover on the south coast might also be linked to increased nutrient concentrations from coastal developments.
- ?? Filter feeders such as sponges and gorgonians were generally more abundant on the northern side of Utila where the increased water movement may provide greater food concentrations.
- ?? Highly prized fishery species such as the Nassau grouper were not seen at any site, highlighting the level of fishing pressure around Utila. Other important indicators of fishing pressure, such as lobster, were also rare. However, the abundance of snappers and grunts within the Turtle Harbour Wildlife Refuge may reflect the effects of protecting fish stocks in this area.
- ?? Parrotfish were also relatively abundant and this is encouraging since they are a key herbivore in reef systems, playing a role in maintaining coral communities despite the presence of competitively dominant algae. *Diadema* urchins are also a key reef herbivore and were seen on all transects, possibly indicating evidence of population recovery.
- ?? A 'conservation index', calculated using the fish and invertebrate data, indicated the importance of an area on the southern coast ('Cabanas'), the Turtle Harbour

Wildlife Refuge, an area to the south-east of Utila ('Flight Path') and a site close to Raggedy Cay.

- ?? Correlations were seen between the abundances of commercially valuable groupers and coral species richness and diversity, showing the importance of maintaining coral health to maximise fisheries potential.
- ?? Overall, therefore, it is obvious that the reefs in Utila have been significantly affected by a combination of regional (coral bleaching and Hurricane Mitch) and local (particularly fishing pressure, sedimentation and nutrification) effects. This conclusion is supported by the comparisons with equivalent data from Belize and the whole Caribbean region. For example, there is some evidence that, prior to 1998, the reefs of Utila may have been of above average health, as measured by Reef Check compared to the averages for the Caribbean region.

#### 4. Summary of monitoring data report

- ?? This summary report provides an overview of the monitoring data from sites established by 'Project Utila' (a series of student expeditions to Utila prior to 1999) and continued by CCC as part of the *Bay Islands 2000* project.
- ?? Three monitoring sites were established and surveyed in 1997 and 1998 by Project Utila and then resurveyed by CCC 1999. The three sites were 'Silver Gardens' and 'Cabañas' (south coast of Utila) and 'Turtle Harbour' (north coast).
- ?? At each site, two baselines were laid perpendicular to the shore and were divided into three depth zones (deep, medium and shallow). Surveys were then conducted along 'survey' transects perpendicular to each baseline.
- ?? On each survey transect, hard corals were surveyed via a 10 m line intercept transect. Fish were surveyed via belt transects 50 m long and 2 m above and to either side of the transect.
- ?? A suite of relatively long-term local and regional factors meant that the highest cover found in this study was 38%. However, much of the change documented in this study from 1997 to 1999 will have been caused by the combination of Hurricane Mitch and coral bleaching in 1998.
- ?? Total hard coral cover fell from 1997 to 1999 with the most significant change from 1998 to 1999 and in the shallow zone (32.5% and 29.4% in 1997 and 1998 respectively to 9.4% coral cover in 1999).
- ?? This pattern was mirrored by the declines of several ecologically important species. For example, a dramatic decline in ribbon coral in shallow water from 1998 to 1999 was recorded (over 8%). Fire, elkhorn and staghorn corals also showed significant declines while mountainous star appeared more robust.
- ?? The loss of species such as ribbon and fire coral could have significant effects on shallow water reef communities in Utila. There was evidence of a 'community shift' in the shallow reefs of Utila, possibly leading to a community dominated by other benthic organisms such as macro-algae.
- ?? A very limited number of commercially important species, such as large snappers, groupers and jacks that were recorded during the surveys.
- ?? Several small, commercially important species showed an increase in median abundance, which may be caused by the reduction of fishing pressure on local reefs in recent years and / or the efficacy of the Turtle Harbour Wildlife Refuge. These results are encouraging and show that additional marine reserves would further increase fish populations.
- ?? The increase in abundance of several herbivorous fish species may have been indicative of higher algal (food) abundance.

## 5. Summary of fish and coral species lists report

- ?? This summary report provides an overview of the fish and coral species lists collated during the *Bay Islands 2000* project.
- ?? Species lists were compiled during the course of the *Bay Islands 2000* project during survey dives by CCC science staff and experienced volunteers.
- ?? A total of 201 species of fish were recorded, along with data on their abundance and frequency of sighting.
- ?? Several species considered uncommon or rare in the Western Caribbean were observed and the record of the northern stargazer (*Astroscopus guttatus*) may be a considerable range extension for this species.
- ?? The low median abundance and sighting frequency scores for commercially important species highlighted evidence of fishing pressure. The reduction of large, commercially important fish has long-term implications for fisherfolk.
- ?? Whale sharks, and their associated fauna, were seen and represent a major attraction for divers. However, the relatively low abundance and sighting frequency for other larger reef associated species may have implications for the attractiveness of Utila to dive tourists.
- ?? A total of 48 species of corals were recorded, along with data on their abundance and frequency of sighting.
- ?? During the study in Utila, several rare species were recorded which might become locally extinct without further protection.

## 6. Summary of dive school survey data report

- ?? This summary report provides an overview of the dive shop survey data collected by the *Bay Islands 2000* project.
- ?? Surveys of the dive schools on Utila were carried out using standard questionnaires during 1999 and 2000 requesting data on the number of dives (both 'training' and 'recreational') and the dive sites used from each of Utila's dive schools.
- ?? During the 1999 study, an average of 133 dives per day was recorded compared to 189 per day in 2000 and hence there was some evidence that levels of diving are increasing. Via extrapolation for questionnaires that were not returned, an estimated 10,929 dives were completed around Utila during the 2000 study period, an average of 342 dives per day.
- ?? Approximately 25% of the dives were for training of novices. This high proportion is important to recognise as trainees are often responsible for causing significantly more damage to corals than more experienced divers.
- ?? The diving schools appear to be acting in a responsible manner to protect the reefs by favouring these sandy areas for training and using the system of mooring buoys to limit coral damage from anchors.
- ?? Overall, diving pressure around Utila appeared to be high. The sheltered southern coast of Utila was shown to be a very popular area for diving, particularly for training. Recreational dives were more widely spread and there was evidence of a concentration on the north-west side, in the Turtle Harbour Wildlife Refuge. South-western Utila did not appear to receive any divers. Dive sites on the eastern side of Utila were also used infrequently, with the exception of the offshore bank 'Black Hills' that is becoming an increasingly popular dive site.
- ?? There were an estimated 124,648 dives per annum in 2000. Although this study did not include any assessment of reefal damage caused by divers, such levels of diving must be causing some mechanical damage. Increased tourism has associated impacts from increased coastal development and waste caused by the expansion of resorts, higher freshwater demands and the need for fishing to keep up with the demands of restaurants.
- ?? The most popular site received an estimated 12,998 dives annually. Seven further sites around Utila were estimated as receiving more than 6,000 dives per year. Research indicates that the 'carrying capacity' of a site is approximately 6,000 and, therefore, some areas of Utila may be close to or exceeding their carrying capacities. Hence, diving may be better managed if dive pressure was more evenly spread across the available sites since many are under-utilised.