An Assessment of the Status and Exploitation of Marine Turtles in the Turks and Caicos Islands

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This project was implemented by the Marine Turtle Research Group (University of Exeter in Cornwall, UK), the Marine Conservation Society (UK), and Duke University (USA) in association with the Cayman Islands Department of Environment, Cayman Turtle Farm, and University of Cardiff (UK). This initial consortium was expanded to include a large number of organisations across the Overseas Territories.

9. Status and Exploitation of Marine Turtles in the Turks and Caicos Islands (TCI)

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9.1 Summary and Recommendations

Summary

At least two species of marine turtle (green and hawksbill turtles) nest in the Turks and Caicos Islands (TCI; see table 9.1.) but these nesting populations appear to have decreased and nesting is now limited to remote cays. Little coordinated marine turtle research or conservation management has been undertaken in TCI and much needs to be done to ensure the continued existence of the country's nesting marine turtle populations. Foraging green and hawksbill turtles are widespread in TCI's coastal waters, and may represent regionally significant populations of both these species despite having been subject to direct exploitation for a long period of time. Direct exploitation still occurs and we estimate that between approximately 240 and 1,130 green turtles and between approximately 180 and 900 hawksbills are likely taken per year in directed fishing effort. In addition, approximately 190 turtles (green and hawksbills) may be incidentally caught on hook and line or in gill nets by TCI fishers each year, the majority of which are consumed. These populations are therefore subject to the largest legal take of marine turtles in the UK Overseas Territories in the Caribbean. Marine turtles are also used indirectly by the tourism industry, both as natural attractions and as saleable icons of the TCI.

TCOT recommends that the Government of the Turks and Caicos Islands takes all necessary steps to ensure the recovery of its nesting marine turtle populations and the sustained existence of its foraging populations. With amended legislation, increased regulation and enforcement, and nominal investment in educational outreach, research, monitoring and fishery management, the TCI turtle fishery has the potential to be sustainable, and meet the demands of TCI tradition without threatening the existence and value of TCI's turtles as natural attractions.

This will require actions under the following headings:

9.1.1. Increase capacity for marine turtle management in the Turks and Caicos Islands

9.1.1.1. Increase the capacity of the Department of Environment and Coastal Resources and the Protected Areas Department.
9.1.1.2. Establish a multi-stakeholder marine turtle management process.

9.1.2. Amend legislation and policy to facilitate marine turtle population recovery

9.1.2.1. Amend harvest legislation.
9.1.2.2. Amend Planning Policy and Beach Management.
9.1.2.3. Recommendations regarding Multilateral Environmental Agreements and TCI national legislation.

9.1.3. Establish systematic monitoring of marine turtle populations to determine trends in abundance

9.1.3.1. Establish systematic monitoring efforts at index nesting beaches.
9.1.3.2. Establish systematic monitoring efforts at index foraging sites

Species	Nesting	Foraging	Harvest
Green Turtle (*Chelonia mydas*)	Yes, probably in very small numbers	Adults and juveniles present Large numbers of juveniles in some areas	Relatively high levels of legal, unmonitored harvest at sea. Some illegal take of undersized specimens Low levels of illegal egg harvest
Hawksbill Turtle (*Eretmochelys imbricata*)	Moderate numbers, the most frequently encountered species nesting in TCI	Adults and juveniles present Large numbers of juveniles in some areas	Relatively high levels of legal, unmonitored harvest at sea. Some illegal take of undersized specimens Low levels of illegal egg harvest
Leatherback Turtle *(Dermochelys coriacea)*	No nesting in TCI	Occasionally seen offshore	No harvest
Loggerhead Turtle (*Caretta caretta*)	Possibly, but probably in small numbers	Adults and juveniles occasionally encountered	Occasional legal harvest of adults

Table 9.1. Marine turtle species and summary of harvest in TCI.

9.1.4. Establish further conservation and awareness programmes to sensitise those living in and visiting the Turks and Caicos Islands to marine turtle conservation requirements

9.1.4.1. Encourage and implement sensitive practices at existing nesting beaches
9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

Additionally, we make a major overarching recommendation to the UK Government to support the conservation and management of marine biodiversity in the UK OTs under the Environment Charters.

The Overseas Territories of the UK have long been acknowledged as being rich in biodiversity (Proctor & Fleming 1999). The small islands or island archipelagos of the Caribbean UK Overseas Territories currently do not or are unable to carry out sufficient monitoring, research, management and educational outreach required to ensure the sustainability of their marine and coastal natural resources. TCOT strongly recommends that the UK Government further contributes to marine biodiversity conservation and management in the UK Overseas Territories through provision of funding and expertise under the FCO/DfID Overseas Territories Environment Programme (OTEP), Defra's Darwin Initiative and through the provision of bespoke scholarships for tertiary education in biodiversity/conservation related subjects for citizens of the OTs. Additionally, much of the environmental legislation in the OTs is in need of revision to facilitate the conservation of marine turtles and their habitats, and therefore TCOT strongly recommends that HMG provide the necessary support to the OTs to facilitate the required legislative amendments.

Specific recommendations

9.1.1. Increase capacity for marine turtle management in the Turks and Caicos Islands

TCOT has contributed to the skills and technical knowledge of one current TCI Department of Environment and Coastal Resources (DECR) officer. However, further capacity building efforts to increase DECR and Protected Area Department staff knowledge and skills with respect to marine turtle biology, conservation and research would be greatly beneficial to TCI turtle conservation. The Department's enforcement patrol, research and monitoring capacity is currently compromised due to a shortage of staff and a limited budget. It is essential that the DECR receives adequate resources to effectively carry out their custodianship of TCI's highly valuable marine and coastal resources on which the country's economy so heavily depends.

To date there has been no long-term dedicated marine turtle research in the Turks and Caicos Islands, and no dedicated decision-making process that involves all stakeholders in the management of TCI's turtle fishery. TCOT SEQ indicated that there was a general acceptance of the importance of marine turtle conservation in TCI. Future conservation measures in TCI will only be effective if they are accepted by the public, and to facilitate such acceptance, stakeholders must have meaningful input into a decision-making progress. Such a process would be most cost-effective if established under existing and appropriate Advisory Committees (e.g. Scientific Authority and/or the Fisheries Advisory Committee). Alternatively, the conservation of marine turtles and their habitats could be considered by advisory groups established and committed to overseeing the implementation of the Environment Charter in TCI.

9.1.1.1. Increase the capacity of the Department of Environment and Coastal Resources (DECR) and the Protected Areas Department (PAD)

a) Ensure DECR/PAD has the capacity, staff and resources to carry out enforcement and monitoring duties relevant to marine turtle management, including data collection, entry, management and analysis for turtle monitoring programmes. Given the importance of all natural resources in the network of Protected Areas, and apparent poor compliance with the National Parks Ordinance, TCOT recommends that an increased capacity to effectively patrol the protected areas should be treated as a priority.

b) It is recommended that national and international funding is sourced to support further capacity-building, as well as dedicated marine turtle population monitoring, turtle genetic sampling, turtle fishery monitoring and turtle conservation awareness and outreach programmes.

c) Ensure that all new research and conservation staff are adequately trained in marine turtle biology, as well as research and conservation techniques.

9.1.1.2. Establish a multi-stakeholder marine turtle management process

a) Identify and establish a marine turtle conservation and management advisory process under the Scientific Authority and/or the Fisheries Advisory Committee. This process should be led and co-ordinated by the DECR and should encourage input from representatives of all interest groups and stakeholders (e.g. government agencies and departments such as DECR and PAD, Department of Planning, TCI Tourist Board; NGO's such as the TCI National Trust; hoteliers; dive operators; construction industry representatives; fishers; schools and colleges and specially interested members of the public). Scientific Authority and/or Fisheries Advisory Committee meetings should discuss marine turtle management issues and advise DECR decisions, paying particular attention to the turtle fisheries, habitat protection, exploring possibilities for sourcing funding, further research/population monitoring, education and

outreach, as well as investigating potential economic benefits of marine turtle conservation. When necessary, DECR could also seek external advice from appropriate experts. It is recommended that appropriate stakeholder input is facilitated by stakeholder attendance at some meetings, with financial support being offered by the Government of TCI (e.g. support of stakeholder inter-island travel etc) when necessary.

9.1.2. Amend legislation and policy to facilitate marine turtle population recovery

The turtle fishery in the Turks and Caicos Islands incurs the largest legal take of marine turtles in the UK Overseas Territories in the Caribbean. From a biological perspective, the Fisheries Protection Ordinance 1998 does not facilitate the sustained management of TCI's nesting and foraging populations of marine turtles. TCOT recognises that a cessation of all turtle fishing would significantly contribute to the recovery of depleted turtle populations. However, TCOT recognises that turtle meat is a component of the traditional TCI diet, and that a demand for turtle meat remains amongst TCI's residents and visitors. TCOT SEQ suggests that foraging turtle populations may be either stable or increasing, indicating that a ban on turtle fishing in TCI would not receive majority support and that such a ban would probably present significant enforcement problems. However, we recommend that future harvest of turtles must be carried out in a highly regulated and controlled manner, with legislation in place to permanently and strictly protect adult turtles, programmes established to monitor stock abundance, and mechanisms in place to reduce or close the fishery in response to measured decreases in turtle stock. It is important to note that the DECR must have the skills, as well as the human, technical and financial resources to effectively manage the fishery.

TCOT recommends a number of legislative changes required to increase the likelihood of sustainability of a turtle harvest in TCI. In addition, it is noted that the regulation of use alone will not serve the sustainable management of turtles in the Turks and Caicos Islands. TCOT therefore also makes recommendations regarding the promotion and publicising of the National Parks Ordinance 1998, which should protect critical marine turtle habitat (see section 9.1.4.2).

9.1.2.1. Amend harvest legislation:

TCOT recommends that the Fisheries Protection Ordinance, 1998 is amended to include the following provisions:

a) Ensure permanent and complete prohibition of harvest of any large, reproductively valuable turtles by instigating a maximum size limit. A suggested maximum may be 50lbs (22.7kg) or less but should be based on additional research on the fishery and turtle stocks. This research should also yield an equivalent maximum curved carapace length for green and hawksbill turtles that should be stipulated in any amended legislation.

b) Consider a continued minimum size limit, as most fishers already accept this as an established conservation measure. A suggested minimum would be 20lbs (9.07kg) with an equivalent minimum curved carapace length for green and hawksbill turtles that should also be stipulated in any amended legislation.

c) Establish a limited turtle fishing licensing scheme, whereby licensed turtle fishers are required to abide by strict regulations regarding fishery practice, limited quotas and catch recording, including statutory monthly catch reporting by fishers to DECR (including incidental catch), and voluntary reporting of all turtles caught in advance of slaughter for biometric measurement and sampling by DECR. Quotas should be reactive and based, inter alia, on number of licensed turtle fishers and stock assessments established through the monitoring regimes. The DECR should have the statutory power to implement spot checks at fish landing sites to assess compliance and to close the fishery if stock monitoring reveals abundance declines below a pre-established and measurable level.

d) Establish a closed season (see NB below) to be reviewed every five years (to facilitate legislative adaptation to possible nesting season shift caused by climate change) to prevent capture of adult turtles entering TCI's waters to breed.

NB. Estimates of composite turtle nesting seasonality for green, hawksbill and loggerhead turtles in TCI, based on regional seasonalities, suggest that while turtle nets are still used in TCI, the ideal closed season would extend from the 1st of April to the 31st of January inclusive (see section 9.5.1). However, it is important to note that no evidence of loggerhead nesting has been recorded in TCI in the last 20 years. TCOT also acknowledges that almost all turtles currently caught in TCI are caught by hand and the use of spearguns and Hawaiian slings is already prohibited. Therefore, if the suggested maximum size limits are introduced, and the use of turtle nets is prohibited as suggested below, then accidental, fatal capture of adult turtles entering TCI's waters to breed will be unlikely. Furthermore, the introduction of a 10 month closed season to the current fishery may present significant enforcement difficulties for the DECR. TCOT therefore suggests that a preliminary 6 month closed season from the 1st of July to December the 31st be considered, to encompass the majority of both the green and hawksbill turtle nesting seasons. This can be reviewed in the future when systematic rookery monitoring, as suggested below, reveals the actual composite turtle nesting season in TCI.

e) Establish regulations with regard to the type of gear that can be used to capture turtles. Possible regulations could ensure permanent and complete prohibition of all turtle capture methods except hand capture (i.e. jumping turtles from a boat and in-water hand capture using only hands and lobster hook) as suggested by turtle fishers during TCOT SEQ.

f) Ensure prohibition of the harvest of loggerhead and leatherback turtles given their very low numbers in TCI.

NB. It is important that all legislative changes are designed under the marine turtle conservation and management advisory process in consultation with the fishing community. Forty-two % of the turtle fishers surveyed said that they thought fishers should be consulted when regulations are set.

9.1.2.2. Amend Planning Policy and Beach Management
Historical records suggest that marine turtle nesting populations in TCI have been subject to prolonged harvest and therefore, while trends in abundance of nesting turtles are unknown, these populations may represent remnants of depleted populations. However, the adverse impacts of increased beachfront development on the nesting populations using TCI mainland beaches must be considered, in addition to the potential adverse impacts of turtle harvest. Every effort should be made to protect the remaining turtle nesting habitat in TCI, and therefore TCOT recommends the following:

a) Where possible, protected status should be extended to all nationally important nesting sites within TCI.

b) Introduce planning regulations to mitigate the adverse impacts of development, including, for example light pollution, nesting female disturbance and erosion on all other nesting beaches.

c) Where the extension of protected status to identified nesting beaches is not possible, TCOT recommends that TCI Government ensures, as a matter of priority, that any development occurring adjacent to important turtle rookeries is undertaken sensitively under the planning regulations mentioned above, to mitigate disturbance and destruction of habitat.

d) Under the guidance of the marine turtle conservation and management process, develop guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings (e.g. property lighting regimes).

9.1.2.3. Recommendations regarding Multilateral Environmental Agreements and TCI national legislation

a) CITES should be extended to TCI as soon as possible, and the appropriate domestic legislation drafted and gazetted, to address the possible trade of hawksbill scutes from TCI to neighbouring states.

b) Given that Article III of CMS accommodates the needs of traditional subsistence users of marine turtles, the Government of TC should consider the role of trade in the subsistence fishery economy of TCI, and limit commercial activities regarding the sale of turtle products.

NB. CITES does not currently extend to TCI and TCOT SEQ corroborates previous reports that suggest there is limited trade in hawksbill turtle shell between TCI, the Dominican Republic and possibly Haiti. TCOT SEQ also suggests that turtle meat may be occasionally and illegally smuggled into the USA via Miami.

9.1.3. Establish systematic monitoring of marine turtle populations to determine trends in abundance
The Turks and Caicos Islands host nesting populations of green and hawksbill turtles, and possibly loggerhead turtles. TCI's waters host regionally significant foraging populations of green and hawksbill turtles, with occasional loggerhead turtles also reported. A lack of recent systematic surveys means that knowledge on abundance and trends in abundance of nesting and foraging populations is absent. Trends in abundance will only be determined by long-term systematic monitoring. In order to understand the conservation status of these populations and inform effective conservation management (e.g. establishment of an appropriate closed season) it is vital to work towards establishing data that will reveal any trends in their abundance, and seasonality of nesting. TCOT therefore recommends, as a matter of priority, that the following monitoring programmes be established, under the guidance of the marine turtle conservation and management advisory process:

9.1.3.1. Establish systematic monitoring efforts at index nesting beaches

a) Seek funds for and establish a comprehensive survey of the beaches of TCI to identify key nesting sites. Ideally, this should involve aerial surveys carried out on at least a monthly basis from April to February inclusive, for three consecutive nesting seasons. These surveys should be followed up by ground truth surveys at sites that show the most nesting activity. Once these 'index' nesting sites have been identified, TCOT recommends that they are regularly monitored on foot (e.g. at least twice a month during the nesting season) to ascertain trends in nesting abundance. Surveys of index nesting sites undertaken in this way should also facilitate extensive genetic sampling to further establish the genetic identity of TCI's nesting turtle populations.

NB. While turtle nesting in TCI appears to be limited to remote cays, this programme should preferably engage local interest groups and residents whenever possible, to facilitate local interest in marine turtle nesting populations. Due to the remoteness of most rookeries, the future development of this programme to incorporate revenue-generating tourist turtle walks is limited, and would only ever appeal to a highly specialised market

9.1.3.2. Establish systematic monitoring efforts at index foraging sites

a) Seek funds for and establish a systematic aerial survey of TCI's waters (perhaps in conjunction with recommendation 9.1.3.1) to understand the current distribution of turtles and identify index foraging sites. Through these surveys, index foraging sites should be identified, and frequently (e.g. once per month) and systematically monitored via boat/snorkel surveys or CPUE sampling to assess trends in abundance of TCI's foraging turtle populations.

b) Expand the sampling regime initiated under TCOT to establish the genetic 'identity' of TCI's nesting and foraging populations. This sampling could be included as part of the surveys mentioned above. The participation of turtle fishers should be encouraged where practicable. Sampling should be extensive and should include an assessment of the prevalence of fibropapilloma (FP) in the foraging, and if possible, nesting turtle populations.

NB. Systematic monitoring at index foraging sites will be essential to assess trends in abundance of foraging populations, and therefore generate the data necessary to responsibly manage TCI's turtle fishery. Under the guidance of the marine turtle conservation and management advisory process, steps should be taken to encourage the involvement of interested local fishers in all monitoring and sampling programmes, and financial incentives to facilitate participation should be considered so long as they fit within the remit of a sustainable programme.

c) Caribbean Turtlewatch has the potential to monitor certain regularly used dive sites for presence and absence of turtles, but requires dedicated staff time to liase with willing dive operators, and treat data generated through the programme. TCOT recommends that if resources allow, DECR/ PAD continue and maintain Caribbean Turtlewatch with current participating dive operators in Providenciales as a relatively cheap method of monitoring turtle abundance at index foraging sites.

9.1.4. Establish further conservation and awareness programmes to sensitise those living in and visiting TCI to marine turtle conservation requirements

Increased awareness of turtles and their conservation requirements in the Turks and Caicos Islands can provide short and long-term mitigation against the threats faced by marine turtles due to development. TCOT recommends the following actions, to be implemented under the guidance of marine turtle conservation and management advisory process, to facilitate public contribution to marine turtle conservation:

9.1.4.1. Encourage and implement sensitive practices at existing nesting beaches

a) Develop a network of hoteliers, beach residents and other beach users to ensure swift reporting of nests not on index beaches, so that they can be marked, protected and monitored. This programme should encourage hoteliers to claim ownership of nest protection and encourage them and their guests to benefit from hatchling emergences.

b) Develop a network of interested beachfront residents and beach/sea users willing to report any turtle strandings and ensure DECR has the capacity to collect, necropsy and document all strandings.

c) Raise awareness through a dedicated campaign to sensitise Islanders to the importance of protecting the nests of such small nesting populations, and to encourage reporting of any illegal take of eggs or nesting females.

d) If nesting activity is detected on developed beaches, DECR should develop guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings, and distribute in the form of an accessible leaflet.

e) Where possible, ensure school participation in any rookery monitoring programmes to sensitise children to importance of rookery protection

9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

a) Raise awareness among residents of the presence in TCI of distinct foraging and nesting turtle populations that contribute to the regional turtle populations, through informational materials and media outputs.

b) Establish a programme of stakeholder meetings to raise awareness of marine turtle biology (including presence of distinct foraging and nesting populations), turtle and habitat conservation needs, national legislation and MEA's.

c) Establish a programme of awareness raising presentations and workshops in fishing communities, schools and other public fora.

d) Establish a programme of awareness raising presentations and workshops to sensitise the tourism industry to the potential impacts of tourism and possible mitigation measures.

e) Develop the TCI National Trust conservation awareness programmes to include curriculum-linked, multi-media marine turtle related educational materials, and expand these programmes to include all schools, with those located in key fishing communities in TCI, as priority.

9.2. Geographical Overview

Forming the south-eastern extremity of the Bahamas chain, The Turks and Caicos Islands lie 145km north of Haiti and the Dominican Republic and 925 km south-east of Miami at approximately 21° 45N, 71° 35W (FCO 1999). There are approximately 40 low-lying islands and cays in the Territory (all <76m above sea-level), covering a total land area of about 500km^2 with only six of the main islands and a few of the small islands currently inhabited.

Photo 9.1. Grand Turk (Photo P. Richardson).

Photo 9.2. The extensive and largely pristine wetlands of North, Middle and East Caicos are fed by a complex of tidal creeks that provide foraging habitat for turtles (Photo P. Richardson).

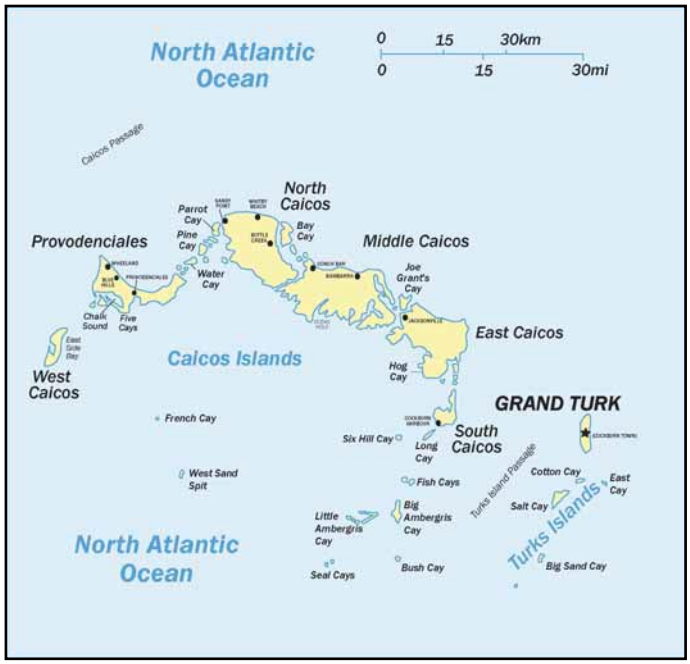

Figure 9.1. Map of the Turks and Caicos Islands.

Over half of the land area consists of wetlands (Proctor & Fleming 1999). The Territory sits on three limestone platforms, the Caicos Bank, the Turks Bank and the Mouchoir Bank (see figure 9.1). The Caicos Bank is the largest (6,140km^2), and to the north is fringed with extensive coral reefs and steep drop-offs, extending along the northern shores of the Providenciales and the Caicos Islands. The majority of Caicos Bank to the leeward of these islands is shallow and sandy, with vast sea grass beds, dominated by *Thalassia testudinum* close to the main islands and a few small cays at the southern extremity of the Bank (Carr *et al.* 1982; Gaudian & Medley 2000; Rudd 2003). The extensive and largely pristine wetlands of North, Middle and East Caicos are fed by a complex of tidal creeks, commonly vegetated by sea grass and algae, and an extensive area encompassing these wetlands, tidal creeks and inshore seagrass beds was declared a Ramsar Convention Wetland of International Importance in 1990 (Fletemeyer 1983; Proctor & Fleming 1999). Grand Turk, Salt Cay and associated cays lie on the Turks Bank (324 km^2), which consists mostly of a sandy bed, with extensive coral reefs and mixed coral and algae beds, while Mouchoir Bank further east is largely coral and sand (Rudd 2003).

The main inhabited islands are Grand Turk (the capital), Providenciales (most populated), South Caicos (the main fishing settlement), Middle Caicos, North Caicos and Salt Cay. The total population in 1998 was estimated at 20,000, including approximately 10,000 foreigners, mostly from Haiti and the Dominican Republic (FCO 1999). In 2000, the GDP per capita stood at US$9,600. Limited rainfall, poor soil and a limestone base have rendered the islands generally unsuitable for agricultural development and the TCI economy is based mainly on tourism and offshore finance. Tourism provides the highest revenue, with 110,855 tourist arrivals using about 2,500 hotel rooms in 1998 (J Skippings (formerly TCI Tourism Board) pers. comm. 2002).

After offshore finance, fishing is the third most important activity, and is the main employment sector on South Caicos (Proctor & Fleming 1999). The two most important fisheries are for lobster (*Panulirus argus*) and Conch (*Strombus gigas*). Most of the lobster and conch that is processed by TCI's fish processing plants is exported to the USA, and it is thought that at least equal, but unrecorded, amounts of conch and lobster are consumed locally (Rudd 2003; B Riggs (DECR) pers. comm. 2004). The local currency is the US Dollar.

9.3. Historical Overview (pre-20th Century)

The Turks and Caicos Islands' extensive reefs and seagrass beds host large foraging populations of juvenile and sub-adult green and hawksbill turtles, with some foraging loggerhead turtles also reported (Carr *et al.* 1982; Fleming 2001; Fletemeyer 1983) (see section 9.6). The numerous beaches on TCI's islands and cays host what is thought to be low-level nesting populations of green, hawksbill and possibly loggerhead turtles (Fletemeyer 1983) (see section 9.5). Leatherbacks may also be occasionally encountered in TCI's offshore waters, but do not nest there (Carr *et al*. 1982).

Pre-Columbian use

These turtle populations have been exploited as a food source in TCI since they were first colonised in about 700AD. Archaeological digs on Grand Turk have revealed that the early Tainos Indian settlers derived 77% of their calories from turtle. The Coralie site (GT-3) on Grand Turk is the island's oldest known human settlement, and work there has revealed the large skull of a loggerhead turtle, estimated to have weighed 1,000lbs when alive, as well as bones of at least 50 green turtles, some exhibiting spearholes. Bones were from specimens of adult, sub-adult and hatchling green turtles, with 85% of the bones coming from juvenile and sub-adult specimens, although nesting females and eggs are also thought to have been harvested (Carlson 2000; Fleming 2001). A hoe made from turtle bone was also discovered at an archaeological site in a cave on Providenciales (Sadler 1997).

Photo 9.4. Turtle carapace bones, showing spear holes, found at Taino archaeological sites on Grand Turk (Photo B. Carlson).

Photo 9.3. Lobster and conch are the TCI's most important fisheries, while finfish and turtles are also taken (Photo P. Richardson).

Use in post-Columbian TCI to the 19th Century

The Tainos inhabited TCI up until at least the late 15th Century, when Columbus 'discovered' Grand Turk in 1492 (Sadler 1997), and were probably dependent on turtles to some extent for as long as they inhabited the islands. After the arrival of the Europeans, Caribbean Indian tribes were decimated by the slave trade, but turtles continued to be utilised in the Turks and Caicos by visiting Europeans (Sadler 1997). Later, in the 18th Century, the TCI had been claimed as British Territory, and the British Government dispatched ships and over 1,000 men from Bermuda to the Turks and Caicos Islands to collect salt in the many lagoons. These operations often lasted 10 to 12 months in which time the workers ate locally harvested food including turtle meat and iguana (Sadler 1997).

By the late 19th Century, Britain was benefiting from a lucrative salt trade from TCI, but also exported sisal, sponge, conch and turtle shell, with £56 of shell exported in 1887, rising to £1,768 worth of shell exported in 1906 (in Sadler 1997). Records from 1849 suggest that green turtles were harvested for their meat, especially at the mouth of North Creek, Grand Turk, and exported to New York (Fleming 2001).

9.4. Organisations Involved with Marine Turtles in TCI

9.4.1. Department of Environment and Coastal Resources (DECR)

The DECR were the key TCOT project partners in TCI, providing excellent advice, staff time, as well as technical and logistical support. Two officers from the DECR attended the TCOT Workshop in Grand Cayman, and one of these also attended the training course in Bermuda in August 2003. Prior to working on TCOT, the DECR had carried out no dedicated marine turtle research or monitoring.

The DECR is a large department with 30 full-time staff, a few part-time staff including a Fisheries sub-department, as well as the Protected Area Department (PAD) that was formally created in 2003. There are DECR offices at the new National Environment Centre (HQ of PAD), Grand Turk (DECR HQ) and South Caicos (office of the Chief Fisheries Officer). DECR have several vehicles and vessels, including two large enforcement patrol boats, a shallow-draught jet boat, as well as some smaller patrol boats and whalers. The DECR is responsible for enforcing several key pieces of legislation relevant to marine turtle management, including the Fisheries Protection Ordinance, Revised Edition 1998 and the National Parks Ordinance, Revised Edition, 1998, and is regularly consulted by other government departments with respect to other key issues such as planning, tourism development and education (M. Fulford-Gardner (DECR) pers. comm. 2003).

Photo 9.5. One of the DECR's fast patrol boats (Photo P. Richardson).

DECR belong to various inter-agency working groups and committees, including the statutory Fisheries Advisory Committee that provides recommendations on fishery management; the National Parks Environmental Advisory Committee that provides recommendations on National Park management and disburses a *Conservation Fund Micro-Projects Programme*; a CITES Working Group that meets quarterly to steer the necessary preparations for CITES extension; and a Scientific Authority that also meets quarterly to discuss and advise on current and planned research programmes in TCI (M Fulford-Gardner (DECR) pers. comm. 2002). DECR also coordinate the National Fishermen's Day, traditionally held in July on South Caicos, where fishers and appropriate agencies meet to discuss fisheries issues and celebrate the TCI fisheries sector. Two DECR officers participated in TCOT capacity-building initiatives, but one of these officers has since left the department. To date, the DECR have not instigated any systematic marine turtle research or conservation programmes, and Fleming (2001) states that the DECR is '*hampered in its efforts to manage and conserve marine life by a shortage of staff*'. DECR communications with DECR management suggest that DECR staff time is over-committed to the various programmes the department is currently involved with, and have little time to dedicate to marine turtle conservation or research (J. Campbell (DECR) pers. comm. 2003).

9.4.2. Turks & Caicos National Trust

The Trust is based on Providenciales, and in 2002 had 200 adult members and 80 junior members. Recently the Trust has been involved in various conservation projects. These include the conservation of Rock Iguanas on various Cays and the conservation of various historical sites. The Trust has also been a key partner in the Darwin Project to establish a management plan for the Ramsar site on North, Middle and East Caicos. The Trust did not have an active involvement in TCOT due to staff commitments, but certainly has the capacity to contribute to future turtle conservation initiatives. The Trust has a strong focus on education, and runs a schools awareness programme and produces "Eco-echoes", a quarterly newsletter for their junior supporters. The Trust is considering reintroducing 'Tessa', an old turtle character from previous "Eco-echoes" editions, in order to publicise turtle conservation efforts in TCI.

Recommendations

9.1.1.2. Establish a multi-stakeholder marine turtle management process

a) Identify and establish a marine turtle conservation and management advisory process under the Scientific Authority and/or the Fisheries Advisory Committee. This process should be led and co-ordinated by the DECR and should encourage input from representatives of all interest groups and stakeholders (e.g. government agencies and departments such as DECR and PAD, Department of

Planning, TCI Tourist Board; NGO's such as the TCI National Trust; hoteliers; dive operators; construction industry representatives; fishers; schools and colleges and specially interested members of the public). Scientific Authority and/or Fisheries Advisory Committee meetings should discuss marine turtle management issues and advise DECR decisions, paying particular attention to the turtle fisheries, habitat protection, exploring possibilities for sourcing funding, further research/population monitoring, education and outreach, as well as investigating potential economic benefits of marine turtle conservation. When necessary, DECR could also seek external advice from appropriate experts. It is recommended that appropriate stakeholder input is facilitated by stakeholder attendance at some meetings, with financial support being offered by the Government of TCI (e.g. support of stakeholder inter-island travel etc) when necessary.

9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

a) Raise awareness among residents of the presence in TCI of distinct foraging and nesting turtle populations that contribute to the regional turtle populations, through informational materials and media outputs.
b) Establish a programme of stakeholder meetings to raise awareness of marine turtle biology (including presence of distinct foraging and nesting populations), turtle and habitat conservation needs, national legislation and MEA's.
c) Establish a programme of awareness raising presentations and workshops in fishing communities, schools and other public fora.
d) Establish a programme of awareness raising presentations and workshops to sensitise the tourism industry to the potential impacts of tourism and possible mitigation measures.
e) Develop the TCI National Trust conservation awareness programmes to include curriculum-linked, multi-media marine turtle related educational materials, and expand these programmes to include all schools, with those located in key fishing communities in TCI, as priority.

9.5. Status of Nesting Marine Turtles in TCI

There has been only one systematic survey of nesting in TCI, when Fletemeyer (1983) carried out partially ground-truthed aerial surveys in 1982, the results of which are shown in Table 9.2. Fleming (2001) states that in the early 1990's a DECR officer carried out '*beach surveys and tagging exercises*' but DECR could not locate any data or reports arising from this survey during TCOT. From his surveys, Fletemeyer (1983) estimated that the TCI hawksbill nesting population consisted of between 125 to 275 nesting females, the green turtle nesting population consisted of between 45 and 105 nesting females, and the loggerhead nesting population consisted of between 25 and 75 females. However, he stated that his estimates of the green and loggerhead populations were made with little confidence and were based on conversations with fishers and divers rather than actual nest counts, with hawksbill nests being the most commonly encountered during his surveys. Ehrhart (1989) later used Fletemeyer's estimate of loggerhead nesting to claim that loggerheads nest in regionally significant numbers in TCI, a claim that has recently been repeated in the literature (Fleming 2001; Proctor & Fleming 1999).

9.5.1. Monitoring efforts

Due to logistical reasons, TCOT was unable to carry out a systematic survey of nesting in TCI. However, as indicated in table 9.2, TCOT did record some turtle nesting activity and conversations with fishers during the TCOT SEQ indicate that some nesting still occurs on the Cays. Table 9.2 also shows where Fletemeyer recorded nesting activity either through physical surveys or through interviews with fishers.

TCOT surveys indicate that low-level nesting occurs on several of the remote Cays and along the northern shores of the North and Middle Caicos, while nesting populations on Providenciales, Grand Turk and Salt Cay appear to have been largely extirpated. TCOT has confirmed that some

Photo 9.6. Peter Richardson and Jasmine Parker (DECR) inspect a recently emerged hawksbill nest on Fish Cay (Photo S. Ranger).

LOCATION	SPECIES	SOURCE
West Caicos (PA - most westerly beaches lie within West Caicos Marine National Park)	Ei, Cm, poss. Cc	Fletemeyer 1983 (TCOT interviews indicated some nesting still occurs on west shore)
Providenciales (PA - NW Point Marine National Park encompasses most westerly beaches, with the remainder within Pigeon Pond and Frenchman's Creek Nature Reserve)	Ei, poss.Cm, Cc	Fletemeyer 1983 (TCOT interviews indicated that beaches at NW Point and further south were nesting beaches in the 1950's. TCOT found no evidence of nesting on NW Point, Providenciales Sept 2003)
Water Cay	Ei, poss. Cm, Cc	Fletemeyer 1983
Pine Cay	Ei, Cm poss Cc	Fletemeyer 1983
Stubbs Cay (PA –within Fort George Land and Sea National Park)	Ei	Fletemeyer 1983
Parrot Cay	Ei, poss. Cm, Cc	Fletemeyer 1983
North Caicos (PA - beaches on East Bay Islands National Park are protected)	Ei, poss. Cm, Cc	Fletemeyer 1983 (TCOT interviews indicate that some nesting still occurs on north shore)
Highas Cay	Ei, Cm, poss. Cc	Fletemeyer 1983 (TCOT interviews indicate that some nesting still occurs on north shore, with one fisherman suggesting this is a nationally important rookery)
Middle Caicos	Ei, Cm, poss. Cc	Fletemeyer 1983 (TCOT confirmed Ei nesting Sept. 2003)
East Caicos (PA - some northerly beaches lie within International Ramsar site)	Ei, Cm, Cc	Fletemeyer 1983 (TCOT interviews indicate that the beaches along the north shore of East Caicos may host nationally important turtle rookeries)
Long Bay (East Caicos)	Poss. Ei	Fletemeyer 1983 (TCOT interviews indicate that these beaches may host nationally important turtle rookeries)
Grand Turk (PA - all westerly beaches lie within Columbus Landfall Marine National Park)	Ei, poss. Cm, Cc	Fletemeyer 1983 (TCOT surveys found no nesting Sept 2002)
Gibbs Cay (PA - lies with Grand Turk Cays Land and Sea National Park)	Cm & poss. Ei	Fletemeyer 1982 (DECR confirmed 1 Cm nest Sept. 02)
Cotton Cay	Poss. Ei	Fletemeyer 1983 (TCOT interviews indicate nesting still occurs)
East Cay (PA - lies with Grand Turk Cays Land and Sea National Park)	Ei	Fletemeyer 1983 (TCOT interviews indicate nesting still occurs)
Salt Cay	Poss. Ei, Cm, Cc	Fletemeyer 1983 (TCOT interviews indicate occasional nests are encountered)
Big Sand Cay (PA - beaches lie within Big Sand Cay Sanctuary)	Ei, Cm	Fletemeyer 1983 (TCOT confirmed Cm nesting Sept. 2003)
South Caicos	Ei, poss. Cm, Cc	Fletemeyer 1983
Fish Cay (PA pending- recently leased to the TCI National Trust, Sanctuary status pending, R. Wild, pers. comm. 2003)	Ei, poss. Cm	Fletemeyer 1983 (TCOT confirmed Ei nesting Sept. 2003)
Big Ambergris Cay	Ei, poss. Cm	Fletemeyer 1983 (TCOT confirmed Ei nesting Jan. 2004)
Little Ambergris Cay (PA pending- recently leased to the TCI National Trust, Nature Reserve status pending, R. Wild, pers. comm. 2003)	Poss. Ei & Cm	Fletemeyer 1983 (TCOT interviews indicate nesting still occurs)
Bush Cay (PA - lies within French, Bush and Seal Cays Sanctuary)	Ei	Fletemeyer 1983 (DECR found 15 Ei nests on 9th January 1992, TCOT found 3-4 nests, probably Ei, Sept. 2002)
French Cay (PA - lies within French, Bush and Seal Cays Sanctuary)	Ei, Cm, poss Cc	Fletemeyer 1983 (TCOT interviews indicate some nesting still occurs here, with some fishermen suggesting this is a nationally important rookery)
White Cay (PA - lies within French, Bush and Seal Cays Sanctuary)	Ei	Fletemeyer 1983 (TCOT interviews indicate nesting still occurs)
Lower Seal Cay (PA - lies within French, Bush and Seal Cays Sanctuary)	Unknown	TCOT interviews indicate some nesting still occurs here
West Sand Spit	Cm, poss. Cc, Ei	Fletemeyer 1983 (TCOT interviews indicate nesting still occurs)
Nurse Cay	Poss. Ei	Fletemeyer 1983
Sand Bars Cay	Poss. Ei, Cm	Fletemeyer 1983
Shot Cay (PA - lies within French, Bush and Seal Cays Sanctuary)	Ei, poss. Cm	Fletemeyer 1983

Table 9.2. Nesting activity indicated by Fletemeyer's 1982 surveys (and other sources, including TCOT, where indicated). NOTES: Location: PA – Protected Area. Species: Ei=hawksbill, Cm=green, Cc= loggerhead.

hawksbill and limited green turtle nesting still occurs in TCI, but found no evidence to support the claim that TCI supports a regionally important nesting population of loggerhead turtles. Fletemeyer (1983) suggests that the nesting season for all turtle species in the TCI extends from April to August inclusive. However, TCOT surveys confirmed that green and hawksbill turtles nest in September, and in January 1992, DECR found 15 hawksbill nests on Bush Cay. One TCOT SEQ interviewee who formerly collected turtle eggs claimed to have collected eggs from June to September, whereas 5 claimed they could collect them all year (see section 9.6.3). To understand the likely nesting season for green, hawksbill and possible loggerhead nesting populations in TCI, it is necessary to consider the nesting seasons of these species on nearby islands.

The loggerhead turtle nesting season in the Cayman Islands extends from May to August, green turtle nesting in the Bahamas occurs from June to September (in Hirth 1997), and in nearby Cuba, the hawksbill season extends from August to February, with peak nesting activity occurring between September and January (Moncada *et al.* 1999). Therefore, the likely composite marine turtle nesting season in the TCI is from May to January. TCOT uses this and individual species' nesting seasons to guide recommended legislative amendments with respect to the introduction of a closed season for turtle harvest at sea.

9.5.2. Genetics of nesting populations

No nesting green turtles or hatchlings were sampled in TCI during TCOT and only one hawksbill hatchling was sampled, from a recently emerged nest on Fish Cay in September 2002. TCOT genetic analysis of this sample has revealed a previously undescribed haplotype, provisionally entitled TCOT3. During TCOT genetic analyses, TCOT3 was also discovered in ***foraging*** hawksbill populations in Anguilla, BVI and Montserrat, as well as in nesting hawksbill populations in Anguilla and Montserrat (see section **10.4.4)**. Further sampling of TCI's nesting populations is urgently required to fully understand and establish their genetic identity.

9.5.3. Data from TCOT SEQ

Of the 92 TCOT SEQ interviewees, only 29 (31.5%) said that they had noticed trends in turtle nesting activity in TCI. Of these, only 7 (24.1%) said that green turtle nesting had increased and 2 (6.9%) said that hawksbill turtle nesting activity had increased in the last 5 years. One respondent said that green turtle nesting had decreased, 1 said that it had stayed the same, and this was mirrored by the responses to hawksbill nesting trends. Only 3 respondents answered the question specifically about loggerhead nesting, with 1 respondent each suggesting that nesting had increased, decreased and stayed the same in the last 5 years.

Nineteen (65.5%) of the 29 respondents who had noticed trends in turtle nesting activity in TCI in the last 5 years answered the question generally, and these present perhaps a more useful indication of perceived changes in nesting activity. Of these, 1 (5.3%) thought nesting activity had increased, 6 (31.6%) thought it had decreased and 8 (42.1%) thought it had remained the same. These respondents do not present a clear pattern of perceived change, and this may be because nesting now appears to be largely limited to remote cays that are not regularly visited by the majority of interviewees and therefore encounters with turtle nests are unusual. However, from these limited responses, there seems to be general perception that turtle nesting activity has either stayed the same or decreased in the last five years.

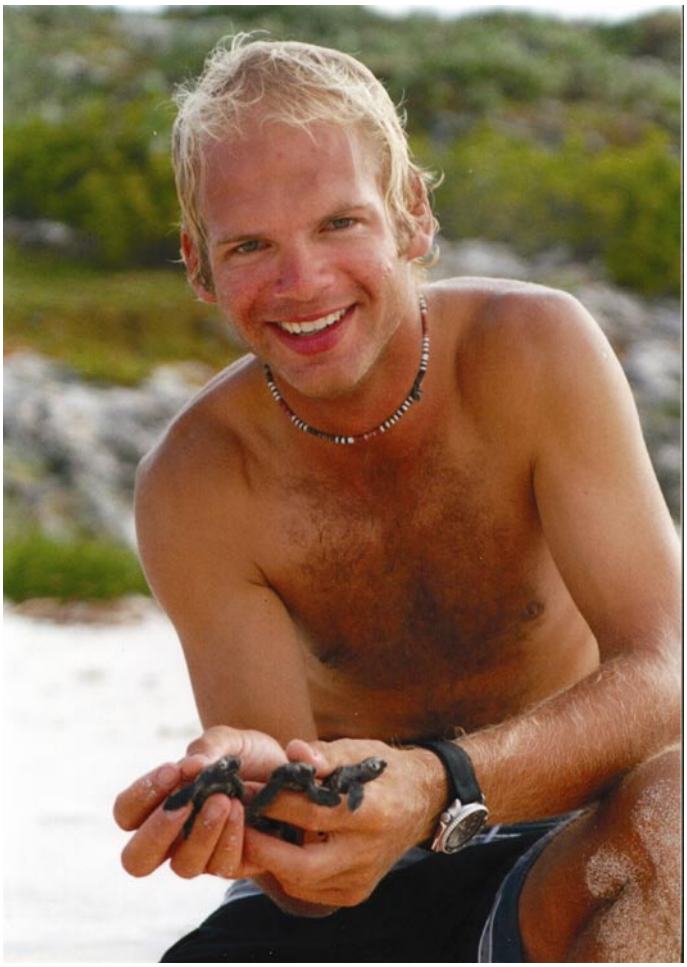

Photo 9.7. Duncan Vaughan (ex-DECR) on Fish Cay with hawksbill hatchlings from the only turtle nest sampled in TCI during TCOT (Photo S. Ranger).

Species-specific responses to the question regarding perceived nesting trends since respondents could remember were similar and therefore as unclear as the species-specific responses described above. Of the 19 respondents who answered the question generally, 2 (10.5%) thought that nesting had increased, 12 (63.2%) thought that nesting had decreased and 5 (26.3%) thought that it had remained the same. Again, while these responses only give a limited impression of perceived changes, one can conclude that there is general perception that turtle nesting activity has decreased in TCI since people can remember.

9.5.4. Threats to TCI's nesting populations

The general perception of declining nesting activity in TCI may reflect real nesting population trends. The extensive take of nesting females and their eggs, prior to and since the introduction of the Fisheries Protection Regulations, 1976, are likely to have had serious adverse impacts on nesting populations. Several TCOT SEQ interviewees commented that the harvest of nesting females and their eggs was common practice on Salt Cay and Grand Turk earlier in the 20th Century, but TCOT surveys suggest that turtle nesting activity on these islands is now either absent or rare. Other interviewees noted that they had seen nesting activity on Grand Turk and on the west coast of Providenciales when they were younger, but not in recent years.

Egg collection and overfishing were identified by 3.2% (n=2) and 8.1% (n=5) respectively of the 62 TCOT SEQ interviewees who provided reasons for a perceived decrease in turtle populations in TCI. This suggests that the majority of interviewees do not perceive current or historical levels of harvest of turtles and their eggs in TCI as major threats. In contrast, tourist development of TCI was the most commonly identified reason for a decline in nesting activity, identified by 38.7% (n=24) of the 62 respondents who gave reasons for a decline of nesting and foraging populations. Development encompassed specifically identified adverse effects of light pollution, boat traffic, vehicle traffic behind the nesting beaches, disturbance on the nesting beaches and the toxic effects of suntan lotion in inshore waters.

Tourism is the main economy of the TCI, and has experienced accelerated growth since the international runway was built on Providenciales in 1986 (Gaudian & Medley 2000; Robinson & Fulford 1997). Since then, there has been significant pressure to develop beaches for tourism, especially in Providenciales, although significant tourist development has occurred on Grand Turk and lower levels of development has occurred on the other islands and some small cays. Sand for construction is often mined from the beaches (Gaudian & Medley 2000; Proctor & Fleming 1999; Robinson & Fulford, 1997). Despite development guidelines provided by the TCI Development Manual (Govt. of TCI 1996), which include a recommended setback of 60feet from the high-tide line and preservation/rehabilitation of beach vegetation, developers routinely build permanent structures within the set-back threshold and clear beach vegetation for development projects. In many cases this has led to beach destabilisation and coastal erosion (Gaudian & Medley 2000; Robinson & Fulford 1997).

Insensitive tourism development certainly has the potential to impact turtle nesting beaches, and may well have done so in TCI. However, both Providenciales and Grand Turk have extensive stretches of undeveloped beaches lying within protected areas (see table 9.2), where, according to some TCOT SEQ interviewees, nesting females and their eggs were historically harvested and where nesting now appears to be absent. This suggests that extensive harvest at the nesting beaches has lead to the demise of some rookeries within TCI.

Fortunately, the majority of the existing nesting beaches lie within the network of protected areas in TCI, where the erecting of any structure is prohibited unless authorised by the Director of Planning under the National Parks Ordinance, 1998 (see table 9.2). Notable exceptions that lie without the protected area network are Big Ambergris Cay and Highas Cay (immediately east of North Caicos) and Long Bay (East Caicos), cays that were consistently referred to as important turtle nesting sites during the TCOT SEQ. Big Ambergris Cay is privately owned and a large new hotel complex is currently under construction there (Anon 2002), whereas plans have been proposed to the TCI Government to develop East Caicos into a cruise liner port and tourist resort (Pienkowski 2002). This development is of particular concern as it would involve extensive and ecologically catastrophic development of the northern shore, reported to be the site of an important rookery, and part of the International Ramsar site, where development is prohibited unless authorised by the Director of Planning. These developments highlight the urgent need to identify TCI's marine turtle rookeries and protect those rookeries deemed nationally important.

Summary

In conclusion, knowledge of turtle nesting activity remains limited and this is of significant conservation concern for TCI's nesting marine turtle populations. Based on collated local knowledge, nesting populations in TCI have been extensively harvested and appear to have declined from the inhabited islands, with some nesting still occurring on remote cays and beaches. TCOT SEQ suggests that a significant percentage of the interviewees perceived development of beaches as a major reason for this decline, and that there is a relatively low level of awareness regarding the adverse impacts of egg and nesting female turtle harvest. This may explain why there has been relatively poor compliance with, and enforcement of, the national legislation that has prohibited these harvests since 1976. Tourism development may have impacted some nesting beaches in TCI, and certainly has the potential to impact on those rookeries located without TCI's network of protected areas.

Photo 9.8. Development immediately adjacent to a beach within Princess Alexandra National Park, Providenciales (Photo P. Richardson).

Recommendations

9.1.2.2. Amend Planning Policy and Beach Management

a) Where possible, protected status should be extended to all nationally important nesting sites within TCI.

b) Introduce planning regulations to mitigate the adverse impacts of development, including, for example light pollution, nesting female disturbance and erosion on all other nesting beaches.

c) Where the extension of protected status to identified nesting beaches is not possible, TCOT recommends that TCI Government ensures, as a matter of priority, that any development occurring adjacent to important turtle rookeries is undertaken sensitively under the planning regulations mentioned above, to mitigate against disturbance and destruction of habitat.

d) Under the guidance of the marine turtle conservation and management process, develop guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings (e.g. property lighting regimes).

9.1.3.1. Establish systematic monitoring efforts at index nesting beaches

a) Seek funds for and establish a comprehensive survey of the beaches of TCI to identify key nesting sites. Ideally, this should involve aerial surveys carried out on at least a monthly basis from April to February inclusive, for three consecutive nesting seasons. These surveys should be followed up by ground truth surveys at sites that show the most nesting activity. Once these 'index' nesting sites have been identified, TCOT recommends that they are regularly monitored on foot (e.g. at least twice a month during the nesting season) to ascertain trends in nesting abundance. Surveys of index nesting sites undertaken in this way should also facilitate extensive genetic sampling to further establish the genetic identity of TCI's nesting turtle populations.

9.1.4.1. Encourage and implement sensitive practices at existing nesting beaches

a) Develop a network of hoteliers, beach residents and other beach users to ensure swift reporting of nests not on index beaches, so that they can be marked, protected and monitored. This programme should encourage hoteliers to claim ownership of nest protection and encourage them and their guests to benefit from hatchling emergences.

b) Develop a network of interested beachfront residents and beach/sea users willing to report any turtle strandings and ensure DECR has the capacity to collect, necropsy and document all strandings.

c) Raise awareness through a dedicated campaign to sensitise Islanders to the importance of protecting the nests of such small nesting populations, and to encourage reporting of any illegal take of eggs or nesting females.

d) If nesting activity is detected on developed beaches, DECR should develop guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings and distribute in the form of an accessible leaflet.

e) Where possible, ensure school participation in any rookery monitoring programmes to sensitise children to importance of rookery protection.

9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

b) Establish a programme of stakeholder meetings to raise awareness of marine turtle biology (including presence of distinct foraging and nesting populations), turtle and habitat conservation needs, national legislation and MEA's.

9.6. Status of Foraging Marine Turtles in TCI

TCI provides extensive foraging habitat for green and hawksbill turtles, while some foraging loggerhead turtles have also occasionally been reported (Carr *et al.* 1982; Fletemeyer 1983). Features of the TCI landscape bear testament to the presence of foraging turtles, with Turtle Pond, Turtle Creek and Turtle Cove found on Providenciales alone. Fletemeyer encountered large numbers of green turtles foraging on the seagrass beds immediately south of North, Middle and East Caicos, as well as in the tidal creeks that permeate the southern shores of these islands. Fletemeyer's stomach content analysis of harvested green turtles from these creeks indicates that they are foraging primarily on seagrass (*Thalassia testudinata*). Green turtles were also recorded feeding on sea grass beds at Highas Cay and Bottle Creek on the north shore of North Caicos. At Bottle Creek, Fletemeyer (1983) captured 9 foraging juvenile green turtles ranging from 26.5cm to 45cm CCL (mean±SD = 40.3cm ± 6.7cm) and 1 foraging sub-adult green turtle (71cm CCL) during his 1982 surveys. Fletemeyer also encountered large numbers of hawksbill turtles of different sizes on TCI's shallow and deepwater fringe and patch reefs, as well as one juvenile on a seagrass bed and several juveniles at Ocean Hole. Ocean Hole is a 1km wide, deep-water submerged hole in the limestone platform on the Caicos Bank immediately south of Middle Caicos.

Location	Species	Source
West Caicos (PA – West Caicos Marine National Park)	Ei, Cm	Slade, 2004 (Caribbean Turtlewatch)
Providenciales – North West Point (PA – North West Point Marine National Park)	Ei, Cm	Slade, 2004 (Caribbean Turtlewatch)
Providenciales – various sites in Princess Alexandra Land and Sea National Park (PA)	Ei, Cm	Presence of Ei & Cm confirmed by TCOT surveys Sept. 2002. Slade, 2004 (Caribbean Turtlewatch)
Providenciales – Blue Hills	Cm	Fletemeyer, 1983
Providenciales – Silly Creek	Cm	Presence of Cm confirmed by TCOT surveys Sept. 2002
Little Water Cay (PA – lies within Princess Alexandra Land and Sea National Park)	Cm	Fletemeyer, 1983 (TCOT SEQ indicated large foraging turtle populations here)
Pine Cay	Ei	Fletemeyer, 1983 (TCOT SEQ indicated large foraging turtle populations here)
Parrot Cay	Unidentified	Fletemeyer, 1983 (TCOT SEQ indicated large foraging turtle populations here)
Southern coast & creeks of North, Middle and East Caicos (PA - Ramsar Site)	Ei, Cm	Fletemeyer 1983 (Presence of Ei & Cm confirmed by TCOT surveys Sept. 2002)
Ocean Hole (PA – lies within Vine Point and Ocean Hole Nature Reserve)	Ei, Cm	Carr et al, 1981, Fletemeyer 1983 (presence of Cm confirmed by TCOT surveys Sept. 2002)
Bottle Creek	Cm	Fletemeyer 1983 (TCOT SEQ indicated large foraging turtle populations here)
Highas Cay	Ei, Cm	Fletemeyer 1983 (TCOT SEQ indicated large foraging turtle populations here)
Windward Passage Going Through (PA - lies within the International Ramsar site)	Cm, Ei	TCOT SEQ indicated large foraging turtle populations
Bell Sound, South Caicos (PA – lies within Bell Sound Nature Reserve)	Ei	Presence of Ei confirmed by TCOT sampling Sept. 2002
Six Hills Cay (PA – lies within Admiral Cockburn Nature Reserve)	Ei	Presence of Ei confirmed by TCOT sampling Sept. 2002
Long Cay (PA – lies within Admiral Cockburn Nature Reserve)	Ei	Presence of Ei confirmed by TCOT sampling Sept. 2002
Middleton Cay (PA – lies within Admiral Cockburn Nature Reserve)	Ei	Presence of Ei confirmed by TCOT sampling Sept. 2002
Big Ambergris Cay	Ei, Cm	Fletemeyer 1983 (Presence of Ei confirmed by TCOT surveys Sept. 2002)
Little Ambergris Cay (PA pending– leased to the National Trust, Nature Reserve status pending, R Wild pers. comm., 2003)	Ei, Cm	Fletemeyer 1983 (Presence of Ei confirmed by TCOT sampling Sept. 2002)
Fish Cay (PA pending– leased to the National Trust, Sanctuary status pending, R Wild pers. comm., 2003)	Ei, Cm	Fletemeyer 1983 (Presence of Ei confirmed by TCOT surveys Sept. 2002)
Bush Cay (PA – lies within French, Bush and Seal Cays Sanctuary)	Ei	Presence of Ei confirmed by TCOT sampling Sept. 2002
Grand Turk (PA – extensive foraging habitat lies within Columbus Landfall Marine National Park, Grand Turk Cays Land and Sea National Park and South Creek National Park)	Ei, Cm	Fletemeyer 1983
Gibbs Cay (PA – lies within Grand Turk Cays Land and Sea National Park)	Ei, Cm	Fletemeyer 1983
Cotton Cay	Ei, Cm	Fletemeyer 1983
East Cay (PA – lies within Grand Turk Cays Land and Sea National Park)	Ei, Cm	Fletemeyer 1983
Salt Cay	Ei, Cm	Fletemeyer, 1983, Groombridge & Luxmore, 1989 in Proctor & Fleming, 1999
Big Sand Cay (PA – lies within Big Sand Cay Sanctuary)	Cm	Presence confirmed by TCOT surveys Sept. 2002
Pear Cay (PA – lies within French, Bush and Seal Cays Sanctuary)	Ei	Presence confirmed by TCOT sampling Oct. 2002
French Cay (PA – lies within French, Bush and Seal Cays Sanctuary)	Ei, Cm	Slade, 2004 (Caribbean Turtlewatch)

Table 9.3. Marine turtle foraging areas in TCI as identified by Fletemeyer's 1982 surveys and other sources.NOTES: Location: PA – Protected Area. Species: Ei=hawksbill, Cm=green, Cc= loggerhead.

Local fishers also describe a 'mulatto' turtle, although Carr *et al.* (1982) and Fletemeyer (1983) suggest that this may be a local name for the loggerhead turtle, despite some fishers clearly identifying loggerhead turtle as a distinct and separate species. Fletemeyer does not discount that 'mulatto' turtles may in fact be ridley turtles (*Lepidochelys* spp.), but did not record either olive ridleys or Kemp's ridleys during his surveys. Table 9.3 shows sites where foraging green and hawksbill turtles were encountered during Fletemeyer's 1982 survey, as well as records from other sources, including TCOT and associated programmes.

9.6.1. Monitoring efforts

Little or no long-term monitoring of TCI's foraging marine turtle populations has been carried out, and therefore trends in abundance of these populations are unknown. Fleming (2001) reports that a dive operator on Grand Turk buys turtles from fishers and has tagged and released nearly 300 turtles in the last few years. TCOT staff were unable to access this operator's records and therefore the results of this effort are unclear.

Photo 9.9. A juvenile green turtle swims over sea grass beds at Bight Reef, Princess Alexandra National Park (Photo P. Richardson).

Photo 9.10. Jasmine Parker takes a genetic sample from a juvenile green turtle caught within the Ramsar site (Photo P. Richardson).

During the TCOT project in TCI, systematic surveying of index foraging sites was implemented (with advice from TCOT) by Lorna Slade at Bight Reef (40 visits), Smith's Reef (13 visits), Turtle Gardens (18 visits), Turquoise Reef (14 visits) and Table Top (11 visits), all within the boundaries of the Princess Alexandra National Park along the north shores of Providenciales (Slade in press). The sites were similar, each consisting of an area of patch reef adjacent to a seagrass bed. Sites were visited between February 2002 and February 2004 before 13:00hrs and snorkel surveys were carried out for 30 minutes at relatively consistent speeds. Any turtles encountered were identified and an estimate of Straight Carapace Length (SCL) was noted, as was the turtles' behaviour and various environmental factors such as weather and visibility. Juvenile green (30cm to 66cm SCL) and hawksbill (25cm to 51cm SCL) turtles were encountered at all sites except Table Top where no turtles were encountered. These surveys indicate that Princess Alexandra National Park provides foraging habitat for juvenile green and hawksbill turtles, and they will be fully reported in time by Lorna Slade and her TCOT collaborators. No other systematic surveying of index sites was implemented under TCOT.

Slade (in press) also coordinated Caribbean Turtlewatch in TCI. Dive Provo and Flamingo Divers regularly completed Caribbean Turtlewatch datasheets, resulting in 318 and 118 recorded turtle sightings respectively. Dives were conducted at fringe reef sites off West Caicos, French Cay, North West Point (Providenciales), Princess Alexandra National Park (Providenciales) and South West Reef (Providenciales), with green and hawksbill turtles seen at all sites except South West Reef, where no turtles were encountered during the survey period. Hawksbill turtles were the most commonly encountered species (83.4% of sightings), including individuals with estimated SCL's of between 23cm and 122cm. It is of interest that the next most commonly encountered species was the 'mulatto', constituting 4.7% of sightings (n=20) including individuals with estimated SCL's of between 31cm to 91cm.

When asked to identify this species on the WIDECAST photographic turtle ID chart, dive operators consistently indicated that they were seeing Kemp's ridley turtles. TCI Caribbean Turtle watch data included 13 loggerhead sightings (3.1% of sightings) including individuals with SCL's between 61cm and 122cm, 12 green turtle sightings (2.8% of sightings) including individuals with estimated SCL's of between 40cm and 91cm, while 23 sightings were unidentified (5.5%). Preliminary analysis of the TCI Caribbean Turtlewatch data therefore suggests that TCI's fringing reefs provide foraging habitat for juvenile, sub-adult and adult hawksbill turtles, with similar size classes being represented on the fringing reefs within smaller populations of green and loggerhead turtles. TCI's fringing reefs may also support a small foraging population of Kemp's Ridleys, although their presence in TCI has not yet been corroborated.

9.6.1.1. TCOT genetic sampling and tagging

Green and hawksbill turtles were captured by TCOT staff, DECR or accompanying fishers during sampling trips to the International Ramsar site, South Caicos, Middle Caicos and some of the cays south of South Caicos (see below). Turtles were tagged, sampled and biometric measurements were taken on board the boats used and turtles were returned to the water where they were caught. However, most of the turtles sampled were captured opportunistically by South Caicos fishers during normal fishing activity and brought to South Caicos where they were tagged, sampled and measured by DECR officers (see below).

Morphometric data: Straight carapace length, width and plastron length measurements are recorded for turtles on capture and following each recapture.

Genetic Sampling: Skin biopsies are obtained from a rear flipper with a sterile 4-millimetre biopsy punch or scalpel and preserved in a buffer solution of 20% dimethyl sulfoxide (DMSO) saturated with Sodium Chloride (NaCl) (Dutton 1996).

Tagging: All captured turtles are tagged according to standard protocols to prevent collection of duplicate genetic samples and to elucidate demographic parameters. Metal Inconel tags are applied to the posterior edge of each front flipper and Passive Integrated Transponder (PIT) tags are injected into the shoulder muscle (Balazs 1999).

During scoping surveys, TCOT staff observed foraging juvenile green turtles in the Silly Creek, south Providenciales in September 2002. TCOT genetic sampling confirmed that the sea grass beds and tidal creeks associated with the International Ramsar Site on the southern shores of North, Middle and East Caicos provide extensive foraging habitat to a significant population of juvenile and sub-adult green turtles. TCOT sampled within the Ramsar site because accompanying fishers suggested that the site encompasses the best turtling grounds in the archipelago. Fifteen (88.2%) of the 17 green turtles captured for TCOT sampling were caught on the sea grass beds within the Ramsar site during three sampling trips, while the other two were caught off South Caicos and at Six Hills Cay (see Table 9.4, Mean CCL(cm) ± SD; 51.5 ± 7.8). In addition, TCOT staff witnessed the landing of an adult green turtle (CCL=103.5cm) at Cockburn Harbour, South Caicos by a local turtle fisher on the 4th September 2002. He had found it resting at the base of a coral head in patch reef at Six Hill Cay and he and his crew had hauled it aboard with lobster hooks. When butchered, the animal yielded many developing eggs and had a gut packed with freshly ingested seagrass. The lower intestine was impacted with a blockage consisting of plastic bags, burlap packaging, copper wire and plastic drinks containers**.** This turtle was probably captured during an inter-nesting interval and may have been part of TCI's green turtle nesting population. Six Hill Cay lies within the Admiral Cockburn Nature Reserve and as such fishing is prohibited within the Reserve boundaries.

Samples were also taken from 41 live captured hawksbill turtles and one suspected hawksbill/loggerhead hybrid (see table 9.4 - Mean CCL (cm) ± SD; 40.9 ± 10.2). The hawksbills were either caught and sampled by TCOT (n=2) or the DECR (n=9), were landed by fishers for butchery (n=4), or were landed by fishers for the DECR to sample (n=26). This cooperation was facilitated by Amber Thomas, former DECR Conservation Officer at South Caicos, who issued a request to some South Caicos fishers that they opportunistically catch and land any turtles they encounter

Photo 9.11. DECR officers worked with South Caicos fishermen during TCOT sampling (Photo P. Richardson).

Photo 9.12. An adult female green turtle landed at South Caicos in September 2002 (Photo P. Richardson).

Photo 9.13. Gut contents of a butchered adult female green turtle, showing ingested marine litter (Photo P. Richardson).

while undertaking their normal fishing, usually for other target species such as lobster (A Thomas (DECR) pers. comm. 2002). From September to December 2002, 6 South Caicos fishers caught and landed 26 hawksbill turtles and 2 green turtles for the DECR to sample, tag and release, while 4 hawksbills landed for butchering were also sampled. The butchered hawksbills had CCL's of 47cm, 48cm, 58cm and 80cm respectively and were therefore larger than the mean hawksbill landed for TCOT to tag and release. It is worth noting that these butchered turtles do not represent the total number of turtles landed for use in the described period, as most fishers would not bring green turtles to the DECR for sampling, rather they would take them directly to Providenciales for sale (A. Thomas (DECR) pers. comm. 2003).

Fibropapillomatosis (FP) is a widespread and sometimes fatal epizootic disease that is commonly associated with green turtles, but has also been pathologically confirmed to occur in populations of hawksbill, leatherback, loggerhead and olive ridley turtles and has been reported in Kemp's ridley and flatback turtles (Aguirre 1998; Aguirre *et al.* 2000, Barragan & Sarti 1994; D'Amato & Moraes-Neto 2000; Herbst 1994; Huerta *et al.* 2002; Jacobsen *et al*. 1989). FP has been recorded in turtle populations around the world, including green turtle populations in the Cayman Islands and both the British and US Virgin Islands (Eliziar *et al.* 2000; Overing 1996; Wood & Wood 1993). Seven (41.2%) of the 17 juvenile green turtles captured for TCOT genetic sampling exhibited FP like growths (see table 9.4). Biopsies of the growths were taken and will be examined in the UK and described in later publications. In addition, during TCOT SEQ, a recreational bonefish angler reported the accidental capture, on rod and line, of a sub-adult hawksbill turtle in the tidal creeks of the Caicos Islands, which apparently also exhibited FP-like growths on the head and flippers. Conversations with TCI fishers have revealed that FP-like symptoms are locally referred to as 'old turtle disease'.

Species	Mean CCL (cm) ± SD (range)	Capture location	Caught by
Green (n=17)	51.5 ± 7.8 (38.3-64.8)	International Ramsar site	Fisherman (n=2) & TCOT (n=15) for TCOT all turtles tagged & released; FP=7)
Green (n=1)	103.5	Six Hills Cay	Fishermen (butchered for sale)
Hawksbill/ loggerhead hybrid(n=1)	43.3	Unknown	Fisherman (tagged & released)
Hawksbill n=41)	40.9 ± 10.2 (22.9-80)	South Caicos (n=4), Middleton Cay (n=1), Big Ambergris Cay (n=4), Six Hills Cay (n=11), Bell Sound (n=3), International Ramsar site (n=3), Bush Cay (n=1), Long Cay (n=1), Iguana Cay, Middle Caicos (n=1) , Fish Cay (n=3), Long Cay (n=1), Pear Cay (n=1), Unknown (n=6)	Fishermen (n=30), DECR (n=9), TCOT (n=2) (All tagged & released except 4 that were butchered)

Table 9.4. Live captured turtles genetically sampled during TCOT (FP= indicates presence of fibropapilloma-like growths).

Photo 9.14. A South Caicos fisher with green and hawksbill turtles caught during TCOT sampling within the Ramsar site (Photo P. Richardson).

9.6.2. Genetics of foraging populations

TCOT genetic analyses have shown that the haplotypes of foraging turtles in TCI have also been described in a number of other nesting and foraging sites (see section 10.4.4)**.**

Foraging green turtles in TCI: Haplotypes described in the 17 samples that generated data during TCOT genetic analysis (1 sample failed) have also been described in ***foraging*** populations in Anguilla (via TCOT), Bahamas, Barbados, BVI (via TCOT), Florida, Montserrat (via TCOT), Nicaragua and West Africa. Some of these haplotypes have also been described in ***nesting*** populations in Ascension Island, Aves Island, Brazil, Costa Rica, Florida, Mexico, and Suriname, as well as Bioko, Guinea Bissau, and Sao Tome and Principe on the west coast of Africa.

Foraging hawksbill turtles in TCI: Haplotypes described in the 38 samples that generated data during TCOT genetic analysis (8 samples failed) have also been described in ***foraging*** populations in Anguilla (via TCOT), BVI (via TCOT), Cayman Islands (via TCOT), Cuba, Montserrat (via TCOT) and Puerto Rico. Some of these haplotypes have also been described in ***nesting*** populations in Anguilla (via TCOT) Antigua, Barbados, Belize, Brazil, Cuba, Mexico, Montserrat (via TCOT), Puerto Rico and the US Virgin Islands.

It should be noted, however, that these are only potential linkages as haplotypes are not unique to individual nesting colonies. Complex mathematical analyses will be run on full sample sets following the next batch of analyses during 2005 and more definitive answers will be available then. At this point, however, it can be clearly highlighted that the turtles foraging in TCI waters will undoubtedly include those originating from a number of nesting colonies across the Caribbean region. Detailed information will be disseminated as part of the cross-territory FCO Overseas Territories Environment Programme (OTEP) funded project, which will focus on Turtle Conservation and the Environment Charter and Multilateral Environment Agreements. However, further sampling of TCI's foraging turtle populations is required to fully understand and establish their genetic identity.

9.6.3. Threats to TCI's foraging turtle populations

Illegal fishing within TCI's network of protected areas may be considered a threat to foraging populations of marine turtles, as these areas have been established as refuges for TCI's wildlife, including marine turtles (Gaudian & Medley 2000). It is worthy of note that of the 30 hawksbills captured by fishers as described in section 9.6.1, 50% (n=15) were caught in the protected areas of Six Hills Cay (n=9), the International Ramsar site (n=1), Bell Sound, South Caicos (n=1), Long Cay (n=1), Middleton Cay (n=1), Bush Cay (n=1) and Pear Cay (n=1), where fishing is prohibited under the National Parks Ordinance, 1998. The hawksbill captured at Pear Cay in October 2002, was an adult female (CCL=80cm) and was one of those butchered for sale.

This reinforces some TCOT SEQ interviewee claims that illegal fishing occurs in several of the protected areas (see section 9.7.1), particularly those away from population centres where enforcement is non-existent (Gaudian & Medley 2000). These sites, as well as the others listed in tables 9.3 and 9.4, provide extensive foraging habitat for what is probably a large population of green and hawksbill turtles in TCI's waters.

Photo 9.15. Fibropapilloma-like growths on juvenile green turtle caught within the Ramsar site (Photo P. Richardson).

During TCOT SEQ, several interviewees claimed that migrant fishers from the Dominican Republic and Haiti were illegally fishing for turtles and other species in TCI's waters (see section 9.7.1), but TCOT was unable to validate or quantify the extent of this harvest (see section 9.6.4). Indeed, the current legal turtle harvest may also pose a threat to TCI's foraging turtles, but as there are no programmes to monitor the turtle fishery or trends in turtle population abundance, it is currently impossible to determine the impacts of this harvest of TCI's turtles.

There are few other threats to TCI's foraging turtles. Proctor & Fleming (1999) report that TCI reefs show little sign of being deleteriously affected by human activity, while Gaudian and Medley (1995; in Gaudian & Medley 2000) showed that there was small but measurable diver impacts on reef benthos. However, there are concerns that inadequate sewage disposal facilities at recent tourism developments may lead to inshore water contamination (Robinson & Fulford 1997), and in May 2002, TCOT staff witnessed juvenile green turtles swimming amongst significant sewage pollution at Turtle Cove, which lies in the Princess Alexandra National Park. Extensive and prolonged sewage effluent can significantly and adversely affect coral reef and seagrass bed ecosystems (Gibson & Smith 1999). The sewage and hyper-saline water discharge pollution in Turtle Cove is currently being addressed by the Planning Department, Environmental Health Department and DECR (B. Riggs (DECR) pers. comm. 2004).

Photo 9.16. Raw sewage pollution at Turtle Cove marina in May 2002 (Photo P. Richardson).

In addition, Slade reports that pleasure boats have been known to collide with turtles in the Princess Alexandra National Park, although the significance of this as a threat to TCI's foraging turtle populations is unclear (L. Slade pers. comm. 2004). Cruise liners are currently received at Grand Turk, and the cruise liner industry is a recognised source of pollution and damage to marine turtle habitats (Klein 2002; NMFS 1993). In Puerto Rico and the USVI, cruise liners have run aground or anchored on coral reefs causing extensive damage to the reefs and in some cases turtle nesting beaches (NMFS 1993), and the potential exists for similar local damage to turtle foraging habitat to occur in TCI as a result of increased cruise liner traffic.

9.6.4. Data from TCOT SEQ

Of the 92 TCOT SEQ interviewees, 62 (67.4%) said that they had noticed trends in numbers of turtles at sea (as opposed to not noticing or not answering the question, n=30).

Of these, 36 interviewees gave non-species-specific (general) answers about trends in turtles at sea in the last 5 years, while 26 gave species specific answers about green and hawksbill turtles. Of these 26, 10 thought that green turtle populations had increased in the last 5 years, 6 thought they had decreased, 9 thought numbers had stayed the same and 1 did not know. Therefore 73.1% of interviewees who noticed species-specific trends suggested that green turtle populations had increased or stayed the same in the last 5 years. Ten of these 26 thought that hawksbill populations had increased in the last 5 years, whereas 4 thought they had decreased, 5 thought they had remained the same, 1 did not know and 6 did not answer this question for hawksbills. Therefore 57.7% who noticed species-specific trends suggested that hawksbill populations had increased or stayed the same in the last 5 years. Only one interviewee, a recreational fishing boat charter owner, gave an answer about leatherbacks, suggesting they had decreased in the last 5 years and only 6 interviewees answered about loggerheads, with equal numbers (n=2) suggesting that populations had increased, decreased and stayed the same.

Of the 36 that answered these questions generally, 11 (30.6%) thought that turtle populations had increased at sea in the last 5 years, 13 (36.1%) thought that turtle numbers had decreased and 10 (27.8%) thought numbers had stayed the same. Two (5.6%) did not know about turtle trends in the last 5 years. Therefore, only 36.1% of those interviewees who gave answers about general trends in turtle numbers thought that populations had decreased in the last five years, whereas 58.4% suggested that populations had increased or stayed the same. Responses to TCOT SEQ therefore suggest that turtles in TCI's waters have either stayed the same or increased in the last 5 years.

The same 62 respondents who noticed trends in turtle populations in the last 5 years also noticed trends in turtle populations since they could remember, and the answers of 36 of these respondents were general. Of

the 26 interviewees that noticed species-specific trends in abundance, 11 suggested green turtle populations had increased since they could remember, 6 said that populations had decreased, 7 said that populations had stayed the same and 2 did not know. Therefore 69.2% (n=18) of interviewees giving species specific responses suggested that green turtle populations had either increased or stayed the same since they could remember. Similarly, 11 respondents suggested that hawksbill populations had increased since they could remember, 4 suggested that they had decreased, 3 suggested they had stayed the same, 2 did not know and 6 did not answer this question. Therefore, 53.8% (n=14) of these respondents thought that the TCI hawksbill population had increased or stayed the same as far as they could remember.

The 36 respondents who answered this question generally mirrored the species-specific answers, with 11 (30.6%) respondents suggesting that turtle populations had increased since they could remember, 13 (36.1%) suggesting they had decreased, 10 (27.8%) suggesting that they had stayed the same while 2 (5.6%) respondents did not know. Therefore 58.4% (n=21) of these respondents thought that turtle populations had increased or stayed the same since they could remember, while 36.1% suggested they had decreased. Again, the majority of TCOT SEQ respondents who noticed trends in turtle abundance suggest that TCI foraging turtle populations are the same or have increased since they can remember.

It is interesting to note that when the current and former turtle fishers' answers to these questions are isolated from other TCOT SEQ interviewees, the results are similar. Nineteen current and former fishers (52.8% of all 36 respondents who answered generally) answered these questions, of which 5 suggested that turtle numbers had increased in the last five years, 6 suggested that had decreased and 7 suggested that they had stayed the same, while 1 respondent did not know. Therefore 63.2% (n=12) of these 19 fishers thought that turtle populations were the same or had increased in the last 5 years, while 31.6% (n=6) thought that numbers had decreased. These same fishers answered generally about turtle trends at sea since they could remember and 5 suggested that numbers had increased, 7 suggested that numbers had decreased and 6 suggested that populations were the same, with 1 who did not know. Therefore 57.9% (n=11) of these 19 fishers believed that turtle numbers had increased or were the same since they could remember, while 36.8% thought populations had decreased (n=7).

When the dive operator, recreational fishing boat charter and boat trip operator responses are isolated, 6 interviewees gave opinions about general trends in turtle numbers at sea. Three of these respondents suggested that TCI's turtle populations had increased in the last 5 years, whereas 3 said they had stayed the same. Three of these respondents suggested that turtle populations had increased since they could remember, 1 said that they had decreased and 2 suggested that they had remained the same.

The 62 TCOT SEQ interviewees who noticed trends in TCI's foraging turtle populations only offered 4 reasons for the perceived increases in numbers. Nineteen (30.6%) suggested that decreased catch was responsible for population increase, 4 suggested that decreased egg collection was responsible, 1 respondent suggested that the National Parks were the reason and 1 suggested that the populations were undergoing a natural increase.

This perceived stability/increase in TCI's populations of foraging turtles may well reflect real population trends due to factors at play way beyond the boundaries of TCI's territorial waters. Previous studies have shown that Caribbean hawksbill and green turtle foraging aggregations are typically comprised of individuals originating from a diversity of regional nesting populations (Bass & Witzell 2000; Diaz-Fernandez *et al*. 1999; Luke *et al.* 2004). Preliminary analysis of TCOT genetic samples indicates that the foraging turtle populations found in the waters of the UK Overseas Territories in the Caribbean are also likely to comprise of mixed stocks (see section 10). While the exact nature of the genetic stock composition of these populations cannot yet be determined by data generated from the relatively low sample sizes collected during TCOT, a review of previous analyses of nearby foraging populations may provide some indication of the possible stock composition of TCI's foraging turtles. For example, Bass & Witzell (2000) analysed the mtDNA of the juvenile green turtle population foraging of the east central Florida coast. Their results suggested that this population is comprised of individuals originating from nesting beaches in Costa Rica (53%), USA and Mexico (42%), as well from Aves Island (Venezuela) and Suriname (4%). A similar study of juvenile green turtles foraging in the Bahamas territorial waters suggested contributions from Costa Rica (80%), United States and Mexico (5%), Aves Island and Suriname (14%), as well as Ascension Island and Guinea Bissau (1%) (in Bass & Witzell 2000). TCOT genetic analysis has identified haplotypes in TCI's green turtle population that are shared with nesting populations in Ascension Island, Aves Island, Brazil, Costa Rica, Florida, Mexico, and Suriname, as well as some West African nesting populations. The large nesting populations at Ascension, Tortuguero (Costa Rica), Yucatan Peninsula (Mexico) and Florida appear to be stable or increasing as a result of rigorous and prolonged conservation measures at the nesting beaches (Bjorndal *et al.* 1999; Godley *et al.* 2001; Seminoff 2004; Troeng & Rankin in press). However, the green turtle population nesting on Venezuela's Aves Island, the second largest green turtle rookery in the Wider Caribbean Region after Tortuguero, appears to have experienced a 90-98% decline over 3 generations (ca 130 years) (Seminoff 2004). Nevertheless, if the large, stable or increasing green turtle nesting populations in the Wider Caribbean are making a significant contribution to TCI's foraging green turtle populations, then extensive or increased production of hatchlings from these nesting beaches may well result in increased recruitment into the TCI foraging population.

Similarly, while Meylan (1999) found hawksbill populations in the Caribbean region to be declining or severely depleted in 22 of 26 countries and territories where data were available, the protected and monitored nesting populations of Barbados, Doce Leguas Cay (Cuba), Mona Island (Puerto Rico, USA) and Yucatan (Mexico) appear to be increasing (Meylan 1999; IUCN 2002). Hawksbill populations nesting at Buck Island (USVI), Jumby Bay, Antigua and Tortuguero in Costa Rica appear to be stable (IUCN 2002). TCOT genetic analysis has identified haplotypes in the TCI foraging hawksbill population that are shared with nesting populations in Anguilla, Antigua, Barbados, Belize, Brazil, Cuba, Mexico, Montserrat, Puerto Rico and the US Virgin Islands. As with the green turtle foraging populations, if these large, increasing or stable regional nesting populations make significant contributions to TCI's foraging hawksbill population, then extensive and increased production of hatchlings at these nesting beaches may result in increased recruitment into TCI's foraging populations.

Summary

In conclusion, despite extensive historical and contemporary harvest of marine turtles in TCI's waters, TCOT SEQ indicates that local foraging turtle populations, largely consisting of green and hawksbill turtles, have remained stable, or possibly increased since most of the interviewees can remember as well as in the last 5 years. TCOT staff observations suggest that both green and hawksbill turtles are abundant in TCI's waters and that patch and fringing reef, tidal creek and seagrass bed habitat within TCI's waters may be of regional importance to both green and hawksbill turtles. TCOT believes that the International Ramsar Site is of particular importance to regional green turtle populations.

Recommendations

9.1.3.2. Establish systematic monitoring efforts at index foraging sites

a) Seek funds for and establish a systematic aerial survey of TCI's waters to understand the current distribution of turtles and identify index foraging sites. Through these surveys, index foraging sites should be identified, and frequently (e.g. once per month) and systematically monitored via boat/ snorkel surveys or CPUE sampling to assess trends in abundance of TCI's foraging turtle populations.

b) Expand the sampling regime initiated under TCOT to establish the genetic 'identity' of TCI's nesting and foraging populations. This sampling could be included as part of the surveys mentioned above. The participation of turtle fishers should be encouraged where practicable. Sampling should be extensive and should include an assessment of the prevalence of fibropapilloma (FP) in the foraging, and if possible, nesting turtle populations.

c) Caribbean Turtlewatch has the potential to monitor certain regularly used dive sites for presence and absence of turtles, but requires dedicated staff time to liase with willing dive operators, and treat data generated through the programme. TCOT recommends that if resources allow, DECR/ PAD continue and maintain Caribbean Turtlewatch with current participating dive operators in Providenciales as a relatively cheap method of monitoring turtle abundance at index foraging sites.

9.7. Direct Use of Marine Turtles in TCI (20th Century and beyond)

In 1907 the Government passed the TCI's first Turtle Protection Ordinance, aimed primarily at preventing illegal turtle take by Bahamians. In 1910, the Caicos Development Company leased the Chalk Sound lagoon to a Mr George Silly for raising and canning turtles, lobsters and other shellfish. The cannery continued to operate until the Second World War, which led to a shortage of tin plate, but apparently the cannery's trade in turtle meat had 'tapered to nil' by 1930. TCI continued to export turtle shell thereafter with £343 worth exported in 1929, with various similar amounts exported up until 1933, when only £150 worth was exported in 1933 at the onset of the Depression, which devastated the island's economy (Sadler 1997). The reasons for the decline in commercial trade of turtles from TCI are unclear, although declining turtle populations and a decline in demand have been suggested (Fletemeyer 1983), and the Depression is likely to have significantly affected foreign demand for luxury delicacies such as turtle meat. In 1941, the Fisheries Protection Ordinance was created to provide a framework to regulate all of TCI's fisheries, and these were revised in 1976 with special provisions for the turtle fishery (see below - Fleming 2001).

Throughout the 20th Century, turtles continued to be fished for domestic consumption, and eggs were also harvested for sale, especially on South Caicos and Salt Cay (Fleming 2001). A popular early 20th Century TCI calypso regularly performed by South Caicos ripsaw bands is titled '*I Dig There*' and recounts how two well known South Caicos men were out collecting turtle eggs one night when one steals the eggs found by another (Bowen 2002). The chorus reads:

'I dig there
Garland dig there
Garland push his finger in my hole
In my hole, in my hole
Garland push his finger in my hole'.

In 1970, Dr Robert Schroeder of Mariculture Ltd (now the Cayman Turtle Farm) visited TCI with a view to establishing another turtle farm, but apparently nothing resulted from his visit (Sadler 1997). In 1976, the Government of TCI introduced the Fisheries Protection Regulations that for

the first time prohibited the collection of turtle eggs and protected nesting female turtles on the beach (Proctor & Fleming 1999). Domestic harvest of turtles at sea continued in the late 1970's, when Meylan (in Carr *et al.* 1982) reported that no commercial harvest of turtles occurred, but juvenile green and hawksbill turtles were chased down in boats and captured 'partly for sport and partly for consumption'. Meylan did not notice any tourist trade in turtle products, and while she did not visit the main tourist island of Providenciales, there was only low-level tourism in TCI at the time. Riggs (DECR pers. comm. 2004) suggests that since the 1970s there has not been a significant trade in turtle shell products to tourists visiting TCI, although Meylan notes that '*insignificant*' trade in hawksbill scutes occurred between local fishers and Haitian buyers (Carr *et al.* 1982).

From a survey carried out in 1981, and contrary to Meylan's finding 2 years earlier, Fletemeyer (1983) estimated that the annual commercial harvest of turtles in TCI stood at about 850 animals, consisting mostly of juvenile green turtles weighing between 2 and 8kgs, with some juvenile and adult hawksbill opportunistically taken during the lobster fishing season. Fletemeyer estimates that about 70 to 90 fishers harvested turtles, most of whom were targeting other species, but would take turtles opportunistically. He also reported that turtle meat was found year round, but sporadically, in TCI's markets, and all was consumed locally. Turtle meat sold at US$1/lb live weight or US$1.90 to US$2.50/lb for butchered meat. Shell was sold at between US$10 to US$20/lb and eggs were sold at 50 for US$1. In addition to the commercial sale of meat, Fletemeyer estimated subsistence takes of 8,000 to 10,000 turtle eggs, 20 to 30 nesting females and between 200 to 400 turtles at sea. On the basis of his findings, Fletemeyer states that '*Fishing pressure at this level does not seem to pose a serious threat to the survival of the sea turtle population in the waters off the Turks and Caicos Islands*'.

Fletemeyer's (1983) reports of egg harvest and sale, as well as harvest of nesting females, are interesting because these takes would have been in direct contravention of the Fisheries Protection Regulations, 1976. He states that at the time there was '*virtually no legal enforcement*' of the regulations, and 2 years earlier Meylan (in Carr *et al.* 1982) concurs, stating that enforcement of the regulations by the authorities was '*probably inadequate*'. Rudd (2003) writes about the recent history of TCI's fisheries and states that compliance with fishery regulations has been poor since the 1960's. This was exacerbated by the rampant drug trafficking through TCI in 1980's, especially South Caicos, the main fishing centre of TCI, which '*encouraged a culture of distrust and disregard for authority in TCI*'. There are no recorded cases of arrest or prosecution for violation of the turtle fishery regulations, despite apparent and significant violation since the Fisheries Protection Regulations were introduced in 1976 (Fleming 2001; Fletemeyer 1983).

These regulations were revised by the Fisheries Protection Ordinance 1998, but the provisions for turtle harvest remained the same. Section 14 of the Ordinance states:

'14.*(1) Any person who takes or is in possession of or sells any marine product smaller than the legal size shall be guilty of an offence: provided that a person shall not commit an offence under this regulation if having inadvertently taken any marine product which is undersize, he forthwith returns the same to the water unharmed.*

(c) Turtles

(i)Hawksbill Turtle (Eretmochelys imbricata) a shell measurement of 20 inches in length measured from the neck scales to the tail piece and a weight of at least 20 lbs;

(ii) Green Turtle (Chelonia mydas) a shell measurement of twenty inches in length measured from the neck scales to the tail piece and a weight of at least 20 lbs;
(iii) Any other turtle, a weight of at least 20 lbs.'

Section 14 states:

(1) No person shall –
(a) take any turtle on any beach or at any place above the low water mark
(b) take or be in possession of or offer to buy or sell, any laid turtle eggs.
(2) Any person who contravenes the provisions of this regulation shall be guilty of an offence.

The National Parks Ordinance was also revised in 1998, and the National Parks Regulations – Section 8 under the Ordinance prohibit *'the taking of any animal or plant by any method on land or at sea'* in any designated National Park, Nature Reserve or Sanctuary.

During TRAFFIC surveys in the UK Overseas Territories in 1998, Allan (1998) found 6 restaurants in TCI selling turtle dishes and, surprisingly, 3 turtle carapaces for sale that had apparently been illegally imported from South-East Asia. Gaudian & Medley (2000) reported that local interest in turtle meat in TCI was 'waning' at the end of the 20th Century, while Bowen (2003) suggests that the diet of Turks and Caicos Islanders has changed significantly over the past few decades, with the consumption of some traditional dishes (including, for example, turtle stew), having declined, and food of USA origin, such as deep-fried chicken and pork ribs, becoming more prominent. Fleming (2001) concurs, reporting that in 2000, few turtles were thought to be taken, with only 3 or 4 fishers consistently taking turtles and others catching them opportunistically. Fleming cites Grand Turk, South Caicos and Salt Cay as centres of turtle fishing activity and describes contemporary fishing methods, including the setting of nets in creeks, as well as jumping and spearing turtles on the seagrass beds. The meat from this harvest is cooked at home or sold to '*restaurants catering to local people*' at US$2 per lb live weight or US$3 per lb for meat. Fleming (2001) cites one restaurant selling dishes of turtle stew and steak at between US$14.95 and US$16.95 per dish. Contrary to Fleming's perceptions, Rudd (2003) acknowledges that there is no information about catch levels, but estimates that the turtle harvest in TCI is '*likely in the hundreds per year*'.

Fleming (2001) did not find any turtle carapaces for sale in TCI during her survey in 2000, but claimed that they were regularly offered for sale to tourists in the mid-1990s. One turtle fisher reported to Fleming that in the early 1990's he would sell hawksbill scutes to Dominican traders at US$20 per lb and others suggested that Dominican fishers illegally fished for turtles on TCI's Mouchoir Banks. Marte *et al.* (2003) report that there is an extensive and illegal trade in tortoiseshell products in the Dominican Republic, which specifically targets visiting tourists. It is interesting to note that illegal trade of hawksbill scutes out of the Dominican Republic has been recorded and Fleming (2001) describes two incidents where Japanese customs officers seized two illegal shipments of raw hawksbill shell originating from the Dominican Republic in 1994. The seizures totalled over 600 kg of scutes and were confiscated from Japanese businessmen involved in the Bekko (tortoiseshell) trade. Marte et al. (2003) suggest that most tortoiseshell jewellery sold in the Dominican Republic appears to be made from the scutes of sub-adult and adult hawksbill turtles, which are apparently absent from Dominican Republic waters. Adult hawksbills are present in TCI's waters, and it is possible that the scutes of adult turtles caught in the TCI turtle fishery have been exported to the Dominican Republic to supply the trade there. Fleming (2001) also reports on a historic link between the TCI turtle fishery and the Japanese market for hawksbill scutes, with Japanese customs reporting the import of a total of 234kgs of scutes from TCI in 1970 and 1971.

Summary

TCI waters appear to host significant foraging populations, and limited nesting populations, of green and hawksbill turtles. These have been extensively exploited for meat, eggs and shell for at least 1,300 years, and exploitation continues today. Despite successive 20th Century legislation regulating TCI's turtle fishery, some and perhaps most turtle fishers have ignored many of the regulations and this appears to have been largely ignored by the enforcement authorities. To date there has been no published or properly reported scientific monitoring of TCI's turtle fishery and without this data, or data pertaining to the origins of TCI's mixed stock foraging populations, it is impossible to accurately determine the impact of TCI's turtle fishery on

Measures of direct exploitation	Past	Present	Never	No response or not applicable
By life stage				
Females on beaches	0	0	50	42
Eggs from beach	17	7	68	0
Turtles in water (intentional)	15	35	8	34
Turtles in water (incidental)	NA	8	50	34
By product				
Meat				
Fishers who sell meat	9	22	18	43
Meat vendors	6	10	8	69
Meat consumers	25	52	14	1
Eggs				
Collectors who sell eggs	1	0	18	73
Egg consumers	18	13	60	1
Non-edible				
Fishers who sell shells	2	1	46	43
Shell vendors	1	0	23	68
Shell consumers	11	4	75	2
Worked shell consumers	8	3	79	2
Measures of indirect exploitation				
Turtles indirectly used in business	7 advertising	16 attraction	14 feature of professional activities	
Total interviews	**92**			

Table 9.5. Summary of TCOT interviewees involved in marine turtle use in TCI, categorised by type of use.

Are you aware of any activities that infringe on TCI turtle harvest laws (n=92)?

	Yes	*No*	*No answer*
n=	17	72	3
%	18.5	78.3	3.3

If yes, what are they (n=17, multi-answers allowed)?

Infringements	*Capture of undersize turtles*	*Collecting eggs*	*Harvesting nesting turtles*	*Turtle fishing in National Parks*	*Exporting meat (to Miami)*
n=	10	4	2	3	1

Who is engaged in activities that infringe on these laws (n=17, multi-answers allowed)?

Social group	*Native*	*Naturalised*	*Resident*	*Visitor (tourist)*	*Haitian/ Dominican migrant fishermen*	*Don't know*
n=	10	0	1	2	5	1

Table 9.6. TCOT SEQ interviewee perceptions of infringements of TCI legislation.

these foraging populations or nesting populations of origin. However, it is reasonable to predict that the extensive, long-term harvest of nesting female turtles and their eggs in TCI will have had significant, adverse impacts on the islands' turtle nesting populations.

9.7.1. Data from TCOT SEQ

Table 9.5 gives a summary of the type of use current marine turtle use as identified by the TCOT SEQ. Despite current and long-standing legislation (see section 9.3) regulating turtle harvest in TCI, only 51 (55.4%) of the 92 TCOT SEQ interviewees claimed to know any details about this legislation. Forty (43.5%) could not describe any laws and 1 did not answer. Of those 51 that suggested they could describe the law, 41 (80.4%) mentioned the size limit, 7 (13.7%) mentioned the prohibition of egg harvest, 3 (5.9%) mentioned the prohibition of nesting female harvest, 5 (9.8%) mentioned no harvest in National Parks, 1 thought that there was a quota in effect, 1 thought there was a total ban on turtle fishing and 2 respondents thought there were no laws regulating turtle harvest. Eight interviewees volunteered measurements for the legal size limits, but 7 of these were incorrect.

When the 92 TCOT SEQ interviewees were asked if they could describe legislation regarding purchase of turtle products, only 16 (18.5%) suggested they could describe the legislation, whereas 72 (78.3%) said they could not. Of those that suggested they could describe the legislation, only 1 respondent mentioned the prohibition of purchase of eggs, 4 mentioned the prohibition of purchase of undersize turtles, 5 mentioned a prohibition on the export of turtle shells, 1 thought that purchase of shells was prohibited, 1 thought that purchased turtles had to be slaughtered immediately after purchase and 3 respondents thought there were no laws regarding purchase of turtle products. TCOT staff also encountered situations where DECR officers appeared to be unaware of the details of the turtle harvest legislation.

Table 9.6 gives an overview of TCOT SEQ interviewee perceptions regarding violation of turtle harvest laws in TCI. Only 18.5% (n=17) of interviewees said they were aware of legislation infringements. The most commonly identified infringement was the capture of undersize turtles (n=10), followed by the harvest of eggs (n=4). Interviewees also identified the capture of nesting females, fishing in National Parks and the illegal export of turtle meat.

Most interviewees who were aware of infringements believed that native TCI Islanders (n=10) were responsible, followed by migrant fishers (n=5), while interviewees also thought that some expatriates and tourists were responsible for infringements.

Summary

There appears to be very low awareness of the current regulations regarding marine turtle harvest in TCI, even amongst some DECR officers, and this may be a factor influencing apparently poor compliance and enforcement. Effective legislation is an important component of a turtle management strategy. It is therefore essential that DECR staff and the TCI public have a better understanding of the current legislation if it is to be generally respected and complied with by the TCI public.

Recommendation

9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

b) Establish a programme of stakeholder meetings to raise awareness of marine turtle biology (including presence of distinct foraging and nesting populations), turtle and habitat conservation needs, national legislation and MEA's.

9.7.2. Harvest of adults on the nesting beach

The harvest of nesting female turtles has been prohibited by TCI legislation since 1976. None of the fishers interviewed for the TCOT SEQ who currently catch or formerly caught turtles said that they catch the females on the nesting beach, although 2 TCOT SEQ interviewees believe that this still occurs (see section 9.7.1). Two turtle consumers, both over 45 years old and born on Salt Cay, said that when they were children their fathers used to catch and kill nesting female turtles on Salt Cay beaches. This was apparently common practice at the time. In an informal interview with Alton Higgs, an elderly bush doctor, beachcomber and resident of Middle Caicos, Higgs said that up to the 1970s nesting female turtles were more common in TCI and men would regularly turn and slaughter nesting females at night. One Grand Turk resident and TCOT SEQ interviewee recalled how he used to encounter local men turning and killing nesting females on Grand Turk until the early 1990s. While this practice may once have been commonplace in TCI, nesting females turtles are rarely encountered by TCI islanders these days, as nesting appears to be limited to remote cays that are rarely visited at night. Illegal harvest of nesting turtles is therefore likely to occur only occasionally. Nesting females may still be caught occasionally at sea, and TCOT staff sampled an adult female green turtle in September 2002, which had developing eggs in the ovaries, that may well have been caught during an inter-nesting interval.

9.7.3. Harvest of eggs

The harvest of turtle eggs was prohibited in 1976, although Fletemeyer (1983) reports that turtle egg harvest continued in the early 1980's. TCOT SEQ identified 7 (7.6%) of the 92 respondents who still collect turtle eggs and 17 who used to collect eggs. As can be seen in Table 9.7, of the 17 former turtle egg collectors, over 40% (n=7) continued to collect turtle eggs after the practice was prohibited in 1976, reinforcing Rudd's (2003) assertion that compliance with fishery regulations in TCI is poor. When asked to give reasons why they stopped collecting eggs, only 1 of the 17 former egg collectors cited the law as a reason, 6 said that they no longer visit the beach, 4 said that they only used to collect eggs as children with their fathers, 4 suggested that they had gained a conservation awareness, 1 said that they had only collected as a one-off event and 1 said that turtle nests were no longer available.

Of all 24 former and current egg collectors identified during TCOT, 50% (n=12) said that they collected eggs opportunistically, whereas 3 suggested other factors that influenced when they collected eggs (season, full moon and personal desire) and 9 did not suggest such factors. Only one interviewee said he sold turtle eggs, but had stopped visiting the beaches and collecting in 1990. Prior to that he sold turtle eggs for US$3 for a dozen to South Caicos men, who considered the eggs to have aphrodisiac properties.

Of the 7 current egg collectors, 5 said that they collect eggs on a yearly basis (between 2 and 4 times per year), 1 said that he collects eggs when the opportunity arises, and 1 (a South Caicos fisherman) claimed that he collects green turtle eggs on a monthly basis throughout the year. This individual expressed a preference for collecting green turtle eggs because he believed *'the taste is stronger'*.

During informal TCOT interviews, dive operators on Salt Cay claimed that occasional nests deposited on Salt Cay and neighbouring Big Sand Cay are still collected by Salt Cay residents. Furthermore, TCOT staff witnessed freshly laid turtle eggs of unknown origin or species being offered to bystanders in Cockburn Harbour, South Caicos in May 2003 and DECR officers made no attempt to enforce the law. TCOT SEQ identified 18 (19.6% of all 92) interviewees who formerly consumed turtle eggs and 13 (14.1%) interviewees who currently consume turtle eggs. Of the 18 former egg consumers, only 2 cited the law as a reason for stopping. Five said there was no longer any opportunity to eat eggs, 2 said they had developed an allergy to the eggs, 1 said he had developed a dislike of the eggs, 4 said they were no longer fishing (and so were no longer finding nests) and 4 did not provide an answer.

Of the current egg consumers, only 3 stated how they get the eggs. Two said that they receive them as gifts on a yearly basis and one Grand Turk resident claimed that she buys them from fishers every week during June and July for US$1 per dozen. TCOT SEQ did not distinguish between follicular (unlaid) eggs, which can be legally traded under the Fisheries Protection Regulations 1998, and laid eggs, which cannot be traded. It is possible that some of the egg consumption recorded by TCOT SEQ involved unlaid eggs.

Year stopped collecting eggs	**'60's**	**'70's**	**'80's**	**'90's**	**2000's**	**Year stopped not recorded**	**Still collecting**	**Never collected**
No. of TCOT SEQ interviewees	3	4	2	4	1	3	7	68
% of former egg collectors (n=17)	17.6	23.5	11.8	23.5	5.9	17.6	Na	Na

Table 9.7. Summary of egg collecting history of TCOT SEQ interviewees (n=92).

Summary
Despite current legislation, egg harvest and consumption continues in TCI. Although the scale of current harvest is unclear, prolonged and extensive egg harvest has the potential to adversely affect small nesting populations of turtles. TCOT therefore recommends that DECR makes every effort eliminate egg harvest in TCI through education and enforcement.

Recommendations

9.1.1.1. Increase the capacity of the Department of Environment and Coastal Resources and the Protected Areas Department

a) Ensure DECR/PAD has the capacity, staff and resources to carry out enforcement and monitoring duties relevant to marine turtle management, including data collection, entry, management and analysis for turtle monitoring programmes. Given the importance of all natural resources in the network of Protected Areas, and apparent poor compliance with the National Parks Ordinance, TCOT recommends that an increased capacity to effectively patrol the protected areas should be treated as a priority.

9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

b) Establish a programme of stakeholder meetings to raise awareness of marine turtle biology (including presence of distinct foraging and nesting populations), turtle and habitat conservation needs, national legislation and MEA's.

9.7.4. Harvest at sea
The harvest of turtles at sea appears to be the most prevalent form of turtle harvest in TCI. TCOT SEQ interviewed 13 former and 45 current fishers (total =58). Fifty-two of these fishers targeted conch, 54 targeted lobster, 54 targeted fish and 49 (84.5%) catch or have caught turtles. Of the 45 current fishers, 25 (55.6%) claimed that lobster was their most important target species, 15 (33.3%) identified finfish, 4 (8.9%) identified conch and 1 fisher did not answer the question. None of the current fishers identified turtle as their most important target species.

Fifteen (30.6%) of the 49 fishers who claimed they catch turtles no longer do so. One of these fishers ceased turtle take in the 1950's, 1 in the 1970's, 4 in the 1980's, 4 in the 1990's and 2 since 2000. Six (40%) of the 15 said they stopped turtle fishing because they arranged alternative employment or no longer had the time to fish, which were the dominant reasons given for stopping. Two respondents said they stopped because they had retired, 2 said they had stopped due to personal ethics (conservation), 2 stopped fishing due to ill health, 2 said they stopped catching turtles because the fishery was no longer economically viable for them, 1 respondent stopped because he moved away from the islands and 1 did not answer the question. Of these 15 fishers, only 1 said turtles were a very important component of his catch before he stopped taking them, 4 said they were somewhat important and 6 said they were unimportant, while 4 did not answer the question. Therefore, according to the TCOT SEQ interviewees, turtles are of limited importance to current and recent historical fisheries by TCI fishers.

However, 75.6% (n=34) of the 45 current fishers interviewed during TCOT SEQ currently catch turtles. In addition, TCOT SEQ identified one bar owner from Providenciales who does not regularly fish, but occasionally catches turtles for sale as turtle meat dishes at his bar. Therefore it is possible that more TCI Islanders occasionally catch turtles for consumption, but are not registered fishers. Including the above mentioned bar owner, the total number of TCI Islanders currently catching turtles identified by the TCOT SEQ is 35 and the total number of current and former turtle fishers is 50. Of these, 33 (66%) catch or caught turtles opportunistically (while targeting other species), 7 catch or caught turtles intentionally, 9 catch or caught turtles both opportunistically and intentionally and 1 fisher did not give an answer to the question.

Photo 9.17. A fisher butchers turtle meat in Cockburn Harbour South Caicos (Photo P. Richardson).

Forty-seven (94%) of all 50 turtle fishers said they preferred to catch green turtles, 1 preferred hawksbill, 1 had no preference and 1 did not answer the question. Eighteen (36%) of the 50 turtle fishers said they preferred hawksbill turtle as their second choice while 1 fisherman said that he prefers to catch hawksbills as a first choice. Forty fishers offered a reason why they preferred to catch green turtles, with '*better taste*' as the dominant reason given (n=21), followed by '*better meat*' (n=9) '*more demand*' (n=7) and '*meat has better texture*' (n=3). The one fisherman who preferred to catch hawksbills said he preferred them because they are easier to catch and more abundant than the other species. Three fishers gave reasons why they caught hawksbills as a second choice, including *'for the shell'* (n=2) and '*easier to catch*' (n=1). Four fishers gave reasons why they tend not catch loggerheads, including meat's '*strong smell*' (n=1), '*poor taste*' (n=2) and '*poor texture'* (n=1).

As expected with a regulated fishery with no closed season, no seasonality of turtle fishing was detected in TCI, with 37 (74%) of the 50 turtle fishers claiming that they caught or catch green turtles all year, whereas 28 (56%) said that they catch or caught hawksbills all year. Of the 35 current fishers, 15 said that they catch turtles on a yearly basis, 3 said that they catch them on a monthly basis, 6 said that they catch them on a weekly basis and 11 did not give an answer to the question. None of the current turtle fishers said that they catch turtles on a daily basis. The factors influencing when fishers catch turtles included '*to make money*' (n=24), '*demand*' (n=21), '*personal choice*' (n=13), '*opportunistic*' (n=4), '*sport*' (n=1), '*weather*' (n=1) and bycatch (n=1).

A few of the older retired fishers described the recent historical use of turtle nets strung across creeks to catch turtles, especially in North and Middle Caicos, but nowadays turtles tend to be caught by hand. This involves chasing turtles in boats on the shallow seagrass beds and jumping on them when they tire, or snagging hawksbills with lobster hooks while fishing for lobster on coral heads. Twenty-four (68.6%) of the 35 current turtle fishers reported catching green turtles by hand or with a lobster hook, 20 (57.1%) reported catching hawksbills by hand or lobster hook, with other methods used to catch greens and hawksbills including nets (n=2), Hawaiian sling (n=2) and speargun (n=1).

Recorded green turtle harvest: Thirty-one (88.6%) of the 35 current fishers gave estimates of their average annual green turtle harvest, with estimates ranging from 1 turtle per year to 50 per year and a mean of 6.7 per year (Median (IQ range); 5 (2-9.5)) and a total estimated average catch of 209 green turtles per year for these 31 fishers. If the average catch is applied to the fishers who did not report catch numbers, then annual green turtle catch is probably closer to 236 turtles for all current turtle fishers identified by TCOT SEQ.

Green turtles of various sizes are currently caught with smallest reported at 2.3kg and the largest reported as 226.8kg. Twenty-five of the 35 current turtle fishers offered estimates of the average sized green turtle they catch. These ranged from 11.3kg to 90.7kg, with a mean of 32.4kg ± SD19.7kg. Therefore adults and small juveniles are caught, but larger juveniles and sub-adults tend to make up the majority of the catch.

Recorded hawksbill harvest: Twenty-three (65.7%) of the 35 current fishers gave estimates of their average annual hawksbill turtle harvest, with estimates ranging from 1 turtle per year to 30 per year and a mean of 5.3 per year (Median (IQ range)=3(1.5-5)) and a total estimated catch of 121 hawksbill turtles per year for these 23 fishers. If the average catch is applied to the fishers who did not report catch numbers then the average annual hawksbill turtle catch is probably closer to 184 turtles for all current turtle fishers identified by TCOT SEQ.

Hawksbill turtles of various sizes are currently caught, with the smallest reported at 4.5kg and the largest reported as 158.7kg. Twenty of the 35 current turtle fishers offered estimates of the average sized hawksbill turtle they catch. These ranged from 13.6kg to 90.7kg, with a mean of 36.7kg ± SD21.4kg. Therefore adults and small juveniles are caught, but larger juveniles tend to make up the majority of the catch. It is worth noting that DECR staff witnessed the landing of an adult female hawksbill (80cm CCL) captured at Pear Cay within the French, Bush and Seal Cays Sanctuary. The turtle was butchered for sale.

NB. TCOT SEQ interviews with turtle fishers were usually carried out in the presence of a DECR officer associated with a government department responsible for the enforcement of the Fisheries Protection Ordinance. After some interviews, DECR officers privately commented to TCOT staff that turtle fishers had under-reported their catch during interviews. TCOT SEQ indicates a very low level of awareness about current turtle harvest legislation in TCI and it is possible that fishers under-reported their catch due to concerns about whether or not they had infringed legislation they knew little about.

Loggerhead and leatherback harvest: No fishers claimed to prefer catching loggerheads and only 1 retired fisher claimed that he used to prefer loggerhead turtles as his second preferred species (after greens), and 1 current turtle fisher offered estimates for the number and size of loggerhead turtles caught. He claimed to catch 4 or 5 loggerheads per year ranging in size from 34 - 136kg. As discussed above, there is little demand or preference for loggerhead meat in TCI and the species is rarely encountered in TCI's waters. Therefore, while some loggerheads appear to be occasionally caught in TCI, they are not a viable or significant component of the TCI turtle fishery. TCOT SEQ suggests there is no harvest of or demand for leatherback turtles and their products in TCI.

Summary

Turtle fishers in TCI tend to catch turtles on an opportunistic, yearly basis, with a view to selling the turtle or meeting a known demand. TCOT SEQ identified at least 16 fishers who intentionally target turtles and at least 9 fishers who

catch turtles on a weekly or monthly basis, probably to meet known demand.

In 2003, there were 491 commercial fishers licensed to fish in TCI in 2003 (J. Campbell (DECR) pers comm. 2004), and if the TCOT SEQ sample was representative, then approximately 371 (75.6%) of TCI fishers may still be catching turtles. However, the TCOT SEQ sample is not representative, for the following reasons:

- In South Caicos, where most of the fishers were interviewed during TCOT SEQ, DECR officers assisting TCOT staff with the SEQ would specifically contact fishers who were known to target turtles. It is highly likely that because of DECR's assistance, the TCOT SEQ sample of 16 intentional turtle fishers included most fishers who are known to specifically target turtles.

- South Caicos fishers tend to fish in pairs or larger crews, and it is possible that if more than 1 person was interviewed from any pair or crew, then the number of turtles caught by individual crews may have been double counted in the TCOT SEQ survey.

- TCOT SEQ interviewed 31 fishers resident in South Caicos (the TCI's major fishing population), 14 resident in Providenciales, 7 in Grand Turk and 4 in Salt Cay, but only 1 (retired) fisherman resident in North Caicos and 1 former fisherman from Middle Caicos. No licensed or unlicensed expatriate fishers (Haitian and Dominican) were interviewed and therefore they, and fishers from North and Middle Caicos are under-represented in TCOT SEQ.

While the actual number of fishers who catch turtles in TCI is not known, only 9.2% of the licensed fishers in TCI were interviewed during TCOT SEQ, and therefore the 34 fishers identified during TCOT SEQ probably represent only a fraction of the number of individuals currently engaged in turtle harvest. The majority of fishers who catch turtles reported that they do so an opportunistic basis and it is therefore reasonable to assume that, based on the TCOT SEQ, and given the limited regulation and enforcement of the turtle fishery, many more fishers in TCI will opportunistically catch a turtle if they think they can sell or use it. Furthermore, several fishers interviewed during TCOT SEQ claimed that migrant fishers from the Dominican Republic and Haiti currently catch turtles. Gaudian & Medley (2000) estimated that there were about 3,000 illegal immigrants in TCI, but the TCOT SEQ did not interview any migrant fishers.

To date there has been no monitoring of the turtle fishery in TCI and therefore it is impossible to accurately quantify the current harvest of turtles in TCI. TCOT SEQ indicates that most fishers catch turtles opportunistically. Twenty-

a	**There should be regulations for which species of turtle can be caught**			
	yes	no opinion	no	na
n	19	5	21	3
%	38	10	42	6
b	**There should be regulations for the type of fishing gear and methods that can be used to catch turtles**			
	yes	no opinion	no	na
n	27	3	15	3
%	54	6	30	6
c	**There should be regulations for the number of turtles that can be caught**			
	yes	no opinion	no	na
n	24	2	17	3
%	48	4	34	6
d	**There should be size limits for turtles caught**			
	yes	no opinion	no	na
n	42	0	20	3
%	84	0	40	6
e	**Open and closed zones should be set for turtle fishing**			
	yes	no opinion	no	na
n	25	0	20	3
%	50	0	40	6
f	**Open and closed seasons should be set for turtle fishing**			
	yes	no opinion	no	na
n	24	3	18	3
%	48	6	36	6

Table 9.8. Current and former turtle fisher attitudes to potential conservation options (n=50).

Question: Who should be involved in setting regulations (multiple responses allowed)?

Category	No. of responses	*Percentage of fishers*
Fishers	21	*42*
Government	12	*24*
DECR	33	*66*
Parks Department	3	*6*
Local People	2	*4*
Tour operators	1	*2*
Scientists	1	*2*
Other	1	*2*
Not applicable (no laws necessary)	3	*6*
No answer	3	*6*

Table 9.9. Turtle fishers' (n=50) opinions on who should be involved in setting turtle harvest regulations.

two fishers who only catch turtles opportunistically offered average annual green turtle catch values during TCOT SEQ and 15 fishers who only catch turtles opportunistically offered average annual hawksbill turtle catch values. Their average annual takes were 4.7 ± SD3.3 green turtles per year and 5.6 ± SD6.6 hawksbills per year (TCOT SEQ indicated that while hawksbills were not the preferred species, TCOT sampling and TCOT SEQ suggested that they were easier to catch, especially by lobster fishers, and therefore may be more likely captured by opportunistic turtle fishers). The 22 opportunistic green turtle fishers represent 48.9% of the total current fishers identified during TCOT SEQ and the 15 opportunistic hawksbill turtle fishers represent 33.3%. While the fishers in the TCOT SEQ sample may not be representative for the reasons given above, if 48.9% of TCI's licensed fishers catch 4.7 green turtles each per year and 33.3% of TCI's fishers catch 5.6 hawksbills each per year, then the TCI annual green and hawksbill turtle harvests may be as high as 1,128 green turtles per year and 907 hawksbill turtles per year respectively.

Therefore, the likely annual take of green turtles in TCI is between 236 and 1,128 turtles and the likely annual take of hawksbill turtles is between 184 and 907 turtles. Due to the sampling biases described above, these are low confidence estimates. However, TCOT SEQ indicates that several thousand kilograms of turtle meat is probably consumed in TCI each year (see section 9.7.5.2), and these estimated annual take values would be required to satisfy this demand. These estimates represent the largest current annual take of marine turtles in the UK Overseas Territories in the Caribbean.

Attitudes of fishers towards potential conservation measures

Table 9.8 presents turtle fishers' attitudes to fishery conservation options. Three (6%) former turtle fishers thought that turtle fishing should be prohibited in TCI and therefore did not think that any of the harvest management options were applicable. The TCOT SEQ revealed general consensus of opinion about only one of the fishing options. However, more of TCI's former and current turtle fishers agreed with the potential conservation measures than disagreed, with the exception of species protection regulations, where 42% of the fishers disagreed with species protection regulations compared to 38% who agreed.

The only option that did solicit general consensus amongst the turtle fishers was the size limit option, where 84% agreed and 6% disagreed. All 25 of the 42 turtle fishers who agreed with size limits and justified their position suggested that a *minimum* size limit is necessary. It is worth noting that, despite this apparent agreement with the current minimum size limit, the capture of undersize turtles was the most commonly identified infringement of TCI's Fisheries Protection Ordinance, 1978 (see section 9.7.1). Therefore, while fishers may appreciate this regulation, compliance amongst fishers may be low. The majority of turtle fishers also agreed with regulations for the type of fishing gear and methods used to catch turtles. Of the 27 fishers who agreed with regulations, 12 suggested spearguns should be banned, 9 suggested that nets should be banned, 7 suggested turtles should only be caught by hand and 2 said that nets should be allowed.

It is interesting to note that 40% of turtle fishers disagree with the concept of open and closed zones for turtle fishing. This significant disagreement may explain why there is apparent poor compliance with the National Parks Ordinance amongst TCI's fishers.

Table 9.9 shows the opinions of the 50 turtle fishers with respect to which institutions should be responsible for setting marine turtle fishery regulations. As expected, 66% believe that the DECR should be involved in setting the regulations. Forty-two percent of these fishers also believed that fishers should be involved in the process of establishing fishery regulations. That there is less agreement among fishers on management options in TCI than in other OTs (see other OT reports) suggests fisher inclusion in the discussion of changes to the fishery in TCI will be particularly important.

Recommendations

9.1.2.1. Amend harvest legislation:

TCOT recommends that the Fisheries Protection Ordinance, 1998 is amended to include the following provisions:

a) Ensure permanent and complete prohibition of harvest of any large, reproductively valuable turtles by instigating a maximum size limit. A suggested maximum may be 50lbs (22.7kg) or less, but should be based on additional research on the fishery and turtle stocks. This research should also yield an equivalent maximum curved carapace length for green and hawksbill turtles that should be stipulated in any amended legislation.

b) Consider a continued minimum size limit, as most fishers already accept this as an established conservation measure. A suggested minimum would be 20lbs (9.07kg) with an equivalent minimum curved carapace length for green and hawksbill turtles that should also be stipulated in any amended legislation.

c) Establish a limited turtle fishing licensing scheme, whereby licensed turtle fishers agree to abide by strict regulations regarding fishery practice, limited quotas and catch recording, including statutory monthly catch reporting by fishers to DECR (including incidental catch), and voluntary reporting of all turtles caught in advance of slaughter for biometric measurement and sampling by DECR. Quotas should be reactive and based on number of licensed turtle fishers and stock assessments established through the monitoring regimes. The DECR should have the statutory power to implement spot checks at fish landing sites to assess compliance and to close the fishery if stock monitoring reveals abundance declines below a pre-established and measurable level.

d) Establish a closed season to be reviewed every five years (to facilitate legislative adaptation to possible nesting season shift caused by climate change) to prevent capture of adult turtles entering TCI's waters to breed.

9.7.5. Trade in turtle meat

Turtle meat is the primary turtle product traded from the TCI turtle fishery. Of the 35 current turtle fishers, 22 (62.9%) said that they sold turtle products, while 13 (37.1%) said that they did not. Of these 22, 15 (68.2%) sell the turtle whole, 18 (81.8%) sell the butchered meat, 8 (36.4%) sell the carapace and 2 (9.1%) sell shell pieces.

Photo 9.18. TCOT staff sample hawksbill turtle meat at a restaurant in Providenciales (Photo S. Ranger).

The shells of green turtles tend not to be sold because the marginal scutes are used, along with plastron and the head, and are boiled to make 'jelly' for soups and stews. The intestines are cleaned and used as is all muscle tissue and the flippers. All these body parts are classed as meat for the purposes of TCOT SEQ. The portion of green turtle carapace including the costal and vertebral scutes is discarded, as is the cloaca. Hawksbill carcasses are similarly used, except the carapace is often left intact for sale or to extract the scutes for sale, because the marginal scutes cannot be used to make 'jelly' and therefore the shells are potentially worth more intact.

9.7.5.1. Sale of meat by turtle fishers

The market for turtle meat in TCI appears to be driven primarily by restaurants catering to local people and special orders for turtle meat from private customers, often ordered for dinner parties and celebrations, e.g. birthdays. Indeed, turtle was served at the lunch break of the DECR-organised Annual Fishermen's Day in South Caicos in July 2003.

Sale of whole turtles: Eight of the 15 fishers who sell whole turtles offered information regarding the annual amount of whole green turtles they sell. They sold between 1 and 12 whole green turtles per year, with a mean of 4.7 (SD=4.3). Twelve fishers offered information on their price for whole green turtle sales, ranging from US2$ per lb to US$3.5 per lb with a mean of US$2.6 (SD=0.7).

Only 2 of the 15 fishers who sell whole turtles offered information regarding the annual amount of whole hawksbill turtles they sell. They sold 1 and 12 whole hawksbill turtles per year respectively. Nine fishers offered information on their price for whole hawksbill turtle sales, ranging from US1$ per lb to US$3.5 per lb with a mean of US$2.5 (SD=0.6). The fishers set these prices, which occasionally change but not significantly. Most of these fishers sell whole turtles at the fish landing site (n=10), over half sell whole turtles at the restaurants they supply (n=7), while others sell them at customers homes (n=4), at markets (n=2, both Grand Turk), on the street (n=2) and hotels (n=1). Some fishers said they charge restaurants and hotels more than they do private customers.

Sale of butchered turtles: Nine of the 18 fishers who sell butchered turtles offered information regarding the annual amount of butchered green turtles they sell. They sold between 1 and 12 butchered green turtles per year, with a mean of 4.7 (SD=±3.3). Sixteen fishers offered information on their price for butchered green turtle meat, ranging from US2$ per lb to US$3.5 per lb with a mean of US$3.1 (SD=1).

Four of the 18 fishers who sell butchered turtles offered information regarding the annual amount of butchered hawksbill turtles they sell. They sold between 1 and 2 butchered green turtles per year, with a mean of 1.4 (SD=0.5). Nine fishers offered information on their price for butchered hawksbill turtle meat sales, ranging from US0.5$ per lb to US$4.5 per lb with a mean of US$2.7 (SD=1). The fishers set these prices, which rarely change. Most of these fishers sell butchered turtle meat at the fish landing site (n=14), some sell to the restaurants (n=5), some sell at the homes of private customers (n=4), some sell at markets (n=3) and some sell on the street (n=3).

Therefore, butchered meat is sold for more per weight than whole turtles and more fishers sell butchered meat than whole turtles. Turtle meat tends to be sold at the fish landing site, or directly to restaurants, with some sale at customer's homes and other locations. TCOT SEQ indicated that, with the exception of the fish market on Grand Turk, there were no retail outlets selling turtle meat in TCI and that leatherback and loggerhead meat is not sold.

9.7.5.2. Sale of meat by direct vendors

Twenty-four of the 92 TCOT SEQ interviewees worked for or owned a business that could sell turtle products, and of these 15 were restaurants, 5 gift shops, 1 a dive shop and 2 fish processing plants. Table 9.10 gives an overview of the history of sale of turtle products for these businesses.

Type of business interviewed during TCOT SEQ (n=23)

	Restaurant	*Gift Shop*	*Dive Shop*	*Fish Processing Plant/ Fish market*
No.	15	5	1	2

Sale of marine turtle products (n=23)

	Currently selling	*Formerly sold*	*Never sold*
No. and type of business	8 restaurants (meat) [6 in Provo, 1 in GT and 1 in S Caicos] 1 fish market (meat)	5 restaurants (meat) 1 gift shop (shells)	1 restaurant 1 dive shop 1 fish processing plant 4 gift shops 1 artisan

When stopped and reasons for stopping (n=6)

Reason/Date	*1970's*	*1980's*	*1990's*	*2000's*
No demand	1 gift shop (shells)	1 restaurant	2 restaurants	na
Management change	Na	Na	1 restaurant	1 restaurant

Reasons for never selling (n=8)

Reason	*Conservation awareness*	*No demand*	*Customer influence*	*Not started to sell yet*
Number	3 gift shops	1 Gift shop 1 Fish plant 1 restaurant	1 dive shop	1 shell artisan (currently works with conch shell but plans to start making tortoiseshell jewellery)

Table 9.10. Overview of direct turtle product vendors from TCOT SEQ.

Table 9.10 shows that lack of demand is the dominant reason why former turtle product vendors stopped selling products, and this is also one of the main reasons why some vendors have never sold turtle products. Three vendors have never sold products because of personal conservation awareness and 1 due to customer influence, presumably because the customers also have a conservation ethic. An increased conservation ethic amongst TCI's tourists may have also resulted in the lack of demand for turtle products that led to 4 vendors ceasing sale of turtle products between the 1970s and 1990s.

All 8 vendors currently selling turtle products are selling meat only. Of these, 8 purchase green turtles, 6 purchase hawksbill turtles and 1 (restaurant) does not distinguish between the species. The fish market owner buys turtle meat on a daily basis, whereas 2 restaurants buy it weekly, 2 restaurants buy it monthly, 3 restaurants buy it on a yearly basis and 1 restaurant buys turtle meat less than yearly.

One restaurant buys meat from fishers who deliver and also buys meat from the fish landing sites at the Five Cays fish processing plants at Provo. Four restaurants only buy meat from the fishers who deliver it, as does the fish market owner in Grand Turk. Three restaurants only buy meat from fish landing sites (Quayside at Leeward Marina - Provo, Five Cays – Provo, West Road – Grand Turk) and 1 restaurant owner in Providenciales catches his own turtles. Therefore the most common route that turtle meat takes to the vendor is via direct delivery by the fishers, followed by purchase at the fish landing sites. Seven of the current vendors reported that the fishers determine the price they pay for turtle meat, whereas 1 vendor exchanges goods for the turtle meat he receives from fishers and 1 bar owner catches his own turtles.

Of the 15 current and former vendors, 12 claimed to have noticed trends in availability of turtle meat (changes in availability of other products was not recorded). Only 1 of these vendors (Grand Turk fish market owner) thought that availability of meat had increased in the last 5 years, whereas 3 thought it had decreased and 6 thought it had stayed then same (the other three vendors either did not know or did not answer the question). The fish market owner also thought that availability of turtle meat had increased since he could remember, 6 thought it had decreased and 4 thought it had stayed the same (the other 2 did not answer the question). Reasons for decreased availability included less turtles caught (n=3), less turtles available because they have been scared away (n=1) and less demand (n=1). The fish market owner thought that availability had increased because '*more turtles are being caught*'.

While there are no clear trends from these answers, availability of turtle meat has probably stayed the same in the last 5 years but has decreased since the respondents could remember. However, it is interesting to note that the fish market owner claims to notice more turtles being caught in the last 5 years and since he can remember, and this may indeed be the case in Grand Turk.

Photo 9.19. A typical turtle stew dish at a restaurant in Providenciales (Photo P. Richardson).

Photo 9.20. Turtle on the menu of a restaurant in Providenciales (Photo S. Ranger).

Eleven (73.3%) of the 15 current and former vendors said that they sell/sold turtle products all year, while 4 did not answer the question. Ten of these 11 vendors said that there were no particular holidays or events when they sold more turtle products and 4 did not answer the question. However, 1 former Providenciales restaurant owner claimed that more turtle is sold to male clients during the August Carnival and the fish market owner said that he sells more turtle meat at Christmas and Easter. Therefore, turtle products are sold all year round, and there may be increased demand in Grand Turk and Providenciales during some holiday periods

Three restaurants offered information regarding the number of turtle dishes they sell per week, amounting to 12 dishes per week, 15 dishes per week and 95 dishes per week. Eight restaurants offered information about the price of their turtle dishes, which ranged from US$5 per dish to US$12 per dish with a mean of US$8.7 per dish (SD=2.5). Therefore, TCI restaurants selling turtle meat may generate between approximately US$100 to US$760 or more gross income

per week from selling turtle dishes. It is therefore of little surprise that 2 (22.2%) of the 9 current turtle vendors said that the sale of turtle meat was very important, 3 (33.3%) said that it was somewhat important and 4 (44.4%) said it was unimportant to their business. Therefore, over half of these vendors suggested that the sale of turtle meat is of some importance to their businesses.

Of the 14 current and former turtle meat vendors (excluding the former shell vendor), 10 noticed trends in the demand of turtle products and 4 had not noticed trends. Of these 10 vendors, 1 said that demand had increased in the last 5 years, whereas 1 said that demand had decreased and 5 said that it had stayed the same. Three did not answer the question. In contrast, while 1 vendor thought that demand had increased since they could remember, 6 vendors said that demand had decreased and 3 said that it had stayed the same. Again, while trends are difficult to distinguish from these answers, demand for turtle products has probably stayed fairly constant in the last 5 years, but has decreased in the living memory of these vendors. The vendors did not provide any dominant reasons for perceived changes in demand, with only 4 offering reasons for decrease, including '*migration of people*' (away from South Caicos, n=1), '*other meats available*' (n=1), '*young people don't like turtle meat*' (n=1) and '*less turtles caught*' (n=1). These reasons were corroborated during an interview with David Bowen, the Director of the Department of Culture, who has recently written about the changing diet of Turks and Caicos Islanders (Bowen 2003). Reasons for an increase in demand included '*increased demand due to decreased availability*' (n=1) and '*tourism*' (n=1).

Contrary to Fleming's (2001) assertion that turtle meat is sold in '*restaurants catering for local people*', tourists may well present a significant demand for turtle meat. Four (28.6%) of the 14 current and former turtle meat vendors stated that tourists were among the main purchasers of turtle meat. However, local people do provide an important market for turtle meat and 11 (78.6%) vendors stated that local people were their main customers, 1 vendor stated that expatriates were among their regular customers and 2 vendors stated that visitors from neighbouring Caribbean states were among their important customers. One restaurant owner said that Haitian and Dominican workers particularly like to eat turtle.

Summary

While the availability and demand for turtle shell has decreased in the last few decades, there is still a thriving commercial trade in turtle meat in the Turks and Caicos Islands. Turtle dishes are financially important to the restaurants that sell them, which are found mainly in Providenciales and Grand Turk, and sold throughout the year to tourists, expatriates and mainly local people who provide a thriving demand for turtle meat dishes. This demand may have decreased in recent decades, as a diversity of imported foods has become more popular with younger generations of Turks and Caicos Islanders.

Recommendation

9.1.2.3. Recommendations regarding Multilateral Environmental Agreements and TCI national legislation

b) Given that article III of CMS accommodates the needs of traditional subsistence users of marine turtles, the Government of TCI should consider the role of trade in the subsistence fishery economy of TCI, and limit commercial activities regarding the sale of turtle products.

9.7.5.3. Consumption of turtle meat

There is a strong tradition of marine turtle consumption in the Turks and Caicos Islanders, which is still manifested in the current population. Of the 92 TCOT SEQ interviewees, 79 (85.9%) reported some form of turtle consumption, while 12 (13%) reported no use at all. 1 interviewee did not answer questions regarding use. However, this sample is not representative as there is a very strong sampling bias towards fishers, a social group that is likely to use turtle products more than other groups. Table 9.11 presents an overview of the TCOT SEQ interviewees' turtle consumption.

A significant percentage (83.7%) of interviewees has eaten or currently eats turtle meat, with over half of the sample reporting that they currently eat turtle meat. In contrast, significant percentages have never eaten eggs (65.2%), never used whole shells (81.5%) or never used worked shells (85.9%).

	Meat	Eggs	Whole shell	Worked shell
Currently	52	13	4	3
Formerly	25	18	11	8
Never	14	60	75	79
Not recorded	1	1	2	2

Table 9.11. An overview of the turtle consumption history of TCOT SEQ interviewees (n=92).

In the last 5 years…				
	Increasing	**Decreasing**	**Same**	**Don't know**
Number	1	16	15	5
%	2.7	43.2	40.5	13.5

Since you can remember…				
	Increasing	**Decreasing**	**Same**	**Don't know**
Number	1	20	13	2
%	2.7	54.1	35.1	5.4

Table 9.12. Former and current turtle meat consumers perceptions of trends in turtle meat availability (n=37).

Ten interviewees gave reasons for why they no longer eat meat, 7 of whom said it was due to ethical reasons (e.g. religion, vegetarianism and conservation), 2 said they have never had the opportunity and 1 said that they were not interested. Twenty-three interviewees gave reasons why they had stopped eating turtle meat, with no dominant reasons emerging. Seven interviewees (30.4%) said they had developed a dislike for turtle meat and 5 (21.7%) said that they no longer have the opportunity to eat turtle meat, while other reasons included the development of *allergies to turtle meat* (n=3), no longer fishing and so *no longer catch turtles* (n=3), *ethical reasons* (n=3) and *no longer interested in eating turtle meat (n=2).*

Table 9.12 shows trends in availability of turtle meat as perceived by 37 former and current turtle meat consumers. Availability appears to have decreased or stayed the same in the last 5 years and decreased since the respondents could remember.

Turtle meat is not a staple component of the diet of most the 52 current turtle meat consumers identified by the TCOT SEQ. Almost half (n=25) eat turtle meat on a yearly basis, while 16 (30.8%) eat it on a monthly basis and 5 (9.6%) eat it on a weekly basis. Two consumers eat it less than once a year and 1 has only eaten it a few times in his/her life. Three current meat consumers did not answer the question. To most of these consumers, turtle meat represents a speciality dish that is infrequently consumed. As expected from the answers of turtle fishers regarding preferred species, of the 77 current and former turtle meat consumers, 61 (79.2%) said green turtle was amongst their preferred species. Seven (9.1%) included hawksbill amongst their preferred species, while 2 said they preferred loggerhead and 1 included 'mulatto'. Eight consumers said they did not have a preference and 9 consumers did not answer the question. Thirty-one current and former turtle meat consumers offered answers about when they purchase turtle products, and 28 of these stated that they buy turtle meat all year round. The other 3 gave different answers, which included different periods in the year.

Thirty-five current and former turtle meat consumers gifted turtle meat, with 88.6% (31) gifting to friends, 68.6% (24) gifting to family and 1 respondent each reporting that they gift meat to neighbours and customers (restaurant owner). Thirty-four current and former turtle meat consumers offered information about where they purchase turtle products. Ten said they buy it at fish landing sites, 10 said they buy it in restaurants, 7 said that fishers bring it to their homes, 3 said that they buy it in the market and 4 said they receive it as gifts.

Sixty (78%) of the current and former turtle meat consumers used turtle meat for food (TCOT SEQ did not record an answer from the other 17 consumers). These consumers would cook the meat into steamed steak, stew, soup, 'turtle balls', while some consumers simply fried or boiled the meat. The 52 current turtle meat consumers stated how much turtle meat they ate per year, ranging from 0.2kg to 43.5kg per year with a mean annual consumption of 7.1kg ± SD10.4. These 52 current turtle meat consumers are therefore eating approximately 369.2kg of turtle meat per year, although it is important to note that 63% (n=58) of the TCOT SEQ sample consisted of former and current turtle fishers, who may be more likely to eat turtle meat than other social groups. Therefore, there may be a significant bias towards turtle consumers in this sample. However, it is reasonable to assume that in a population of 20,000 people (with most being either TCI belongers, Haitians or Dominicans) in a country that has an established culture of turtle meat consumption, the number of current turtle meat consumers in TCI is one or two orders of magnitude greater than the number of current consumers identified during the TCOT SEQ. The annual consumption of turtle meat in TCI may therefore amount to thousands, and perhaps tens of thousands of kilograms of turtle meat per year.

Summary

The availability of turtle meat has decreased or stayed the same in the last 5 years but has decreased in the living memory of TCOT SEQ respondents. It is unclear why availability has decreased. However, foraging turtle populations have either remained stable or increased in

recent decades (see section 9.6.4), while demand for turtle meat has probably decreased in recent decades (see section 9.5.6.2). Therefore, the perceived decreased availability of turtle meat is more likely to be due to a decreased turtle fishery effort in response to decline in demand, rather than declining foraging turtle populations. Bowen (2003) suggests that new, imported foods have replaced traditional TCI foodstuffs, including turtle meat. Nevertheless, despite the decreased demand for and availability of turtle meat, a demand still exists amongst locals, tourists and other visitors to the islands. TCI fishers are catching hundreds, if not thousands of turtles, mostly juvenile green turtles, each year to satisfy this demand. Turtle meat consumers primarily buy turtle meat raw at the various fish landing sites (e.g. Five Cays – Provo, West Rd - Grand Turk, Cockburn Harbour – South Caicos), buy cooked turtle dishes at a number of restaurants on Providenciales and Grand Turk, or receive raw meat delivered to their homes by fishers.

9.7.6. Trade in shells and shell products

9.7.6.1. Sale of turtle shells

As described above, green turtle shells tend not to be sold individually but are butchered as meat. Only 3 of the 45 current turtle fishers said that they sell green turtle shells for between US$25 and US$50 per shell depending on the size. One of these fishers said that he sells about 5 green turtle shells per year at about US$30 per shell. Only 1 current turtle fisher said that he currently sells 1-2 whole hawksbill turtle shells per year for about US$50 per shell. Seven of the 15 former turtle fishers said that they used to sell hawksbill shells, usually to tourists, with 1 stating that he sold shells '*when the tourists were allowed to take them home*'. The shells were sold at between US$25 to US$60 each depending on the size, and were sold at customers homes (n=4), the fish landing site (n=3), market (n=1), restaurant (n=1), retail (n=1) and to tourists on yachts (n=1). In addition, 1 elderly former turtle fisher (>65 years old) recounted how, when he was a boy, his father would catch and preserve whole hawksbills to sell as curios to the foreign sailors on the boats that shipped salt out of TCI.

TCOT SEQ suggests that there was a limited trade of hawksbill and green turtle shells between TCI's fishers and tourists some years ago, but the trade seems to have largely died out. This is probably due to a decreased market as a result of increased tourist awareness regarding trade in endangered species. One fisher said that when there was a tourist market for turtle shells, the fishers would set the price. Nowadays if someone asks him for a turtle shell the customer will set the price depending on how much they are prepared to pay. While surveys of gift shops in TCI during TCOT were not exhaustive, they did not reveal any whole turtle shells for sale anywhere in TCI during field visits.

9.7.6.2 Sale of shell pieces

TCOT staff did not find any evidence of worked turtle shell for sale in any retails outlets in TCI. During TCOT SEQ, 3 fishers stated that they used to sell raw turtle scutes to foreign traders but they have not done so for a long time. One fisher stated that *'Chinese people and people from the Dominican Republic used to came to South Caicos (1986-87) to buy shell, but don't come any more'*. Prices of hawksbill scutes during this time ranged from US$2.50 per lb to US$20 per lb of scute, with an average price of US$12.50 per lb (n=5).

However, 1 fisher said that he currently sells about 1 to 2 hawksbill shells worth of scutes per year and another fisher claimed that several South Caicos fishers save the scutes from the hawksbills they catch to sell to a Dominican trader who lives on South Caicos. This report was corroborated by another from an old fisherman in South Caicos, who told TCOT staff that the discarded hawksbill shells often seen in Cockburn Harbour are left there so that the connective tissue decomposes, and the scutes can be easily removed for sale to Dominican traders.

As discussed in section 9.7, there is extensive illegal trade in tortoiseshell products in the Dominican Republic, and in recent years the Japanese authorities have seized illegal imports of hawksbill scutes from Japanese businessmen travelling from the Dominican Republic. TCOT was not able to assess the status of illegal trade in hawksbill scutes between TCI and the Dominican Republic, but based on TCOT SEQ it appears that a limited trade probably continues today.

Recommendations

9.1.1.1. Increase the capacity of the Department of Environment and Coastal Resources and the Protected Areas Department

a) Ensure DECR/PAD has the capacity, staff and resources to carry out enforcement and monitoring duties relevant to marine turtle management, including data collection, entry, management and analysis for turtle monitoring programmes. Given the importance of all natural resources in the network of Protected Areas, and apparent poor compliance with the National Parks Ordinance, TCOT recommends that an increased capacity to effectively patrol the protected areas should be treated as a priority.

9.1.2.3. Recommendations regarding Multilateral Environmental Agreements and TCI national legislation

a) CITES should be extended to TCI as soon as possible, and the appropriate domestic legislation drafted and gazetted, to address the possible trade of hawksbill scutes from TCI to neighbouring states.

Have you ever accidentally caught turtles while fishing for other target species?		
	Yes	***No***
No.	8 (7 current, 1 former fisher)	50
%	*13.8*	*86.2*

No. of turtles caught accidentally each year (n=8)				
No. caught	***Once***	***1-2 per year***	***3-4 per year***	***10-12 per year***
No. respondents	2	3 (incl. 1 former fisher)	1	2

State of turtles caught accidentally (n=8)			
	Mostly alive	***Equal dead and alive***	***Mostly dead***
No. of respondents	8	0	0

Methods used when accidentally catching turtles (n=8)		
	Gill nets (for bonefish)	***Hook and line***
No. of respondents	3	5

Species caught (n=8, multiple answers)			
	Green	***Hawksbill***	***Loggerhead***
No. of respondents	7	2	1

Fate of turtles captured accidentally (n=8)			
	Release	***Sell***	***Use***
No. of respondents	3	2	3

Do you think other fishers accidentally catch turtles? (n=58)				
	Yes	***No***	***Don't know***	***No answer***
No. of respondents	6	1	2	49

What is the fate of these turtles? (n=6)			
	Release	***Sell***	***Use***
No. of respondents	0	3	3

Table 9.13. Overview of incidental capture of turtles.

9.7.7. Incidental catch in marine fisheries

Incidental capture of turtles in TCI appears to occur at very low levels, as described by the 58 current and former fishers interviewed during TCOT SEQ. Table 9.13 gives an overview of incidental catch in TCI.

Most (86.2%) of the current and former fishers said that they did not incur incidental catch of turtles, while 7 current and 1 former fisher (13.8%) said they did. Of these, 5 accidentally catch turtles on hook and line and 3 catch them in gill nets set for bonefish. All 8 fishers report that incidentally caught turtles are usually found alive, whether in nets or on a hook and line, with 5 reporting that they either sell or use the turtles they catch. Incidental catch levels appear to be low, but this is consistent with fishing methods used to catch conch and lobster, (i.e. diving and capture by hand or by hook). The level of current regular catch (reported by only 5 of these fishers) ranges from 1 to 12 turtles per year with a mean of about 3.5 turtles per year. The TCOT SEQ current fisherman sample represents 9.2% of the fishers licensed in TCI 2003. If the level of bycatch is representative of TCI's fishers as a whole, then annual bycatch of turtles in TCI may be at least 190 turtles per year. As can be seen in Table 9.12, most incidentally caught turtles are used and most respondents thought that other fishers would use any turtle they accidentally caught.

One fisher's recent encounter with an incidentally caught turtle is of particular interest. He snagged a hawksbill turtle '*of about 40lbs*' on a bonefish line while fishing in a tidal creek

on the southern shores of North Caicos in September 2003. The turtle exhibited fibropapilloma-like symptoms, with large '*scrambled egg or cauliflower*' like growths on both sides of the head and shoulders, but especially on the right side where the growth covered the eye. Despite the growths, the turtle was very energetic and put up a good fight before it was reeled in and released. Fibropapilloma may therefore be present in the TCI's foraging hawksbill population as well as in the foraging green turtle population.

Recommendations

9.1.2.1. Amend harvest legislation

c) Establish a limited turtle fishing licensing scheme, whereby licensed turtle fishers agree to abide by strict regulations regarding fishery practice, limited quotas and catch recording, including statutory monthly catch reporting by fishers to DECR (including incidental catch), and voluntary reporting of all turtles caught in advance of slaughter for biometric measurement and sampling by DECR. Quotas should be reactive and based on number of licensed turtle fishers and stock assessments established through the monitoring regimes. The DECR should have the statutory power to implement spot checks at fish landing sites to assess compliance and to close the fishery if stock monitoring reveals abundance declines below a pre-established and measurable level.

9.1.3.2. Establish systematic monitoring efforts at index foraging sites

b) Expand the sampling regime initiated under TCOT to establish the genetic 'identity' of TCI's nesting and foraging populations. This sampling could be included as part of the surveys mentioned above and fishers participation should be encouraged where practicable. Sampling should be extensive and should include an assessment of the prevalence of fibropapilloma (FP) in the foraging, and if possible, nesting turtle populations.

Photo 9.21. DECR leaflets using turtle images.

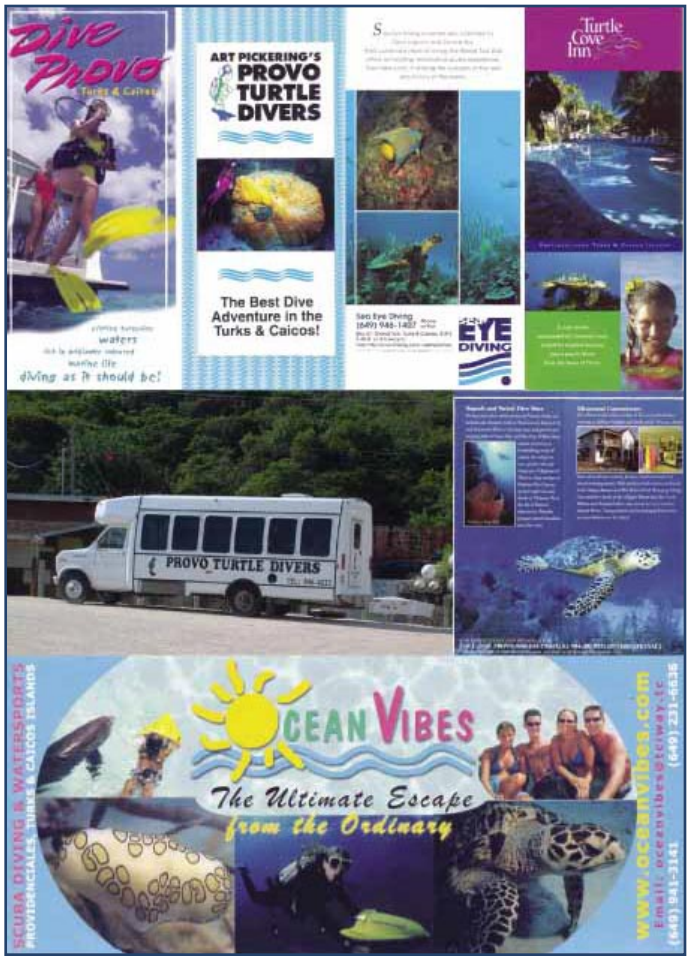

Photo 9.22. Turtle images are used to promote tourism in TCI.

9.8. Indirect Use

The main indirect uses of turtles in TCI include dive/snorkel tours and the sale of turtle related merchandise in tourist gift shops. The Protected Areas Department also used photographs of hawksbill turtles in a leaflet promoting TCI's national parks (*Welcome to the Turks & Caicos Islands – "Beautiful by Nature*") and a promotional leaflet entitled *Enjoy the National Parks of Grand Turk and Salt Cay*. The Turtle Cove Inn in Providenciales uses a stylised turtle image as a logo and the names of some private residences on Providenciales refer to turtles.

9.8.1. Turtle watching on beaches

Turtle nesting activity appears to be restricted to remote cays and therefore turtle-watching on beaches is unlikely to be viable as mainstream tourist activity.

9.8.2. Dive/snorkelling tourism

Dive tourism is a significant business in TCI, with approximately 20 operators based in Providenciales (n=13), Grand Turk (n=3), Salt Cay (n=3) and North Caicos (n=1). At least 5 of these operators use photographs of hawksbill turtles in their promotional leaflets. Some of the larger dive operators also run boat trips and snorkel tours for tourists, and TCOT SEQ identified 3 individuals (2 fishers and 1 restaurant owner) who ran private boat trips including snorkel tours. One of the fishers catches turtles for consumption, but during TCOT surveys, expressed a reluctance to fish for

Advertising	Attraction	Professional
Turtles are used as a way of promoting a service	*Customers may see live turtles or buy turtle merchandise*	*Involvement in marine turtle research, conservation and education*
1 recreational fishing charter company	4 boat tour operators (incl. 1 former operator)	2 DECR employees
6 (of 10) dive operators	9 (of 10) dive operators	
	3 gift shops	
7 (35%)	**16** (80%)	**2** (10%)

Mean percentages of customer categories for the commercial indirect users (n=18, not incl. DECR)

Local	Expat	Tourist
4.1	8.4	87.3

Table 9.14. Summary of indirect turtle users identified during TCOT SEQ (n=20).

turtles when running snorkel trips because '*they don't like to see it*'. He would occasionally catch a turtle to show to his customers and then release it.

9.8.3. Aquaria holding captive turtles

There are no such facilities in the TCI other than the laboratory aquarium at the DECR office on South Caicos that was used to house some of the turtles captured by fishers specifically for TCOT tagging and sampling.

9.8.4. Gift Shops

There are several gift shops around the TCI, but most are found on Providenciales. Employees of 3 gift shops were interviewed during TCOT SEQ and the shops sold significant quantities of merchandise featuring turtle images, including t-shirts, key rings, fridge magnets, caps, towels, cuddly toys and games (PIC).

9.8.5. Data from the TCOT SEQ

Table 9.14 gives an overview of the indirect turtle users identified by TCOT SEQ. Nineteen current and 1 former indirect users answered questions about their use/involvement with turtles during TCOT SEQ, with the majority using turtles as an attraction for tourists, either as live animals in the wild or as merchandise using turtle imagery.

When asked the question, would you still use/be involved with turtles if they were no longer found in TCI, 8 (40%) said yes and 9 (45%) said no, while 3 did not answer the question. Ten (50%) respondents said that that their services would stay the same if turtles were no longer found in TCI, whereas 8 (40%) said that their services would decrease. One (DECR) respondent said their services would increase (more research to investigate cause) if turtles were no longer found in TCI and the question was not applicable to the former boat trip operator. While these results suggest that the services of these indirect users are not dependent on the presence of turtles in TCI, 8 (40%) said that turtles were very important to their services, 7 (35%) said they were somewhat important and 4 (20%) said they were unimportant, while the question was not applicable to the former boat trip operator.

The majority of these users therefore perceive turtles as important to their services. Nine out the 10 dive operators said that their customers are generally excited when they see turtles on the dive, with 2 operators comparing tourist interest in turtles to other large marine animals they might see, such as sharks and eagle rays. All 3 gift shop owners/managers said that their customers buy merchandise with turtle images because they associate turtles with the TCI, often because they have encountered turtles while snorkelling. One Providenciales gift shop owner directs her tourist customers to 'Coral Gardens', a snorkelling site in Princess Alexandra National Park, where juvenile green turtles and occasionally hawksbills are often encountered. She said that these tourists usually return to her shop to thank her and often buy turtle-related merchandise '*as a conversational piece back home*'.

9.9. Attitudes to conservation

TCOT SEQ sought to assess overall attitudes towards conservation of marine turtles, and options for marine turtle management. Respondents could agree, disagree, or have no opinion. In some cases, they could choose 'not applicable'. While details of responses to these questions have been circulated to project partners in TCI, basic results are summarized here. The most common response is cited. In general, most respondents agreed that:

- It is important that sea turtles exist in the wild in the future (96.7%)
- Turtles are culturally valuable in this TCI (88%)
- Turtles should be protected, regardless of their use to humans (87%)
- The government needs to actively work to protect sea turtles (85.9%)

- Turtles play an important ecological role in our natural environment (85.9%)
- Some income from tourism should be used to support sea turtle conservation (84.8%)
- As turtles are migratory, they should be managed in cooperation with neighbouring states (84.8%)
- Local people should be allowed to catch and eat sea turtles, provided it doesn't threaten the regional population (80.4%)
- Turtles are an economically valuable resource in TCI (78.3%)
- Turtles should be used both as a tourist attraction and as a source of food (70.7%)
- Local people should be allowed to purchase sea turtle meat (70.7%)
- The government needs to do more to ensure that existing laws regarding marine turtles are effectively enforced (68.5%)

There was less agreement among the interviewees regarding the following statements:

- Turtles should be used as a tourist attraction rather than as a source of food (47.8% agree, 39.1% disagree)
- Turtle fishing should be stopped until more information is known on the size and health of the populations (44.6% disagree, 42.4% agree)
- Existing laws protecting marine turtles are effectively enforced (40.2% agree, 30.4% disagree)
- Tourists should be allowed to purchase sea turtle meat (51.1% agree, 42.4% disagree)

A majority of respondents disagreed that:

- Turtle fishing should be stopped completely (67.4%)
- Turtle fishing should be unregulated (65.2%)
- Tourists should be allowed to purchase sea turtle shell and take it home with them (52.2%)

These results suggest that marine turtles are considered to be ecologically and culturally important to the TCI and, therefore, there is wide support for marine turtle use, both direct and indirect, and turtle conservation in Turks and Caicos Islands. There is particularly high support for general 'feel good' statements (e.g. *It is important that sea turtles exist in the wild in the future*), and wide acceptance of the role of government in turtle conservation.

More contentious are statements related to the effectiveness of current enforcement efforts, management options to assess turtle populations and the role of tourism in the local marine turtle product trade. This was reflected by the fact that over 50% of interviewees were opposed to the sale of turtle shell souvenirs to tourists. The majority of interviewees did not feel that turtle fishing should be stopped completely but felt that some regulation of the fishery is necessary.

Photo 9.23. Turtle merchandise for sale in a gift shop in Providenciales (Photo P. Richardson).

Photo 9.24. South Caicos fisher with a hawksbill turtle caught, tagged and released within the Ramsar site (Photo P. Richardson).

9.10. Capacity Building and Outreach Activities During TCOT

9.10.1. Capacity building

In September 2002, DECR officers Jasmine Parker and Amber Thomas attended the TCOT training workshop in the Cayman Islands, and Jasmine attended the Bermuda Turtle Project In-water course in August 2003 with support from the Foreign and Commonwealth Office. In addition, other DECR officers have been closely involved in some TCOT fieldwork and local fishers were involved in TCOT sampling at every opportunity, The capacity of the DECR staff to carry out marine turtle monitoring has been significantly improved through the TCOT project, but Amber Thomas has since left the DECR and therefore there is a need for further capacity building within the DECR and PAD with respect to marine turtle conservation and management.

9.10.2. Outreach activities

TCOT staff did not carry out any dedicated outreach activities during field visits, apart from one public presentation about turtles in TCI and TCOT that was held in September 2003 at the new Environmental Centre, Providenciales. TCOT also produced an informational leaflet entitled '*Turtles and Tourism: how you can help*', which was distributed at tourist centres throughout Providenciales and Grand Turk. Amber Thomas, formerly of DECR, carried out some educational activities with South Caicos school children, which often involved them visiting the DECR aquarium to view the turtles temporarily held captive there.

Recommendations

9.1.4.2. Implement general awareness programmes regarding marine turtle conservation in the Turks and Caicos Islands

a) *Raise awareness among residents of the presence in TCI of distinct foraging and nesting turtle populations that contribute to the regional turtle populations, through informational materials and media outputs.*

b) *Establish a programme of stakeholder meetings to raise awareness of marine turtle biology (including presence of distinct foraging and nesting populations), turtle and habitat conservation needs, national legislation and MEA's.*

c) *Establish a programme of awareness raising presentations and workshops in fishing communities, schools and other public fora.*

d) *Establish a programme of awareness raising presentations and workshops to sensitise the tourism industry to the potential impacts of tourism and possible mitigation measures.*

e) *Develop the TCI National Trust conservation awareness programmes to include curriculum-linked, multi-media marine turtle related educational materials, and expand these programmes to include all schools, with those located in key fishing communities in TCI, as priority.*

9.1.1.1. Increase the capacity of the Department of Environment and Coastal Resources (DECR) and the Protected Areas Department (PAD)

a) *Ensure DECR/PAD has the capacity, staff and resources to carry out enforcement and monitoring duties relevant to marine turtle management, including data collection, entry, management and analysis for turtle monitoring programmes. Given the importance of all natural resources in the network of Protected Areas, and apparent poor compliance with the National Parks Ordinance, TCOT recommends that an increased capacity to effectively patrol the protected areas should be treated as a priority.*

b) *It is recommended that national and international funding is sourced to support further capacity-building, as well as dedicated marine turtle population monitoring, turtle genetic sampling, turtle fishery monitoring and turtle conservation awareness and outreach programmes.*

c) *Ensure that all new research and conservation staff are adequately trained in marine turtle biology, as well as research and conservation techniques.*

Additionally, we make a major overarching recommendation to the UK Government to support the conservation and management of marine biodiversity in the UK OTs under the Environment Charters.

The Overseas Territories of the UK have long been acknowledged as being rich in biodiversity (Proctor & Fleming 1999). The small islands or island archipelagos of the Caribbean UK Overseas Territories currently do not or are unable to carry out sufficient monitoring, research, management and educational outreach required to ensure the sustainability of their marine and coastal natural resources. TCOT strongly recommends that the UK Government further contributes to marine biodiversity conservation and management in the UK Overseas Territories through provision of funding and expertise under the FCO/DfID Overseas Territories Environment Programme (OTEP), Defra's Darwin Initiative and through the provision of bespoke scholarships for tertiary education in biodiversity/conservation related subjects for citizens of the OTs. Additionally, much of the environmental legislation in the OTs is in need of revision to facilitate the conservation of marine turtles and their habitats, and therefore TCOT strongly recommends that HMG provide the necessary support to the OTs to facilitate the required legislative amendments.

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9.12. References

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