



An Assessment of the Status and Exploitation of Marine Turtles in the Cayman 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.

7. Status and Exploitation of Marine Turtles in the Cayman Islands

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7.1. Summary and Recommendations

Summary

At least two species of marine turtle (green and loggerhead turtles) nest in the Cayman Islands but in critically low numbers (see table 7.1). Much needs to be done to ensure the continued existence of marine turtles nesting in the CI and facilitate their recovery. Foraging marine turtles (green and hawksbill turtles) are widespread in CI coastal waters and appear to be locally abundant at some sites, despite having been subject to direct exploitation for a long period of time. Direct exploitation still occurs at much reduced levels but targets large individuals, a significant proportion of which are likely to be part of the breeding population. Local authorities have advised that this fishery should be discontinued as turtle meat which is so important in Caymanian culture is available from cultured stocks from the Cayman Turtle Farm (CTF). Indirect exploitation of turtles and their image is higher in the Cayman Islands than in any of the other OTs.

Summary of Recommendations

TCOT recommends that the Government of Cayman Islands takes all necessary steps to ensure the sustained existence of nesting and foraging populations of marine turtles in Cayman Islands and facilitate their recovery. This will require actions under the following general headings:

7.1.1. Increase capacity for marine turtle management

7.1.1.1. Increase the capacity of the Cayman Islands Department of Environment (CIDoE).

7.1.1.2. Establish a multi-stakeholder marine turtle management process.

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

7.1.2.1. Revise harvest legislation.

7.1.2.2. Increase the network of Protected Areas in the Cayman Islands.

7.1.2.3. Enact Endangered Species Trade and Transport Law.

7.1.3. Continue and enhance systematic monitoring of marine turtle populations to determine trends in abundance

7.1.3.1. Continue systematic monitoring efforts at nesting beaches throughout the three Islands.

7.1.3.2. Establish sustainable, regular and frequent (monthly), constant-effort monitoring programmes at a range of in-water study sites for both green and hawksbill turtles around the Cayman Islands.

7.1.3.3. Undertake limited night time beach monitoring for identification and genetic sampling adult nesting green turtle females.

7.1.3.4. Consideration be given to acting as a regional training centre.

Species	Nesting	Foraging	Harvest
Green Turtle (<i>Chelonia mydas</i>)	Small numbers possibly increasing	Adults and juveniles present. Large numbers of juveniles in some areas	Licensed turtle fishery present at reduced levels targeting large juveniles and adults Low level of illegal take on the nesting beach and at sea. Low levels of illegal egg take
Hawksbill Turtle (<i>Eretmochelys imbricata</i>)	Very small numbers possibly extirpated	Adults and juveniles present Large numbers of juveniles in some areas	Still present at reduced levels targeting large juveniles and adults Low level of illegal take at sea Egg take unlikely
Leatherback Turtle (<i>Dermochelys coriacea</i>)	Occasional nest	Rarely encountered	Unlikely
Loggerhead Turtle (<i>Caretta caretta</i>)	Small numbers	Rarely encountered	Licensed turtle fishery present at reduced levels targeting large juveniles and adults Low level of illegal take on the nesting beach and at sea Low levels of illegal egg take

Table 7.1. Marine turtle species present and summary of exploitation in the Cayman Islands.

7.1.4. Maximise the role of the Cayman Turtle Farm in marine turtle conservation

7.1.5. Establish further conservation and awareness programmes to sensitise those living in and visiting Cayman Islands to marine turtle conservation requirements

7.1.5.1. Encourage and implement sensitive practices at existing nesting beaches.

7.1.5.2. Implement general awareness programmes regarding marine turtle conservation in the Cayman 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

7.1.1. Increase capacity for marine turtle management in Cayman Islands

TCOT has significantly contributed to the skills and technical knowledge of the CIDoE officers. Although CIDoE are relatively well resourced in OT terms, additional resources would further improve the magnitude and quality of the work currently being undertaken. It is essential that the CIDoE receives adequate resources to effectively carry out their custodianship of Cayman Islands' highly valuable marine and coastal resources, on which the country's economy so heavily depends.

7.1.1.1. Increase the capacity of the CIDoE

It is vital to ensure CIDoE has the capacity, staff and resources to carry out research, monitoring and enforcement duties relevant to marine turtle management, including data collection and analysis for turtle monitoring programmes. CIDoE staff are well trained and highly motivated, but have

a limited research budget which constrains current efforts. It is recommended that national and international funding is sourced to support ongoing research and monitoring efforts as the work being carried out in the Cayman Islands is potentially of profound regional importance and CIDoE has the capacity to match support.

a) Increased presence in Cayman Brac/Little Cayman

Given the importance of Little Cayman as a foraging and nesting site, and that Cayman Brac has recently been discovered to host nesting and foraging populations of unknown magnitude, but has long been a centre of turtle exploitation, it is recommended that CIDoE have a more significant presence on these sister islands. Although CIDoE have one enforcement officer for each of the two Islands, it would seem that, at minimum, a sister islands field base and sufficient operating resources are warranted to facilitate more extensive research, monitoring and community outreach by DoE scientific staff.

7.1.1.2. Establish a multi-stakeholder marine turtle management process

To date there have been 5 years of dedicated marine turtle research on wild marine turtles in the Cayman Islands and marine turtle conservation and management in the Cayman Islands is now of significant public interest. It is essential that public compliance with marine turtle management measures continues and, to facilitate such compliance, it is necessary that stakeholders feel they have meaningful input into the decision-making progress.

It is therefore recommended that the CIDoE coordinate a Marine Turtle Working Group to include representatives of relevant stakeholders (e.g. government agencies and departments such as CIDoE, CTF, Planning and Tourism; NGOs such as CI National Trust; hoteliers; dive operators etc.). The working group should meet regularly to discuss marine turtle management issues and to provide input to government's management and regulatory processes. The group would also function as a public education resource, promoting marine turtle conservation and informing their respective stakeholder groups on marine turtle management issues.

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

It is felt by CIDoE that data from their ongoing inwater monitoring provide convincing evidence that the fishery should be closed and they have made such a recommendation to the Marine Conservation Board (G. Ebanks-Petrie (CIDoE) pers. comm. 2004). Available data suggest the fishery, although small, as currently structured is likely to be affecting nesting population recovery. TCOT recognises that cessation of all turtle fishing would significantly contribute to the recovery of depleted marine turtle populations in the Cayman Islands. TCOT also recognises that turtle meat is a component of the traditional Caymanian diet, but that in the Cayman Islands, turtle meat can be obtained from farmed stocks. Complete closure of the traditional turtle fishery may, however, be deemed politically and socially unacceptable.

At minimum, it is recommended regulations governing the traditional harvest be altered.

In addition, the Cayman Islands' turtles face a host of threats imposed by the growing human population (2.71%, 2004 est.), and the regulation of utilisation alone will not serve the sustainable management of these turtle populations. TCOT therefore also makes recommendations regarding legislation and policy changes to facilitate protection of critical marine turtle habitat in the Cayman Islands.

7.1.2.1. Harvest legislation recommendations:

While the Cayman Islands have relatively sophisticated regulations to monitor marine turtle harvest, this harvest must be accompanied by meaningful, long-term and systematic monitoring programmes to ascertain trends in turtle abundance. TCOT makes the following recommendations:

- a) Prohibit the capture of all adult marine turtles in Cayman waters. Ensure permanent and complete prohibition of the harvest of reproductively active turtles by extending the closed season to include the 1st of April to the 30th of November inclusive.
- b) 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 that should be stipulated in any amended legislation.
- c) 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 stipulated in any amended legislation.
- d) Ensure prohibition of the harvest of loggerhead and leatherback turtles. The CIDoE have also expressed that they would recommend prohibition of any future take of hawksbill turtles.

7.1.2.2. Increase the network of Protected Areas in the Cayman Islands

a) Key nesting sites should be given protected status

At present, none of the key nesting beaches in the Cayman Islands is afforded protected status. It is recommended that key nesting sites for marine turtles are given a high level of protection from the deleterious effects of inappropriate coastal development. While there is currently no legislation to implement this recommendation, the Draft National Conservation Law would provide the necessary legal framework. Therefore, TCOT recommends the immediate enactment of this law.

b) Key foraging sites should be given protected status

Based on the ongoing and recommended expanded inwater monitoring programme, key foraging sites not already protected should be given protected status to ameliorate the effects of coastal development and recreational use. In so

doing, it is likely that key coral reef and seagrass habitats will be preserved. The Draft National Conservation Law would provide a comprehensive framework for management of protected areas and species.

7.1.2.3. Endangered Species Trade and Transport Law

TCOT recommends that the CIDoE be adequately resourced to implement the provisions of the recently enacted Endangered Species Trade and Transport Law, and that the necessary commencement orders be issued by Cabinet as soon as possible. When this legislation comes into effect, it will fully transpose CITES to domestic law.

7.1.3. Continue and enhance systematic monitoring of marine turtle populations to determine trends in abundance

Cayman Islands hosts nesting populations of green, loggerhead and hawksbill turtles and foraging populations of greens and hawksbills. The Cayman Islands' nesting turtle populations are remnant and at critically low levels; indeed the hawksbill nesting population may be extirpated. 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, it is vital to work towards establishing data that will reveal any trends in their abundance. TCOT therefore recommends the continuation and expansion of the following monitoring programmes, under the guidance of the CIDoE, as a matter of priority:

7.1.3.1. Continue systematic monitoring efforts at nesting beaches throughout the three Islands

The CIDoE currently runs an exemplary monitoring program that has been in operation for 6 years in Grand and Little Cayman. Given the recent discovery of nesting on Cayman Brac, survey efforts have been expanded to Cayman Brac. The main aims of such monitoring in all three islands would be to determine nesting abundance trends, monitor hatching success, describe threats and facilitate genetic analysis of nesting populations through nest excavation and sampling.

7.1.3.2. Establish sustainable, regular and frequent (monthly), constant-effort monitoring programmes at a range of in-water study sites for both green and hawksbill turtles around the Cayman Islands

Enhancing ongoing work, this would be carried out around all three of the Cayman Islands to allow the detection of temporal patterns of abundance, and to facilitate genetic sampling to further determine trends in genetic stock composition of green and hawksbill turtle populations. Surveillance for fibropapillomatosis should continue to be incorporated.

7.1.3.3. Undertake limited night time beach monitoring for identification and genetic sampling of adult nesting green turtle females

Given the large financial investment previously made in the CTF headstarting operation, it is highly recommended that CTF support the CIDoE's nocturnal monitoring to

allow a fuller appreciation of the impact of the headstarting experiment to be ascertained.

7.1.3.4. Consideration be given to acting as a regional training centre

The combined inwater and nesting monitoring programme of the CIDoE would be an excellent training platform for a range of interns, including fisheries officers, from throughout the wider Caribbean region.

7.1.4. Maximise the role of the Cayman Turtle Farm in marine turtle conservation

The Cayman Turtle Farm (CTF) is ideally and uniquely suited to promoting the conservation of marine turtles in the Cayman Islands. One key area is in the maximization of the proportion of production that is sold to local people. Since recent production cuts at the CTF, there has been a relative scarcity of turtle meat relative to demand. This has an intrinsic potential to drive the trade in both legal and illegally captured turtle meat from the wild. It is strongly advised that, where possible, production is increased and/or re-routed towards the local market, whether it be through supermarkets or restaurants catering largely to local people, in preference to those most frequented by island visitors. It is recommended that the sale of farmed turtle products be controlled under the Trade and Transport Law to prevent illegal trade in wild turtle products through commercial establishments.

7.1.5. Establish further conservation and awareness programmes to sensitise those living in and visiting Cayman Islands to marine turtle conservation requirements

Increased awareness of turtles and their conservation requirements in the Cayman 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 the CIDoE, to facilitate public contribution to marine turtle conservation:

7.1.5.1. Encourage and implement sensitive practices at existing nesting beaches

- a) Continue coordinating the established network of hoteliers, beach residents and other beach users to ensure swift reporting of nests 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. Key issues to be addressed are lighting, vehicular traffic, and the use of heavy beach cleaning equipment.
- b) Develop a network of interested beachfront residents and beach/sea users willing to report any turtle strandings and ensure CIDoE has the capacity to collect, necropsy and document all strandings. This network could be supported by a toll-free hotline.

- c) Raise awareness through the continuation and expansion of the campaign to sensitise Caymanians 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) Update and expand distribution of guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings.
- e) Ensure continued enhanced school participation in relevant marine turtle conservation programmes to sensitise children to the importance of rookery protection.

7.1.5.2. Implement general awareness programmes regarding marine turtle conservation in the Cayman Islands

- a) Raise awareness among Caymanians of the presence of distinct foraging and nesting 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) Enhance existing CIDoE programme of awareness raising presentations and workshops in local 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 Cayman Islands specific turtle-related educational materials, and expand them to include further curriculum linked, multi-media educational materials where appropriate.



Figure 7.1. Map of Cayman Islands.

7.2. Geographic Overview

The Cayman Islands (Fig 7.1.) are a group of three islands: Grand Cayman, Little Cayman and Cayman Brac. They have a land area of 259 km², 207 km of coastline, and a population of 43,103 growing at 2.71% (2004 est.). The economy is second only to Bermuda among the 6 OT's involved in TCOT, with a GDP per capita of US\$35,000 (2002 est., statistics from CIA World Fact Book <http://www.cia.gov/>). With no direct taxation, the islands are a thriving offshore financial centre. Tourism is also a mainstay, with over 2.1 million visitors in 2003.

7.3. Historical Overview

Historically, nesting marine turtles were abundant in the Cayman Islands (Williams 1995), with a large migrant population of green turtles reproducing between May and October on both Grand Cayman and Little Cayman (Lewis 1940; Parsons 1984). When Christopher Columbus discovered the islands in 1503, he named them "Las Tortugas" (Spanish: the turtles). His expedition recounted that the islands were:

"full of tortoises, as was all the sea about, insomuch as that they looked like little rocks."

Murray (1991) reports that, while stopping off at Tortugas en route to Florida in 1564, the English slave-trader Sir John Hawkins recorded:

"These Islands beare the name of Tortoises, because of the number of them, which there do breed, whose nature is to live both in the water and upon land also, but breed onely upon the shore; in making a great pit wherein they lay egges, to the number of three or foure hundred, and covering thm with sand, they are hatched by the heat of the Sunne; and by this meanes commeth the great increase. Of these we tooke very great ones, which have both backe and belly all of bone, of the thicknes of an inch; the fish whereof we proved, eating much like veale; and finding a number of egges in them, tasted also of them, but they did eat very sweetly."

The population was so large that authors have suggested that the Cayman Islands may have been the largest rookery for the green turtle in the Caribbean (Groombridge & Luxmoore 1989; King 1982; Jackson 1997).

Turtle fishing later came to form the basis of the economy and culture of the Islands, providing a rich food source and means of livelihood for several centuries. Indeed, this easily attainable resource was what originally attracted people to the islands, which were first colonised in the mid 1600's, with turtle fishing becoming the main local industry. By 1688, 40 sloops from Jamaica were engaged full time, with sources suggesting shipments of 13,000 turtles a year (King 1982). The level of take was undoubtedly unsustainable and by the late 1700s nesting turtles of the Cayman Islands were no longer a significant commercial resource. The population

was thought to have been completely extirpated by the 20th Century, but it appears that a remnant population has persisted (see Aiken *et al.* 2001a; 2001b, Bell & Austin 2002 and references therein).

By the early 1800s, Caymanian turtle fishers were sailing to Cuba, then to the Miskito Cays, Nicaragua to catch turtles (Lewis 1940; Parsons 1984). The Caymanian turtle fleet operated in this manner, largely sustaining the local economy, until tourism overtook as the major industry in the 1970s. Parsons (1962; 1984) suggests that the inhabitants of Cayman Brac were traditionally hawksbill fishers using "trap nets" while those in Grand Cayman focussed largely on the green turtle. Presumably, the green turtle take involved targeting nesting turtles on beaches as well as using "set nets" that were subsequently used in the Miskito Keys (Parsons 1984).

7.4. Organisations Involved with Marine Turtles in the Cayman Islands

There are two main organisations concerned with marine turtles in the Cayman Islands.

7.4.1. Cayman Islands Department of Environment

The responsibilities of the Cayman Islands Department of Environment (CIDoE) are broad, encompassing research, monitoring, advisory, enforcement, and education. There is a staff complement of 31: Director; 2 Assistant Directors (Operations; Research & Assessment); Research Manager; Senior Research Officer (Aquaculture & Fisheries); Environmental Assessment Officer; 5 Research Officers; 2 Special Projects Officers; Marine Parks Maintenance Supervisor; 2 Marine Parks Maintenance Officers; 2 Technical Assistants; Marine Technician; Chief Marine Enforcement Officer; Marine Enforcement Supervisor; 9 Marine Enforcement Officers; Executive Officer; Administrative Officer. The overall operating budget estimate for 2004-2005 was CI\$2,848,469 (T. Austin (CIDoE) pers. comm. 2004). The CIDoE currently operates 13 vessels and 11 road vehicles in support of Research, Marine Enforcement, and Marine Parks Operations in Grand Cayman, Little Cayman, and Cayman Brac.

The CIDoE has played a pivotal role in research, conservation, and management of wild marine turtles in the Cayman Islands since 1998, when the Marine Turtle Research Project was initiated with support of a grant from the UK Foreign and Commonwealth Office. Currently, research is carried out using the extensive field experience of the CIDoE and the collaborative academic expertise of the Marine Turtle Research Group at the University of Exeter in Cornwall. Through TCOT support, the CIDoE greatly expanded the range and scope of existing initiatives. As the agency responsible for research, public education, and management of the natural environment in the Cayman Islands, the CIDoE will ensure that TCOT recommendations and results are presented to the public and considered in the relevant policy decisions.

	Grand Cayman					Little Cayman					Cayman Brac
	1999	2000	2001	2002	2003	1998	2000	2001	2002	2003	2003
Green	1	18	2	43	18	9	9	3	8	4	0
Loggerhead	18	25	27	12	31	0	0	5	1	4	12
Hawksbill	2	0	0	0	0	2	0	0	0	0	0
Unidentified	2	2	1	9	1	4	2	0	2	0	0
Total	23	45	30	64	50	15	11	8	11	8	12

Table 7.2. Overall magnitude of nesting in the Cayman Islands since monitoring began in 1998 in Little Cayman and 1999 in Grand Cayman Islands.

7.4.2. Cayman Turtle Farm

As a key part of the exploitation of turtle products in the Cayman Islands, a detailed profile of the Cayman Turtle Farm is given in Section 7.7.7.

7.5. Status of Nesting Marine Turtles in the Cayman Islands

7.5.1. Data from nesting beach monitoring

The following information is distilled from a paper in preparation by Catherine Bell (CIDoE) *et al.*:

A total of 27 beaches covering 37 km of Grand Cayman's 129km of coastline have been identified as suitable for marine turtle nesting based on beach morphology and composition, and information from historical records and anecdotal reports. The Grand Cayman coastline has been monitored during the reproductive season from 1999 – 2004 (Photo 7.1). In Little Cayman the survey has been carried out in 1998, and every year commencing 2000. Sixteen beaches covering 18km of coastline were identified as suitable for marine turtle nesting habitat. In Cayman Brac, sporadic and reactive monitoring of its limited nesting

habitat began in 2003 in response to reports of marine turtle activity in these areas. Table 7.2 summarises nesting data gathered to date. There has been no recorded hawksbill nesting in the Cayman Islands since 1999 and it is possible that the hawksbill nesting population on the Cayman Islands may have been extirpated. Although nesting in every year, green (Photo 7.2) and loggerhead (Photo 7.3) nesting are at critically low levels and continued monitoring will give insights into trends in nesting numbers. Individual nests are followed through to hatching or failure and excavated to assess success (Photo 7.4).

7.5.2. Data from TCOT socioeconomic questionnaire

Although systematic nesting beach monitoring by the CIDoE was only instigated in 1998, some insight can be obtained from past egg collectors. As part of the TCOT SEQ, 2 former egg collectors expressed their views that, in general, marine populations had declined. However, one thought that nesting turtles, especially loggerheads, had increased in the last 5 years. This same observer also felt that hawksbill nesting had continued to decline in the last 5 years.

All questionnaire respondents were also asked about perceptions of change in nesting numbers over time (in the last 5 years and since they can remember), both



Photo 7.1. Relatively undeveloped beaches persist in the Cayman Islands (Photo P. Richardson).



Photo 7.2. Green turtle nesting (Photo M. Orr).



Photo 7.3. Raking over loggerhead turtle track (Photo P. Richardson).



Photo 7.4. Nest excavation (Photo B. Godley).

in general and for specific species (Q105a-b). Twenty respondents noticed changes, 78 did not, and 12 did not answer the questions. For those who did notice change, for each species and in general, more people believed turtle nesting was decreasing versus increasing, in the past 5 years and since they can remember. For example, for turtles in general, 4 people believed nesting numbers had increased in the last 5 years, as opposed to 10 who believed they had decreased. Three believed they had increased since they could remember, and 10 believed they had decreased. Perceptions of species decline and increases are summarised in Table 7.3 below.

Respondents were asked about reasons for the perceived increase or decrease, both in the number of turtles nesting and found in OT waters (reasons were not distinguished by habitat). Responses (offered by 29 respondents) varied, with no single explanation dominating. Reasons cited for decreases included: over-fishing or inappropriate fishing methods, increased demand, environmental pressure, overpopulation, cultural traditions, over-consumption and storm damage. Reasons for increases included: conservation efforts, law and the turtle farm.

7.5.3. Threats

The following anthropogenic threats to adult turtles, their eggs and hatchlings have been documented by the CDoE and reviewed by Solomon (1998):

1. Fisheries capture (via legal turtle licenses; see Section 7.7.4)
2. Illegal fishing of adults (via hand capture and illegal set nets).
3. Illegal collection of eggs
4. Egg predation by domestic dogs

In the last 5 years...

	Increasing	Decreasing	Same	Don't know	NR
Green	2	9	0	4	5
Leatherback	1	4	1	8	6
Loggerhead	3	6	0	7	4
Hawksbill	1	6	1	8	4
General	4	10	1	6	0

Since you can remember...

	Increasing	Decreasing	Same	Don't know	NR
Green	2	8	0	4	4
Leatherback	0	5	1	7	7
Loggerhead	1	8	0	6	5
Hawksbill	0	8	1	6	5
General	3	10	1	7	0

Table 7.3. Perceptions of changing abundance of sea turtles nesting in Cayman Islands, in the last 5 years and since respondents can remember (n=20 respondents who noticed change).

5. Hatchling misorientation due to inappropriate beach lighting (Photos 7.5 and 7.6)
6. Nests being placed at risk by heavy beach cleaning equipment
7. Beach erosion
8. Coastal armouring and other physical obstacles on beaches
9. Loss of native vegetation

The CIDoE has a substantial enforcement capacity and does bring prosecutions for illegal activities (Section 7.7.4). It has an extensive liaison with property owners, media and community groups, including schools, to help ameliorate other threats (J Solomon (CIDoE) pers. comm. 2004).

7.5.4. Genetics of nesting turtles

TCOT genetic analyses has shown that the haplotypes of nesting samples collected in the Cayman Islands have also been described in a number of other nesting sites and foraging areas (see section 10.4.4).

For farmed green turtles, haplotypes described in the Cayman Turtle Farm have also been found in the

foraging areas of Anguilla, Bahamas, Barbados, BVI, Montserrat, Nicaragua, TCI, USA and West Africa. These same haplotypes have also been described from **nesting** aggregations in Costa Rica, Mexico, USA and Venezuela. **For wild green turtles**, haplotypes described in nesting turtles/hatchlings from the Cayman Islands have been described from **foraging** grounds in Bahamas, Barbados, Nicaragua and USA. These same haplotypes have also been described from **nesting** aggregations in Costa Rica, Mexico, USA and Venezuela.

For hawksbill turtles no genetics vouchers were collected.

For loggerhead turtles, haplotypes described in nesting turtles/hatchlings from the Cayman Islands have been described from **foraging** grounds in Panama and the Eastern Atlantic, but have also been described at **nesting** colonies in Greece, Mexico, and the USA.

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 at the end of 2004 and more definitive answers will be available at that point. Despite the small size of the nesting populations in the Cayman Islands and the limited sampling to date, previously undescribed haplotypes were described for both green and loggerhead turtles. This highlights the likelihood that Cayman Islands may host its own discrete nesting populations with limited immigration/emigration, underlining the importance for protection. Data will be disseminated as part of the recently funded cross-territory Overseas Territories (OTEP) project which will focus on Turtles and the Environment Charter and Multilateral Environment Agreements.

7.5.5. Nesting overview

Although once large, the populations of turtles nesting in the Cayman Islands may be genetically unique and are critically small. Indeed, the hawksbill turtle nesting population may be extirpated. Anthropogenic threats faced include direct and indirect capture and a range of factors related to coastal development.

Recommendations

7.1.2.2. Increase the network of Protected Areas in the Cayman Islands

a) Key nesting sites should be given protected status

At present, none of the key nesting beaches in the Cayman Islands is afforded protected status. It is recommended that key nesting sites for marine turtles are given a high level of protection from the deleterious effects of inappropriate coastal development. While there is currently no legislation to implement this recommendation, the Draft National Conservation Law would provide the necessary legal framework. Therefore, TCOT recommends the immediate enactment of this law.



Photo 7.5. Green turtles misorientated by lights and then killed by road vehicles (Photo CIDoE).



Photo 7.6. Nests in highly developed sites are caged to protect against misorientation and damage (Photo CIDoE).

7.1.3.1. Continue systematic monitoring efforts at nesting beaches throughout the three Islands

The CDoE currently runs an exemplary monitoring program that has been in operation for 6 years in Grand and Little Cayman. Given the recent discovery of nesting on Cayman Brac, survey efforts have been expanded to Cayman Brac. The main aims of such monitoring in all three islands would be to determine nesting abundance trends, monitor hatching success, describe threats and facilitate genetic analysis of nesting populations through nest excavation and sampling.

7.1.3.3. Undertake limited night time beach monitoring for identification and genetic sampling adult nesting green turtle females

Given the large financial investment previously made in the CTF headstarting operation, it is highly recommended that CTF support the CDoE's nocturnal monitoring to allow a fuller appreciation of the impact of the headstarting experiment to be ascertained.

7.1.5.1. Encourage and implement sensitive practices at existing nesting beaches

- a) Continue coordinating the established network of hoteliers, beach residents and other beach users to ensure swift reporting of nests 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 emergencies. Key issues to be addressed are lighting, vehicular traffic, and the use of heavy beach cleaning equipment.
- b) Develop a network of interested beachfront residents and beach/sea users willing to report any turtle strandings and ensure CDoE has the capacity to collect, necropsy and document all strandings. This network could be supported by a toll-free hotline.
- c) Raise awareness through the continuation of the campaign to sensitise Caymanians 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) Update and expand distribution of guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings.
- e) Ensure continued and enhanced school participation in relevant marine turtle conservation programmes to sensitise children to the importance of rookery protection.

7.6. Status of Foraging Marine Turtles in the Cayman Islands

7.6.1. Monitoring efforts

CDoE co-ordinated in-water survey work, with remote guidance offered by MTRG before and during the TCOT project. **Janice Blumenthal and Catherine Bell of CDoE write:**

The Cayman Islands Department of Environment has been carrying out an in-water monitoring project since 2000. Sampling was undertaken from May 2000 to August 2002 and bi-monthly following initiation of the TCOT project. To date, over 160 juvenile hawksbill turtles and 35 juvenile green turtles have been captured on foraging grounds in Grand Cayman and Little Cayman. During each capture occasion, data are collected on location, capture depth and habitat type, Catch Per Unit Effort, turtle morphometrics, size frequencies, recaptures (for capture-mark-recapture modeling), and incidence of lesions suggestive of fibropapillomatosis. Turtles are sampled for blood (serum and red blood cells – RBC's), tissue, and epibionts.

Many aspects of sea turtle population dynamics remain unevaluated, hampering conservation efforts. Basic demographic parameters such as sex ratio, growth rate, habitat utilisation, and foraging behaviour must be elucidated in order to model population dynamics and evaluate risks to threatened populations. Initial monitoring efforts have uncovered great geographic variability, necessitating the study of regional index populations. As identified at the West Atlantic Green Turtle Population Modelling Workshop (Bolten & Chaloupka 2004), the Cayman Islands are ideally situated to provide a robust reference point for marine turtle population biology in the Western Caribbean.

The following techniques are being used:

i) Modified Mark and Recapture using Snorkel Tow

Hawksbills, and to a lesser extent green turtles, are hand-captured in foraging habitat by snorkellers towed approximately 30 feet behind a small boat (Photo 7.7). Capture depth, weather and sea conditions, capture habitat, turtle activity on sighting, Catch Per Unit Effort (CPUE), and other parameters are evaluated during each capture occasion. This methodology was demonstrated to participants during the TCOT workshop (2002), and has now been adopted in other Overseas Territories. Captures in CI to date include:

Hawksbills: 82 foraging hawksbills have been captured in Grand Cayman and 79 in Little Cayman (Total: 161);
Green turtles: 32 foraging green turtles have been captured in Grand Cayman and 3 in Little Cayman (Total: 35).

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). Weight, straight



Photo 7.7. Catching a juvenile hawksbill turtle (Photo P. Richardson).

carapace length, width, depth, plastron length, and tail measurements are recorded for turtles on capture and following each recapture. Scales and calipers are calibrated prior to all capture days. Morphometric data are collected for all foraging turtles. Skin biopsies are obtained from a rear flipper with a sterile 4-millimetre biopsy punch and preserved in a buffer solution of 20% dimethyl sulfoxide (DMSO) saturated with Sodium Chloride (NaCl) (Dutton 1996). Samples are collected from all captured turtles.

To collect blood for sex determination, turtles are restrained head-down while 5-10 ml samples are collected from a dorsal cervical sinus (Owens *et al.* 1980) using a 21-gauge needle and an evacuated blood-collecting tube (Dutton 1996). Blood samples for sex determination are collected in Sodium Heparin vials (to prevent coagulation of the blood) and are centrifuged upon return from field to separate serum from red blood cells (RBCs). Serum is stored at -70°C pending analysis by Radioimmunoassay (Diez & van Dam 2003), and RBCs are archived for stable isotope analysis.

Samples collected to date include: Hawksbills: 47 serum samples have been collected from foraging hawksbills in

Grand Cayman, and 35 in Little Cayman; Green turtles: 6 serum samples have been collected from foraging green turtles in Grand Cayman and 2 in Little Cayman.

ii) Transect Surveys

Transect surveys have been conducted in lagoonal and reef habitats. Capture-Mark-Recapture and transect surveys are performed in order to collect data on foraging population abundance and distribution. Transect methodology has been adapted from reviews in Bjorndal and Bolten (2000) and habitat classification methodology from Kendall *et al.* (2001). Distribution and habitat information will be incorporated into GIS mapping of benthic habitat. Habitat and marine turtle abundance data are collected for 66 transect lines.

iii) Aerial Surveys

Aerial surveys are in progress to facilitate an evaluation of habitat use and trends. To date, 4 trial/training flights have been conducted in order to standardize survey methodology, sightings, and recording. Following finalisation of technique, bi-monthly flights will be conducted.

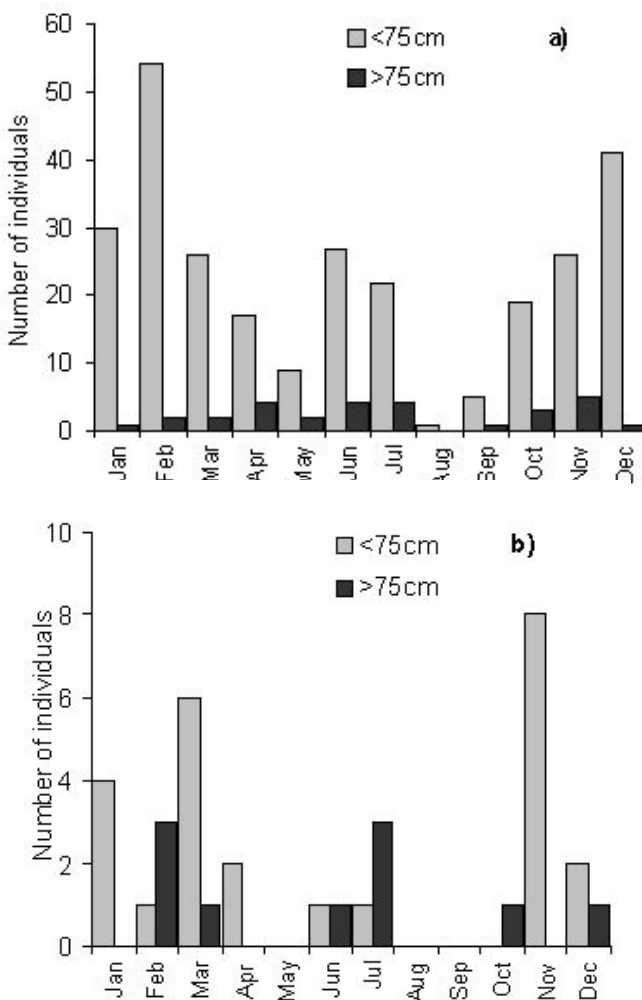


Figure 7.2. Temporal distribution of sighting of a) hawksbill and b) green turtles in the Cayman Islands. Pale bars represent individuals of <75cm in carapace length estimated by observers. Dark bars represent those >75cm, considered adults.

Species	<25	26-50	51-75	>76	Unknown	Total	Site
Green	1	20	4	10	3	38	2,14,18,32,39,50,63,69,70,71,83, 85, 86,97,106,112,118, 127,144
Hawksbill	47	177	53	29	13	319	2,4,5,6,8,10,12-17,20,23-25,29-31,33,35,37-40,42,45,47-49, 52-61, 63-65,69-71,74-76,78,79,81-83, 85, 87, 89-95, 98, 104, 106,109,110, 112-120,122,125,127,128,131-134,136,137,141v
Loggerhead	0	0	1	0	0	1	31
Unidentified	0	13	7	3	5	28	2,22, 29, 36,42,69,85,106, 127, 132, 141

Table 7.4. Summary of species and size class of individuals turtles observed by divers in the Cayman Islands 1 September 2002 – 26 November 2003. Key to locations: 14 Trees ¹, Anchor Point ², Andes Wall ³, Aquarium ⁴, Armchair Reef ⁵, Babylon ⁶, Balboa ⁷, Barracuda bight ⁸, Bears Paw ⁹, Big Dipper ¹⁰, Big house ¹¹, Big Sister ¹², Big Tunnel ¹³, Black Forest ¹⁴, Black Hole ¹⁵, Black Rock ¹⁶, Black Rock Shallow ¹⁷, Blackie's Hole ¹⁸, Blue Peter ¹⁹, Bonnie's Arch ²⁰, Breakers Cut ²¹, Bus Stop ²², Caribbean Sand Chute ²³, Chain Reef ²⁴, Charlie's ²⁵, Cheeseburger reef ²⁶, Chinese Garden ²⁷, Christina's Wall ²⁸, Chubb Hole ²⁹, Cinderella's Castle ³⁰, Coconut Wall ³¹, Crushers Wall ³², Cumbers Cove ³³, Delilah's Delight ³⁴, Doc Polson ³⁵, Donna's Delight ³⁶, Dreamweaver ³⁷, Eagle Ray Pass ³⁸, Eagle Ray Round Up ³⁹, Eagle's Nest ⁴⁰, Eden Rock ⁴¹, Fish Tank ⁴², Gail's Mountain ⁴³, Gails Reef ⁴⁴, Ghost Mountain ⁴⁵, Governor's Reef ⁴⁶, Great House Wall ⁴⁷, Great Wall ⁴⁸, Great Wall East ⁴⁹, Great Wall West ⁵⁰, Grouper Grotto ⁵¹, Grundy's Gardens ⁵², Hammerhead Hill ⁵³, Harbour Heights ⁵⁴, Hepp's Wall ⁵⁵, High Rock ⁵⁶, Hole in the Wall ⁵⁷, Hyatt Drop Off ⁵⁸, Ironshore Garden ⁵⁹, Jack McKinney's ⁶⁰, Jackson Wall and Reef ⁶¹, Japanese Garden ⁶², Joy's Joy ⁶³, Julie's Wall ⁶⁴, Kangaroo Gorge ⁶⁵, Kelly's Cavern ⁶⁶, Keno ⁶⁷, Kent's Caves ⁶⁸, La Mesa ⁶⁹, Lea Leas Lookout ⁷⁰, Lemon Reef ⁷¹, Leslie's Curl ⁷², Lighthouse Wall ⁷³, Little Bluff Reef ⁷⁴, Little House on the Prairie ⁷⁵, Little Tunnel ⁷⁶, Long Point Seven Mile Beach (N) ⁷⁷, Lost Valley ⁷⁸, Maggie's Maze ⁷⁹, Main Street ⁸⁰, Marilyn's Cut ⁸¹, Meadows ⁸², Middle Sister ⁸³, Mitch Millers Reef ⁸⁴, Mixing Bowl ⁸⁵, Mountain ⁸⁶, Nancy's Cup of Tea ⁸⁷, Ned's Tunnel ⁸⁸, No Name Wall ⁸⁹, Northern Lights ⁹⁰, NW Point Drop Off ⁹¹, Old Wreck Head ⁹², Omega Reef ⁹³, Orange Canyon ⁹⁴, Ore Verde ⁹⁵, Paradise Reef ⁹⁶, Paradise Wall ⁹⁷, Pat's Wall ⁹⁸, Peppermint Reef ⁹⁹, Pirate's Caves ¹⁰⁰, Playing Fields ¹⁰¹, Princess Penny's Pin ¹⁰², Public Beach ¹⁰³, Public Beach North between 3 Tree and Bolters ¹⁰⁴, Queens Throne ¹⁰⁵, Randy's Gazebo ¹⁰⁶, Red Bay Caves ¹⁰⁷, Red Bay Caves W ¹⁰⁸, Ridgefield reef ¹⁰⁹, Ringer Wall ¹¹⁰, Rivers of Sands ¹¹¹, Robert's Wall ¹¹², Round Rock ¹¹³, Royal Palm's Ledge ¹¹⁴, Sand Chute W ¹¹⁵, Sarah's Set ¹¹⁶, Scuba Bowl ¹¹⁷, Seaview Reef ¹¹⁸, Sheer Wall East ¹¹⁹, Silver Sands ¹²⁰, Smith's Cover ¹²¹, Snapper Hole ¹²², Soto's Reef ¹²³, Splash House ¹²⁴, Split Rock ¹²⁵, Stingray Alley ¹²⁶, Sunset Reef ¹²⁷, Tarpon Alley ¹²⁸, Tarpon Alley (E) ¹²⁹, The Edge ¹³⁰, The Maze ¹³¹, The Pinnacles ¹³², The Wharf ¹³³, Three B's ¹³⁴, Three Trees ¹³⁵, Tolero ¹³⁶, Trinity Caves ¹³⁷, Turtle Farm ¹³⁸, Turtle Pass ¹³⁹, Turtle Reef ¹⁴⁰, Valley of the Dolls ¹⁴¹, Whitestoke ¹⁴², Wildlife Reef ¹⁴³, Jackson's Bay ¹⁴⁴.

iv) Net-based Surveys

Initial attempts at in-water capture of green turtles employed several unmonitored set nets and a 500-foot entrapment net deployed from the stern of a small outboard boat. Initial efforts resulted in 17 green turtle captures, and beginning in summer 2004, an intensive capture effort will be initiated using monitored set nets, with the aim of collecting 50-100 samples from foraging green turtles in the Cayman Islands.

v) Use of Caribbean Turtlewatch

Caribbean Turtlewatch surveys were conducted in the Cayman Islands between September 1, 2002, and November 26, 2003. Seven dive operators on Grand Cayman (including the CDoE) and 3 dive operators on Little Cayman took part in the survey. During this time 521 check forms were completed, detailing 521 check dives over 144 dive sites around the two islands. On 244 dives, no turtles were seen and on the other 277 dives, 386 turtle sightings were recorded. A total of 319 hawksbill, 38 green, 1 loggerhead and 28 unidentified turtle sightings were logged. On 196 occasions only 1 turtle was seen, on 54 occasions 2 turtles were seen, and on 5 occasions 4 turtles were seen. See table 7.4 for a summary of species and size class of individuals observed.

The most frequently sighted turtle in the Cayman Islands is the hawksbill turtle (83% of total sightings). Green turtles were also observed on occasion (10% of total sightings). Only 1 loggerhead sighting was recorded, and no leatherback turtles were sighted in Cayman waters. Green and hawksbill turtles commonly reside on Cayman's reefs and seagrass beds, and it is therefore more likely that they would be sighted by divers.

The months during which individuals were observed are given in table 7.5. In addition, data on the temporal distribution of hawksbill and green turtle sightings are presented in figure 7.2.

Divers completing Caribbean Turtle Watch forms were asked the question: *Did the chance of seeing a turtle influence your decision to choose this particular dive?* Of 310 responses to this question, 110 were positive, 185 responses were negative and 12 were unsure.

When asked the question: *How important was your turtle sighting to the enjoyment of the dive?* 205 felt it was very important, 90 felt it was important and 11 replied that the sighting of a turtle did not influence their enjoyment of the dive.

	Green		Hawksbill		Loggerhead		Unidentified		Total
Month	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	
Jan	4	0	30	1	0	0	0	0	35
Feb	1	3	54	2	0	0	0	0	60
Mar	6	1	26	2	0	0	0	0	35
Apr	2	0	17	4	0	0	1	0	24
May	0	0	9	2	0	0	2	0	13
Jun	1	1	27	4	0	0	0	0	33
Jul	1	3	22	4	0	0	0	0	30
Aug	0	0	1	0	0	0	0	0	1
Sep	0	0	5	1	0	0	1	0	7
Oct	0	1	19	3	0	0	0	0	23
Nov	8	0	26	5	1	0	1	0	41
Dec	2	1	41	1	0	0	0	0	45

Table 7.5. Temporal distribution of observations of all species in the Cayman Islands. Juveniles are classed as those <75cm in carapace length and possible adults those >75cm.

These answers show that, although the majority of divers are not selecting dive sites in the hope of seeing a turtle (possibly a reflection of the low numbers of turtles in Cayman waters and the consequent difficulty in being able to guarantee a sighting at any site), once sighted, turtles are highly appreciated by most divers. Data presented should be considered preliminary and will be given a full and detailed analysis by Catherine Bell (CIDoE) who will explore the utility of this approach whilst discussing many of the potential sources of bias.

7.6.2. Overview of species present

The Cayman Islands host relatively large foraging aggregations of immature hawksbill and green turtles. CIDoE in-water capture surveys, *Caribbean Turtlewatch*,

and formal and informal interviews during the course of TCOT Socioeconomic Questionnaire (SEQ) suggest that Grand Cayman, Little Cayman, and Cayman Brac provide developmental habitat for juvenile hawksbill and green turtles, while mature turtles are observed exclusively during the summer breeding and nesting season. Hawksbills captured during CIDoE in-water surveys ranged from 22.7 - 61.9 cm Straight Carapace Length (n=161), while green turtles ranged from 24.5 - 53.0 cm (n=37). These size classes are indicative of post-pelagic juveniles and sub-adults, confirming the role of the Cayman Islands as a developmental habitat. Loggerhead turtles are rarely observed in Caymanian waters, despite the Islands hosting a small nesting population. Undoubtedly these adults are only seasonal migrants.

In the last 5 years...

	Increasing	Decreasing	Same	Don't know	NR
Green	2	5	0	0	1
Leatherback	0	3	0	1	7
Loggerhead	0	5	0	1	5
Hawksbill	2	5	0	0	4

Since you can remember...

	Increasing	Decreasing	Same	Don't know	NR
Green	1	6	0	0	4
Leatherback	0	3	0	1	7
Loggerhead	0	5	0	1	5
Hawksbill	1	6	0	0	4

Table 7.6. Fishermen's perceptions of changing abundance of sea turtles found in OT waters, in the last 5 years and since they can remember (n=8 fishermen who noticed change).

In the last 5 years...					
	Increasing	Decreasing	Same	Don't know	NR
Green	12	14	1	9	0
Leatherback	0	10	1	17	7
Loggerhead	3	16	0	13	2
Hawksbill	7	15	1	10	1
General	4	15	1	11	4

Since you can remember...					
	Increasing	Decreasing	Same	Don't know	NR
Green	7	17	1	8	2
Leatherback	0	9	1	16	9
Loggerhead	1	15	1	12	6
Hawksbill	3	15	3	9	5
General	3	16	1	10	5

Table 7.7. Perceptions of changing abundance of sea turtles found in OT waters, in the last 5 years and since respondents can remember (n=35 respondents who noticed change).

7.6.3. Spatial patterns in relative abundance

The Cayman Islands support an extensive system of back-reef lagoons, providing habitat for foraging juvenile green turtles. Seagrass beds within the lagoons are primarily composed of turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*), along with several genera of green algae, including *Halimeda*, *Penicillus* and *Rhizochephalus* (Roberts 1994). Surveys to date indicate that the southerly South Sound and the eastern edges of the North Sound lagoon provide key seagrass habitats for green turtles. Additionally, green turtles have been documented on exposed western algal foraging grounds. Hawksbill turtles have been documented in colonised hard-bottom areas, patch reef, and the vertical reef wall, with key habitat occurring in Bloody Bay, Little Cayman, and Western Grand Cayman. These areas have been designated index sites for intensive monitoring and abundance estimation via Capture-Mark-Recapture (CMR) modelling.

7.6.4. Trends in abundance

Trends in abundance on index sites (key foraging areas) will be evaluated via CMR modelling, which allows estimation of absolute abundance. The CJS (Cormack-Jolly-Seber) modelling approach is a multiple sequential modelling technique used for derivation of apparent survival (ϕ – probability of surviving and remaining in the study area) and temporal recapture probabilities (p) of marked individuals in an open population. Preliminary CJS population estimates for foraging grounds in Little Cayman and Grand Cayman have been conducted via the program MARK (White & Burnham 1999) to establish the viability of the approach, and precision and reliability of estimates can be confirmed when sample size has increased.

End of section by Blumenthal and Bell.

Answers provided by fishers as part of the SEQ suggest that turtle populations have decreased over time. Four turtle fishers provided their views on the temporal patterns of marine turtle abundance in Cayman waters. Three turtle fishers felt there has been a general decrease in marine turtle numbers in both the short (5 years) and long term (since they started fishing). One believed turtle numbers had increased in the past 5 years. All respondents were asked their opinions on changes in abundance of turtles overall and for each species, in the short and long term (section 9, Q104a-c). Views of fishers, 8 of whom noticed change while 3 did not, are isolated in table 7.6, while views of all respondents are shown in table 7.7.

Of 106 respondents to TCOT SEQ, 35 perceived a change, while 59 did not, and 12 did not respond. As with nesting turtles, the number of people perceiving a decline in numbers exceeded the number of people perceiving an increase, for all species, and for both time periods. For example, over the last 5 years for turtles in general, 4 respondents perceived an increase in the number of turtles in water, while 15 perceived a decrease. Since they can remember, 3 respondents perceived an increase and 16 perceived a decrease. Results for individual species and turtles in general are shown in table 7.7.

Respondents were asked about reasons for the perceived change, both in the number of turtles nesting and in water. Responses (offered by 29 respondents) varied, with no single explanation dominating. Reasons cited for decreases included: over-fishing or inappropriate fishing methods, increased demand, environmental pressure, overpopulation, cultural traditions, over-consumption and storm damage. Reasons for increases included: conservation efforts, law and the turtle farm.

Measures of direct exploitation	Past	Present	Never	NR or NA
By life stage				
Females on beaches	0	0	-	-
Eggs from beach	3	0	-	-
Turtles in water (intentional)	4	4	-	-
Turtles in water (incidental)	6	-	-	-
By product				
Meat				
Fishers who sell meat	1	2	-	-
Meat vendors	2	9	-	-
Meat consumers	24	42	40	-
Eggs				
Collectors who sell eggs	0	0	-	-
Egg vendors consumers	0	0	-	-
Egg consumers	3	7	96	-
Non-edible				
Fishers who sell shells	1	1	-	-
Shell vendors	1	1	-	-
Shell consumers	22	4	80	-
Measures of indirect exploitation				
Turtles indirectly used in business	21			
Total interviews	106			

Table 7.8. Numbers of TCOT SEQ respondents involved in exploitation, by exploitation category. Key NR- No Response, NA - Not Applicable.

7.6.5. Threats

The following anthropogenic sources of mortality or injury have been documented by the Cayman Islands Department of Environment:

1. Fisheries capture (via legal turtle licenses)
2. Illegal fishing (via hand capture and illegal set nets)
3. Boat strike (fatal propeller wounds to carapace and limbs)
4. Entanglement in monofilament fishing line (leading to fatal tissue necrosis; Photo 7.8)
5. Ingestion of fishhooks and helium balloons

Pollution and nutrient enrichment are also of concern in the Cayman Islands, as incidence of fibropapillomatosis disease may be correlated with poor water quality. Additionally, coral bleaching, anchor damage, sedimentation, and dredging have the potential to compromise marine turtle habitat in the Cayman Islands. On a broader scale, preliminary genetic studies (TCOT genetics section) indicate that juvenile hawksbills in the Cayman Islands originate from a range of Caribbean jurisdictions. Therefore, exploitation on nesting beaches and adult foraging grounds in other areas could significantly impact foraging aggregations in the Cayman Islands.

7.6.6. Genetics of foraging populations

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



Photo 7.8. Hawksbill killed as a result of entanglement (Photo CIDoE).

For wild green turtles sampling is now underway by DoE. **For hawksbill turtles** haplotypes described in **foraging** turtles in the Cayman Islands have been described from **foraging** grounds in Anguilla, BVI, Cuba, Mexico, Montserrat, Puerto Rico, and TCI. These haplotypes have also been described from **nesting** aggregations in Antigua, Barbados, Belize, Brazil, Mexico, Cuba, Puerto Rico, USVI.

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 at the end of 2004 and more definitive answers will be available at that point. At this point, however, it can be clearly highlighted that the turtles foraging in Caymanian 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 recently funded cross-territory Overseas Territories (OTEP) project that will focus on Turtles and the Environment Charter and Multilateral Environment Agreements.

7.6.7. Foraging overview

It is likely that only green and hawksbill turtles forage in Cayman waters where there are pockets of abundance of both species.

Recommendations

7.1.2.2. Increase the network of Protected Areas in the Cayman Islands

b) Key foraging sites should be given protected status

Based on the ongoing and recommended expanded inwater monitoring programme, key foraging sites not already protected should be given protected status to ameliorate the effects of coastal development and recreational use. In so doing, it is likely that key coral reef and seagrass habitats will be preserved. The Draft National Conservation Law would provide a comprehensive framework for management of protected areas and species.

7.1.3.2. Establish sustainable, regular and frequent (monthly), constant-effort monitoring programmes at a range of in-water study sites for both green and hawksbill turtles around the Cayman Islands

Enhancing ongoing work, this would be carried out around all three of the Cayman Islands to allow the detection of temporal patterns of abundance, and to facilitate genetic sampling to further determine trends in genetic stock composition of green and hawksbill turtle populations. Surveillance for fibropapillomatosis should continue to be incorporated.

7.7. Direct Use of Marine Turtles in the Cayman Islands

7.7.1. Overview

The main domestic legislation that covers turtle use is the Marine Conservation (Turtle Protection) Regulations (1996 Revision), which is fully reviewed in Section 3. In summary, the laws of the Cayman Islands protect eggs and nesting females and maintain turtle harvests at sea to a limited licensed traditional take within a geographically restricted open season. The CIDoE have 10 enforcement officers working throughout the 3 islands, and enforcement is considered effective, but not absolute. Through informants, enforcement officers are aware of infringements of laws that occur despite possible penalties of fines of up to CI\$500,000 or 1 year imprisonment. Although there are few records or accounts of prosecutions for turtle related offences, in August 2004 an individual was fined CI\$1,000 for slaughtering a wild green turtle, which included \$500 for possession and \$500 for slaughter without inspection by a Fisheries Officer (T. Austin (CIDoE) pers. comm. 2004). A second case is pending trial in Cayman Brac. Marine Park Regulations and Marine Conservation Laws are publicised in an attractive pamphlet (Appendix 7.1) that outlines the location and rules for limited use areas, as well as summarising the regulations in easily accessible language. The TCOT SEQ revealed reasonably high awareness of laws regulating marine turtle fishing; over 50% of respondents reported their awareness of laws, and most of these could provide specific examples of restrictions.

Data on use of marine turtles were gathered by combining published information, that provided by project partners and the data gathered using the TCOT Socioeconomic Questionnaire or SEQ (See Section 2). In Cayman, 106 questionnaires were completed and a breakdown of how much information gathered on marine turtle exploitation is digested in the Table 7.8.

Methods

The TCOT SEQ was administered in Cayman Islands by community college students. Preparation involved training of teaching staff in week 1, and student training in week 2, which included a briefing and practice administration. In week 3, teaching staff carried out an overview and problem-solving session in advance of student administration in week 4. It appears, however, this was not sufficient to allow all of the students to negotiate some of the more difficult parts of the questionnaire. While some questionnaires were completed correctly, it is evident that administration protocol was not followed rigorously in many instances. One problem in particular is pertinent to the following exploitation report, and is described here. The TCOT team had made the decision to allow pleasure fishers to 'opt out' of section 3 (for fishers), with pleasure fishing defined in contrast to fishing undertaken as a means of supporting oneself (for food or cash). While we imagined that some pleasure fishers might incidentally hook a sea turtle now and again, we felt having them complete a long section of the survey, most of which would not be relevant to them, was undesirable. We also imagined that there would be few 'pleasure' turtle fishers.

However, 4 people who identified themselves as pleasure fishers went on to complete section 4 of the survey, designed for turtle fishers. There are two possible explanations for this. First, the first question of section 4 asks respondents if they catch turtles intentionally, opportunistically, or both, and all 4 people responded 'opportunistically'. These pleasure fishers may have misunderstood opportunistically to mean incidentally (and college students may have been unable to explain that the section was not relevant to them). Second, it may be that some pleasure fishers do opportunistically catch sea turtles, though this would at first seem unlikely given the illegal nature of the activity and the fact that there may be some difficulty in hiding sea turtles at public landing site. We have included these 4 fishers in the discussion below.

7.7.2. Harvest of adults on the nesting beach

In the Cayman Islands, it is strictly illegal to take nesting females during the nesting season as:

1. turtles taken as part of the legal fishery must be captured outside the reef crest and;
2. the closed season encompasses the recorded nesting season of both green and loggerhead turtles and is likely to encompass the majority of hawksbill turtle nesting, although there are very few nests from this species.

Some illegal take of nesting females is thought to still occur (G. Ebanks-Petrie (CIDoE) pers. comm. 2004), possibly at a low level. Indeed, one such attempt was thought to have recently been foiled where a nesting green turtle was discovered turned and tied to a tree by CIDoE staff during beach monitoring. The turtle was released under police supervision (Photo 7.9). It transpires that the turtle had been captured under the misunderstanding that a temporary lifting of the protective legislation, which had been instigated to allow recapture of the escaped Cayman Turtle Farm stock in the wake of Hurricane Michelle, had still been in place. CTF paid the turtler who had previously been paid for recoveries of escaped farm stock (J. Parsons (CTF) pers. comm. 2004). None of the interviewees in the TCOT SEQ reported catching nesting turtles at any time.



Photo 7.9. Green turtle released under police supervision (Photo CIDoE).

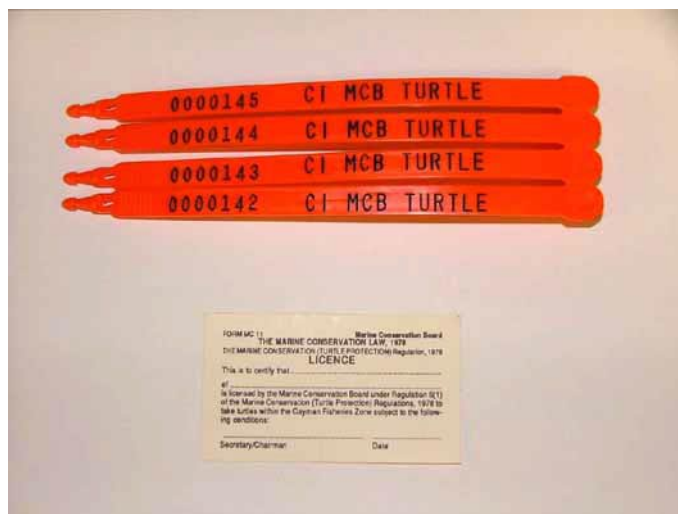


Photo 7.10. Tags and license for use in turtle fishery (Photo CIDoE).

7.7.3. Harvest of eggs

Despite being illegal, taking of eggs still occurs. CIDoE staff have 9 reliable records of clutches of eggs having been taken since 2000 (n=1 green turtle nest), 2002 (n= 3 green turtle nests; n =2 unknown species) and 2003 (n=3 nest of unknown species). It is felt that this is undoubtedly an underestimate as surveillance is less intense on Little Cayman and Cayman Brac, and nest poachers are thought to camouflage their own tracks and those of the turtle laying the clutch to minimise the chance of detection.

Nesting levels in the Cayman Islands are very low (Aiken *et al.* 2001a; 2001b; Bell & Parsons 2002) and it is thought that only a minority are subject to egg poaching, thus the total number of eggs involved is not large. The mechanism and prices involved in any sale of eggs is not yet assessed, but suffice to say that the take and sale of sea turtle eggs is not a significant economic activity. If information provided by past egg collectors holds true today, it is most likely that eggs collected are used for personal consumption.

In the TCOT SEQ, no interviewees reported current egg collecting although we received data from 3 former egg collectors (2 from Cayman Brac and 1 from Grand Cayman). Two of these ceased egg collection approximately 25 years ago when they became aware it was illegal and another reported stopping in 1990 following an incident when he was nearly caught by Police. It appears from the testimony of these 3 interviewees that the eggs of all three hardshell species were collected. Two interviewees expressed a preference: hawksbill turtle eggs (n=1; more eggs per nest) and green turtle eggs (n=1; better tasting). Two of the three interviewees offered opinions as to the pattern in abundance of nesting turtles, and their views are isolated from the general population of respondents. One responded that nesting numbers in general had decreased over the past 5 years and since he could remember. The other responded in general, and for specific species. In general, he believed nesting numbers had increased in the past 5 years, but decreased since he could remember. He described the same trend for loggerhead turtles specifically.

Year	Month	Spp	Mass (lbs)	Mass (kg)	sex	Capture method
1999	Apr	L	154	70.0	U	U
2000	Nov	G	U	U	U	U
	Dec	G	U	U	U	U
	Dec	G	155	70.5	U	trap net
	Dec	U	U	U	U	U
	Apr	L	350	159.1	U	U
	Apr	H	98	44.5	U	U
2001	Jan	G	240	109.1	U	U
	Apr	G	180	81.8	M	U
	Apr	G	300	136.4	M	trap net
	Apr	H	110	50.0	U	trap net
2002	Feb	G	130	59.1	F	trap net
	Feb	H	105	47.7	U	trap net
2003	Mar	G	>100	>45.5	U	U
	Nov	H	120	54.5	U	U
	Apr	G	225	102.3	M	trap net
	Apr	H	110	50.0	F	trap net
	Apr	H	110	50.0	M	trap net
	Mar	H	85	38.6	U	set net
	Apr	H	82.5	37.5	U	set net
	Nov	H	90	40.9	F	set net
	Nov	G	264	120.0	M	trap net
2004	Apr	H	85	38.5	F	trap net
	Apr	G	200	91	M	U
	Apr	G	>200	>91	M	trap net
	Apr	L	>200	>91	M	trap net
	Apr	G	280	127	M	trap net
	Apr	G	>200	>91	M	trap net

Table 7.9. Data on legally captured marine turtles in the Cayman Islands 1999-2004. Data Courtesy of CI DoE (Key G: Green turtle; H: Hawksbill turtle; L: Loggerhead turtle; U: Unknown species, sex or fishing method of capture; M: Male; F: Female).

However, he believed that hawksbill turtles had decreased during both time periods. The lack of a significant economy in turtle eggs is somewhat supported by the fact that none of the three former egg collectors reported ever having sold eggs. Of 7 former egg consumers, only 2 had opinions as to temporal trends in availability; both considered that egg availability had decreased in the short and the long term. Three respondents reported they were current consumers of sea turtle eggs, but no further information was proffered.

7.7.4. Harvest at-sea

A traditional marine turtle fishery still exists in the Cayman Islands, which has been a license-only fishery since 1978. The open season is 1st November-30th April. There are 20 individuals with the right to apply for a marine turtle fishing license; 14 of these are current and 8 have taken turtles since 1998 (5 in Cayman Brac and 3 in Grand Cayman; C. Bell (CIDoE) pers. comm. 2004). The other eligible fishers do not have licenses at this time and therefore cannot fish for turtles. Eligible licensees are individuals from families which have a long tradition of turtling. Licenses are non transferable and under the current legislation, the fishery will die with the last of the 20 traditional turtle fishers.

Under this system, each fisher is allowed to take no more than 6 turtles per season and each turtle must be greater than 120lbs (54.5kg) if a green turtle, or greater than 80lbs (36.4kg) if a loggerhead or hawksbill turtle. Turtles must be taken outside the reef crest using traditional methods only (set net, trap net). Harpoons or spear-guns are specifically prohibited. Upon capture, licensed fishers are required to place an individually numbered tag that is issued with license (Photo 7.10) on a captured turtle and report it to a fisheries officer before slaughter. Fisheries officers are not limited to CIDoE officers and are appointed by the Marine Conservation Board. The fisheries officer checks and records the details of the license under which the turtle has been taken, the weight and sex of the turtle, the area and date of the capture, and the number of tags the license holder has remaining. Where possible, genetic vouchers are obtained.

Formal data recording has only been instigated in recent years, but the data in Table 7.9. show that green (at least 50%), loggerhead (at least 11%) and hawksbill turtles (at least 36%) are all taken. Estimates made by marine enforcement officers and marine turtle fishers suggest that since 1986 approximately 10 large turtles are taken legally per year. In addition, however, more than 10 are thought to be taken

illegally per year by licensed turtle fishers, by those who would be eligible for, but do not possess a current license, and by others (Aiken *et al.* 2001a; C. Bell (CIDoE) pers. comm. 2004). This illegal take includes nesting females, undersized turtles, turtles taken outwith the season, or captured in prohibited areas. Illicit harvest still occurs despite legally available turtle meat from the Cayman Turtle Farm, demonstrating the magnitude of desire for turtle meat in the Cayman Islands.

As can be seen in Figure 7.3., 16 of the 22 reported captures occurred in April. This is the time of the year when many breeding adults in the Caribbean are undertaking their breeding migrations and individuals of the Caymanian nesting populations will be moving into the waters for mating. There is thought to be a delay of the order of 1 month between mating and the first egg-laying of the season, with marine turtle nesting in the Cayman Islands beginning in May. Given the closed season is currently designed to protect adults, extending the closure to include April would better accomplish its aim of protecting the Caymanian breeding turtle population.

Since events at the CTF following Hurricane Michelle, at least 3 relatively freshly butchered green turtle carapaces have been found in secluded areas around the island by CIDoE staff. Although these could be resultant from illegal take at sea, they could also be turtles stolen from CTF during the Hurricane and from Jackson's Pond. The latter is used as a temporary holding facility for a large number of farm turtles since the Hurricane and until construction on the new facility is complete (anticipated end 2005).

A total of 14 fishers in the TCOT SEQ reported catching marine turtles in the past or present. Of these, 8 have intentionally captured turtles whilst 6 report catching them accidentally as part of other fishing activities (see section 7.7.5). Of the 8 turtles fishers, 4 had since stopped fishing for turtles; 2 gave reasons: 1) Changes in the law and poor health; 2) Concerns for the environment. Of the 4 current turtle fishers, 2 identified themselves as intentional fishers, 1 as both intentional and opportunistic and the fourth as only opportunistic. Methodologies used included capture by hand (n=1) and nets (n=2). Four of the 8 fishers (2 fishing in the past and 2 in the present) also identified themselves as pleasure fishers only (see methods note, section 7.7.1.1).

Information on number and size of turtles caught was limited, as only 1 current fisher provided estimates. He reported capturing 2000 green turtles per year, but not all from Cayman Islands. The survey administrator failed to have the fisher distinguish between local and other fishing. No fishers provided data for any other species.

The meat from the legal harvest is widely thought to be kept for personal use on family occasions or gifted and is considered of great cultural importance, with license holders having fished for turtles all their lives as did their forefathers (C. Bell (CIDoE) pers. comm. 2004). However, of the 4 present turtle fishers who responded to the TCOT SEQ, 2

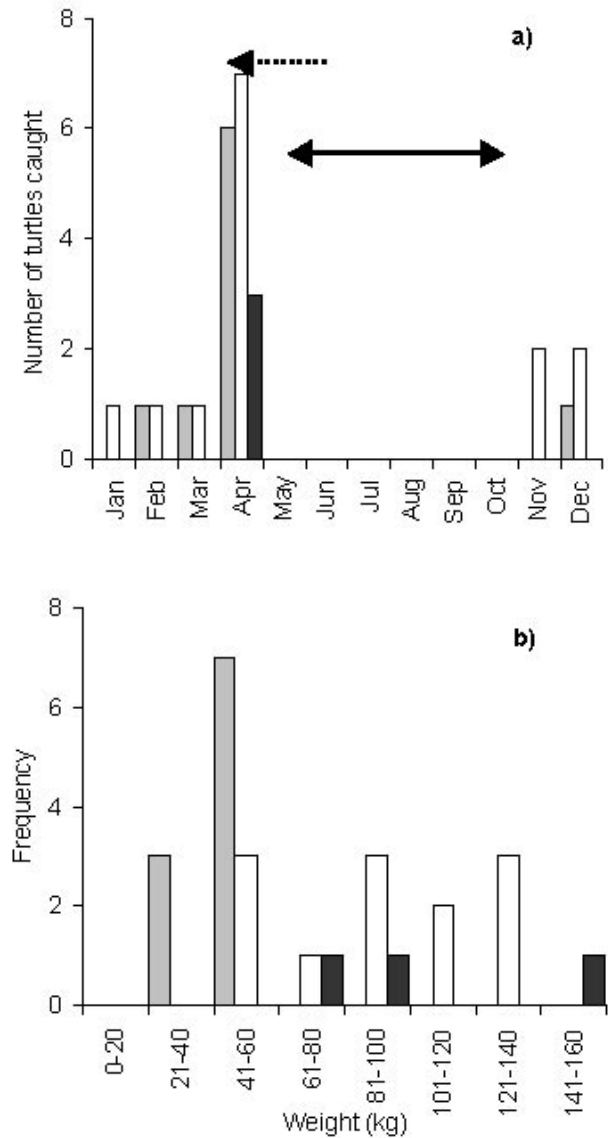


Figure 7.3. All reported capture data from the Cayman Islands legal fishery April 1999-April 2004. **a)** Temporal distribution of all reported captures. Dashed line indicates the likely start of the mating season (one month prior to the first nesting) and consequent entrance of adults into Cayman waters. Solid line describes the extent of the Cayman Island nesting season. **b)** Weight distribution (kgs) of all reported captures. Most weight records were taken as an estimate at the time of capture. Where a range was presented by a fisherman or enforcer, the lowest estimate was used. Key: *E. imbricata*: grey boxes, *C. mydas*: white boxes, *C. caretta* black boxes.

(1 from Grand Cayman and 1 from Cayman Brac) reported selling the meat). One suggested the going price was CI\$6 per turtle (although we suspect this is a translation error for a per lb price), and 1 suggested he received CI\$6 per lb (the latter of these is 1 of those who identified himself as a pleasure fisher). That he sells meat and filled out all parts of section 3 and 4 suggest that in this case, it was the initial categorization as a pleasure fisher that was incorrect.

While price was reported by only 2 current fishers, the reported price for marine turtle meat from wild turtles is comparable with that of Cayman Turtle Farm stew and

Menavelins (see section 7.7.7. below). Both fishers stated that the price rarely changed, with 1 respondent suggesting the price was set by fishers and another suggesting it was defined by local consumers.

The economic importance of turtle fishing varies across respondents. For past turtle fishers (n=4), 2 rated turtle fishing their most important catch before they stopped, while 2 did not respond to the question. For current fishers, only 1 ranks turtle fishing as his most important economic activity. Two others rank it 3rd and 4th, while 1 current fisher did not answer the question. Given the small number of fishers legally licensed, and the suspected small number of illegal fishers, the harvest probably does not play a significant role in the economy of the Cayman Islands. Indeed, this can be said for the whole commercial fishing sector. There are currently only 2 vessels that could be considered part of the commercial fishery. These fish the offshore banks (Misteriosa, Rosalind, Serranna, 60 mile) and supply fish to local restaurants. They contribute to the majority of the livelihood of only 4 fishers (P. Bush (CIDoE) pers. comm. 2004).

7.7.5. Trade in shells and shell products

Trade in shell and related products is not a major enterprise in the Cayman Islands other than when operated by the Cayman Turtle Farm (see section 7.7.7. below). Only 2 fishers identified themselves as selling shells as by-products of capture for meat; 1 in the past and 1 in the present. Other than the Cayman Turtle Farm, no current vendors were identified.

7.7.6. Incidental catch in marine fisheries

Although there are few commercial fishers in the Cayman Islands, fishing is important and guide-fishing for tourists targeting bone fish and tarpon is prevalent. The majority of these operations are believed to be 'catch-and-release' and are considered as 'sport fishing' in that the catch in no way supplements household incomes although guiding fees will contribute significantly to some. Of these, there are 10-20 based in Grand Cayman and 1 based in Little Cayman. Additionally the recreational fishing sector is large, numbering up to 400 unlicensed boats. Although this does not constitute the major part of the earnings of any individuals, catch supplements the income of many.

Incidental catch is considered as minimal within Caymanian waters. The commercial fishing industry is very small and no records of interactions with the game fishing industry have been recorded by CIDoE. Anecdotal evidence, however, suggests that occasionally turtles (usually reported to be juvenile green turtles but including occasional hawksbills) are hooked accidentally whilst fishers line fish. There have been two recent incidences of this in the North Sound, and on each occasion it was reported that more than 1 turtle was taken (C. Bell (CIDoE) pers. comm. 2004).

Data from the TCOT SEQ suggest that bycatch may be more prevalent than previously thought. Six of 12 fishers who contributed to the TCOT SEQ reported catching turtles



Photo 7.11. CTF yearling turtles (Photo B. Godley).



Photo 7.12. Feeding turtles in growing tanks (Photo B. Godley).

accidentally as part of other fishing activities; with estimates ranging between 1 and 2 turtles per year per fisher. When asked which turtles they catch most often, 3 fishers identified greens, 2 identified loggerheads, and 1 identified hawksbills. Fishers were also asked what other turtles they caught incidentally, and an equal number identified greens, loggerhead, and hawksbills. Data suggest that turtles captured are usually alive. Methodologies likely to interact with turtles were line based methods (n=6) and net fishing (n=1). All six fishers said that they release turtles when captured with 4 giving reasons: legality (n=3); dislike of taste (n=1). When asked about other fishers, 4 of the 6 respondents thought that other fishers kept accidentally caught turtles and only 1 thought that in general fishers release them. Given the number of fishers suggesting they catch turtles accidentally using line and hook, and the number of pleasure fishers who suggested they captured turtles 'opportunisticly' (and may have met accidentally), the incidence of accidental catch of turtles by pleasure fishers could be high and warrants further investigation.

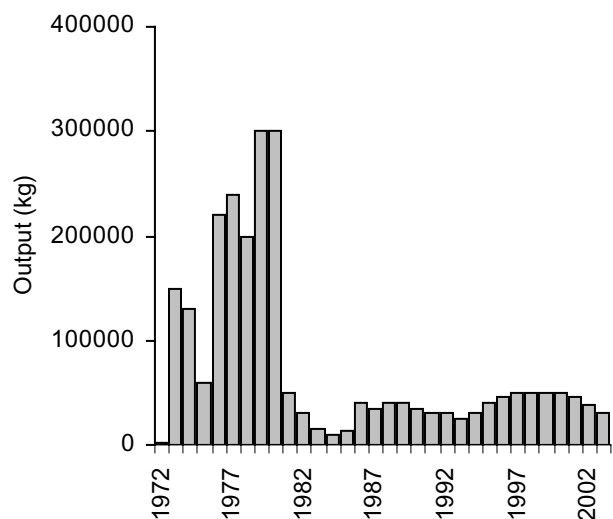


Fig 7.4. Output (kg) of edible product from the Cayman Turtle Farm 1972-December 2003 (Data courtesy of Cayman Turtle Farm).

7.7.7. The Cayman Turtle Farm

i. Introduction

The Cayman Turtle Farm has been in operation since 1968 as a commercial venture to raise green turtles. To form the herd, eggs, adults and sub-adult turtles were collected from the wild. A minimum of 477,644 eggs were collected from Ascension Island, Costa Rica, Guyana, and Suriname between 1968 and 1978. Additionally, 60 adults were collected from Ascension Island, Costa Rica, Guyana, and Suriname, between 1968 and 1973. A further 117 adults and sub-adults were obtained from Mexico between 1976-1977, and 31 individuals of adult size (24 females and 7 males) were purchased from Caymanian fishing boats fishing the Miskito Keys of Nicaragua between 1970 and 1971 (Cayman Turtle Farm 2002).

Breeding adults are held in a large breeding pond next to an artificial nesting beach. Eggs from each clutch laid on the beach are incubated in a hatchery (Critchley *et al.* 1983; Wood & Wood 1979) and hatchlings are reared in groups (Photos 7.11 and 7.12). Animals selected for release are in excess of what is required for local use and future breeding stock, and have in the past equated to ca. 10-15% of annual production (Cayman Turtle Farm 2000). The stock level has varied over the years, and by 2001 the breeding herd stood at 355 (94 males, 261 females) and mean annual production of hatchlings from 1980-2001 was 10,500. In November 2001, Hurricane Michelle caused severe damage to the Farm and 78% of the breeding stock was washed out to sea. Since then, a new facility has been built further inland. The Cayman Turtle Farm continues to provide meat for local consumption and remains one of the major tourist attractions on Grand Cayman.

ii. Product Utilisation and Distribution

Animals are reared to slaughter typically at 4-5 years of age when they weigh 27-36kg (60-80lb). As a way of maintaining the product output with less turtles since Hurricane Michelle, slaughter animals have typically been older and heavier: 7 years old and of the order of 45kg (100lb) in weight.

Typically, animals are slaughtered and butchered on site 4 days per week. In general, 60% of the edible product is sold wholesale to 2 outlets: Farmers Market and Foster's Supermarket. The additional 40% is sold retail to 8 restaurants, CTF, staff and a small number of individuals, and some is donated as charitable gifts to the local retirement home, a special-needs day care centre, sports and service clubs, religious fundraisers and other charitable events.

Carcasses are processed into:

1. Steaks: Eight ounce pieces of filleted meat.
2. Stew: Packaged mixture containing large pieces of meat, fat, liver, lung, calipee (pre-boiled and boned) and can include portions of tail, neck, and flippers minus larger bony elements.
3. Menavelins: Packaged mixture of small cuts of meat, fat, skin, heart, kidney and spleen.
4. Waste: All guts, the carapace and major bony elements of larger turtles are now dumped.

In 2001 CTF applied to register under CITES as a captive breeding operation. The purpose of this registration proposal, concerning carapaces only, was to allow tourists that visit the Cayman Turtle Farm to export carapaces as personal effects. Each carapace processed for sale would have borne a permanently fixed metallic label with the Farm's logo, the ISO country code for the Cayman Islands, a unique number, and year of production. It would also have been accompanied by a CITES permit with a digital photograph of the carapace bearing the unique serial number. At the CITES CoP, Santiago, Chile, November 2002, this proposal failed to reach the required two-thirds majority with a vote of 38 in favour, 24 against and 48 abstentions. Prior to this proposal, a small number of carapaces were prepared for local sale and this practice was discontinued in 2002. However, in 2004 CTF resumed local sale of marine turtle carapaces.

iii. Pattern of Production

The output of edible product from the farm has varied greatly over the years, rising from the start of production in 1972 to a peak of nearly 305 metric tonnes in 1980. With the loss of international markets in the early 1980's, as a result of decisions taken at CITES meetings and the instigating of strict import measures of some importing states, production was reduced (see figure 7.4.). The long-term average 1983-2000 was 34.8 metric tonnes of product per annum, which corresponds to the slaughter of 1500-3000 animals per year with live body weight of the order of 30kg.

There appears to be no marked seasonal variation in demand for turtle meat in the Cayman Islands other than a slightly elevated demand driven by local people towards the end of the year (J. Parsons (CTF) pers. comm. 2004). This is coincidental with the occurrence of the local Pirates Week festival in October and the Christmas/New Year celebrations. Following the damage caused by Hurricane Michelle in November 2001, CTF management

realised that they would need to reduce meat production while management re-assessed its capacity for future productivity. This management measure was instigated in January 2002 (see fig 7.5), with slaughtering of fewer animals per slaughter day, and on only 3 days per week. Additionally, CTF largely ceased retail operations, limiting trade to wholesale partners and the gifts to care institutions and other donations. This production has, however, been incrementally increased since January 2003.

Although greatly reduced from its peak, consumption of turtle food products is prolific. Although our sampling strategy for the TCOT SEQ was not random, the fact that of 106 people interviewed, 42 were current consumers of turtle meat and an additional 24 were past consumers is illustrative of the presence of turtle meat eating in the Cayman Islands. Undoubtedly, the vast majority of turtle consumption occurring in the Cayman Islands is that of farmed product. Of 42 current consumers of turtle meat, 15 purchased at the supermarket, 12 at restaurants, 7 at the Cayman Turtle Farm and 1 “at the harbour”. With regard to this latter case, it is not known if this means purchase of wild meat from a fisher or from a restaurant near the harbour.

iv. Pricing and Patterns of Distribution

Although CTF staff informed us that preferential wholesale rates are given to Fosters Supermarket/Farmers market, the system is geared so that the retail price would be broadly consistent whether the product is purchased from CTF or either retailer.

The prices as of 1st February 2004 for retail from CTF (J Parsons (CTF), pers. comm. 2004) were as follows:

Steak	CI\$9.00 per lb retail
Menavelins	CI\$4.00 per lb retail
Stew	CI\$5.40 per lb retail

Foster's Food Fair Supermarket

On 10 February 2004, a member of CIDoE staff visited Foster's Food Fair Supermarket in Georgetown. There was



Photo 7.13. Staff prepare to distribute turtle meat (Photo CIDoE).

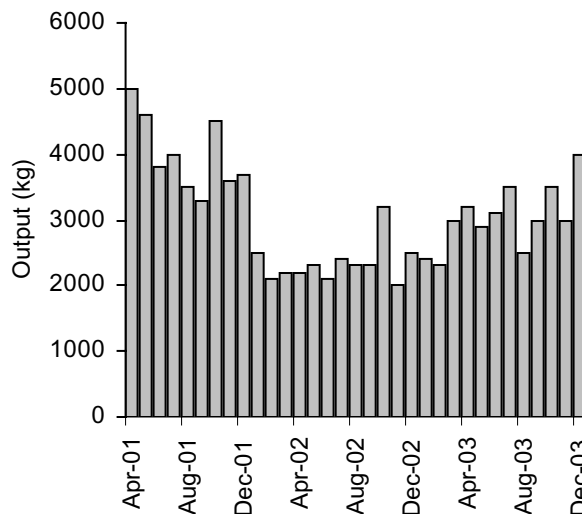


Fig 7.5. Output (kg) of edible product from Cayman Turtle Farm April 2001-December 2003 (Data courtesy of Cayman Turtle Farm).

no turtle meat for sale, but she was informed that Foster's buy 200lbs per week, which it sells at its Republic store (West Bay). In the past, steaks had been sold at a second store at the Strand, West Bay Road (Seven Mile Beach), but this had been discontinued. The third Foster's Supermarket near the airport is close to Farmer's Market and does not retail turtle meat. She was informed that the meat arrives on a Wednesday morning and that, since the post-Hurricane production cuts, it is typically sold out immediately, with people waiting at the door when the store opens. Prior to Hurricane Michelle, Foster's would buy considerably more and it would sell more gradually throughout the week.

On 11 February 2004, a CIDoE staff visited the Foster's Store (Republic - West Bay) and waited in a queue of 8 other people for the opening of store and turtle meat retail. One senior citizen in the queue informed CIDoE that this was the smallest queue she had ever seen and that it usually numbered 20 or more people. About 30 minutes after the store opened the assistants from the meat department wheeled out a trolley full of boxes, and handed these out 1 per person to ensure equity of distribution (Photo 7.13). Staff at the store informed us that this competition for turtle meat had not been an issue before Hurricane Michelle. All meat was sold out within the hour and did not even reach the point of merchandising.

Foster's prices of the 2 turtle products they sell are as follows:

Stew	CI \$27 per 5lb box
Menavelin	CI \$18 per 5lb box.

These prices are very similar to those given by CTF.

Farmer's Market

On 10th February 2004, a member of CIDoE staff visited Farmer's Market in Georgetown and was informed that they sell turtle to the public on Thursday and Saturday mornings. It was pointed out that they only sell what is left

after they fill their orders (of steak/stew and menavalin) for the restaurants, which vary from week to week. They too reported an undersupply versus demand in recent times, with little left for retail to the public and whatever was available in high demand.

Restaurant Sector

A selection of restaurants were contacted to confirm what dishes were sold and the prices per portion of turtle product. These are summarised below:

Liberties	Stew	CI\$10.75	Thursdays only
	Steak	CI\$18.95	Daily to order
Wellies Cool Spot	Stew	CI\$11.00	Fridays only
Vivine's Kitchen	Stew	CI\$16.00	Wednesday
	(part of buffet)		
Bus Side	Stew	CI\$10.00	Friday only
Champion House	Stew	CI\$8.00	Tuesdays only
	Steak	CI\$15.00	Daily to order

In the TCOT SEQ, 9 interviewees identified themselves vendors of turtle meat. Of these, 7 owned or managed restaurants that sold turtle meat. Of these, 5 stated that turtles were important to their business. All 7 have noted a decrease in meat availability over time.

iv. Demand

Our preliminary description of the retail network surrounding edible marine turtle products has shown that there is currently an underproduction versus demand. Overall, of the 42 respondents who currently consume turtle meat, 29 of them answered questions regarding change in availability of products in general (Q101a-c). For meat specifically, 19 respondents commented on trends over the last 5 years, with 15 respondents noticing a decrease and 1 noticing an increase. Eighteen respondents commented on availability since they can remember; 13 perceived a decrease and 1 perceived an increase. CTF recognises that demand has outstripped production during the step down in production since Hurricane Michelle. Production is still on the increase and it is expected that pre-Michelle levels will be reached within the next year.

Did the CTF's pre-Michelle production level satisfy local demand? CTF thinks this is the case (J. Parsons (CTF) pers. comm. 2004). CTF had the potential of markedly increasing production in the years before Michelle should the demand have necessitated. This was not the case and since the mid 1980's production has been relatively constant. Turtle consumption has been integral to the Caymanian culture for centuries and was prevalent before the start-up of the Farm. Indeed CTF purchased a number of animals from the Cayman based fishery catch to bolster its stock of adults in the early 1970s. As the international fishery closed down, CTF production was available to fill the gap and the culture of eating turtle products persisted at a high level.

Does CTF production stimulate a demand which needs to be satiated by a wild harvest? Given the suspected total wild take makes up such a small fraction of Caymanian

turtle consumption, it is felt that in general terms this is unlikely. Our reported observations suggest that since Hurricane Michelle the demand of local consumers is not being fully met. Although monitoring of covert illegal actions is difficult, CIDoE have not reported any marked increase in legal or illegal turtle fishing activities as a result of the reduction in CTF production. A matter of concern, however, would be the likely consequence of long-term reduced production, i.e. whether this would stimulate illegal take from the wild.

Additional points worthy of note include:

1. The retail cost of turtle food products is highly subsidised by the Farm's tourist revenue.
2. The price has varied little in the last decade, thus in real terms this subsidy has been increasing across time.
3. Despite a marked reduction of production and relative scarcity ensuing from Hurricane Michelle, no market forces driven price increase was instituted.
4. Theft of turtles has been recorded from the Cayman Turtle Farm, especially during Hurricane Michelle (K. Hydes (CTF) pers. comm. 2004). Ongoing illegal take from the wild may simply be financially driven by individual misfortune rather than the dynamics of the demand of wild versus cultured turtle meat.

v. Benefits of the Cayman Turtle Farm

Cayman Islands Authorities consider the primary conservation benefit of the Farm to be that making available farmed green turtle meat has proven to be an effective means of filling local demand for turtle meat, and accordingly limiting the impact on wild turtle populations (Cayman Turtle Farm 2002; G. Ebanks-Petrie (CIDoE) pers. comm. 2004). As part of this mission of turtle meat production for cultural preservation, the CTF has become a major employer in Grand Cayman (30 employees) and a significant tourist attraction (340,000 visitors in 2001), and has an extremely high profile in tourist related publications (Photo 7.14). The revenue generated from gate receipts and retail outlets at the CTF significantly subsidises the price of turtle derived food products.

Other than this, how does marine turtle conservation in the Cayman Islands and internationally benefit from the income generated by the CTF?



Photo 7.14. Cayman Turtle Farm promotion in tourist publication.

Locally

Beach Monitoring: Prior to the CIDoE becoming the lead agency responsible for monitoring wild turtle population, CTF responded to reported nesting and was involved with hatchery incubation of eggs considered “doomed”.

Rescue and rehabilitation: The Farm acts as a facility for the rehabilitation of sick and injured wild turtles.

Support to Training Initiatives: CTF has financially supported participation of CIDoE staff in International Sea Turtle Symposia and the Bermuda Turtle Project Annual Training Course. In addition, CTF provided support to the TCOT training workshop held in 2002.

Headstarting: In 1980, CTF initiated a program of releasing juvenile turtles produced and raised on the Farm into the territorial waters of the Cayman Islands; a process often termed “headstarting”. This release programme was set up to determine whether headstarted turtles were capable of surviving in the wild and recruiting to breeding populations. It was also hoped that data could be provided concerning age at sexual maturity, and that returns would provide geographical insights into migration and the selection of nesting and foraging grounds (J. Wood (ex-CTF) pers. comm. 2003). The results of this 22 year study have been analysed with the support of MTRG staff as part of the TCOT initiative, and have been submitted for publication (Bell *et al.* submitted). The abstract of this manuscript follows:

“Headstarting is a management technique employed to enhance recruitment of turtles into diminished or extirpated marine turtle populations. Between 1980 and 2001, 16,422 hatchlings and 14,347 “yearling” green sea turtles were released from the Cayman Turtle Farm. Approximately 80% of all turtles released were subject to some form of tagging, including living tags. A total of 392 tagged animals have been recaptured at intervals of up to 19 years. Of this total, 160 individuals were captured in the Cayman Islands and 232 from other locations within the Wider Caribbean and south-eastern USA. There was significant variation in the release-recapture intervals at the three countries with most returns (Cayman, Cuba and Nicaragua). A positive relationship exists between time at large and size at recapture, and data suggest growth rates comparable to those of wild green turtles in the region. There have been at least 6 living tag returns, four released as yearlings and two as hatchlings, demonstrating an age at maturity which may be as short as 15-19 years. These results show that some headstarted turtles are moving around the Caribbean, surviving for long periods of time and contributing to the local breeding population.”

Thus, at least some of the turtles nesting in the Cayman Islands are the result of this headstarting effort. Further monitoring and/or genetic analyses may allow the assessment of the relative importance of this contribution to be assessed.

Internationally

Repatriation: Between 1970-1983, in accordance with the collecting agreements with government authorities of the countries from which eggs were obtained, almost 2,500 turtles of more than 10 months of age were marked using a notching technique and returned to the nesting beaches of origin (Cayman Turtle Farm 2002).

Supporting Research: Since it commenced operation, CTF has been responsible for, or sponsored, a considerable volume of research, both pure and applied, on both green and Kemp’s ridley turtles. This work has resulted in numerous scientific papers many of which are listed in the TCOT bibliography (Appendix 11.1). More recently CTF commissioned a preliminary stochastic simulation model of green turtle dynamics in the West Atlantic, which was discussed and developed during a supporting workshop also funded by CTF: West Atlantic Green Turtle Population Modelling Workshop (22 – 24 October 2003). This workshop included the following international participating specialists: Alberto Abreu, George Balazs, Catherine Bell, Karen Bjørndal, Janice Blumenthal, Alan Bolten, Milani Chaloupka, Gina Ebanks-Petrie, Scott Eckert, Vin Fleming, Jack Frazier, Brendan Godley, Julia Horrocks, Ken Hydes, Cynthia Lagueux, Brian Lusty, Neca Marcovaldi, Anne Meylan, Felix Moncada, Nicholas Mrosovsky, Joe Parsons, Henri Reichart, Sebastian Troëng, Vincent Vera, and Melania Yanez.

Education: The Farm provides one of the few locations in the world where visitors are able to view 4 different species of marine turtles and learn about their conservation. Visitor numbers, the vast majority international, are increasing annually. Guided tours and information boards explain the purpose and operation of the Farm, and highlight the threats marine turtles face. The re-development plans for CTF include enhanced educational facilities.

Kemp’s Ridley Insurance Population: CTF was the location of a highly successful captive breeding program for a small population of Kemp’s ridley turtles until it became apparent that the Rancho Nuevo population showed signs of recovery, and the vast majority of animals were repatriated. A few exhibit animals remain at the CTF.

Partnership in TCOT: The farm has been a partner in TCOT since the current project bid was submitted. The role of CTF was to:

1. Contribute to training as part of the TCOT workshop.
2. Participate in genetics analysis of the CTF herd.
3. Support assessment of the CTF’s activities with free access to all relevant data.

CTF has completely fulfilled its commitments in all these regards.

Supporting International Sea Turtle Conservation Community: CTF has been a donor to three of the organisations central to the co-ordination of marine turtle conservation efforts internationally: International Sea Turtle Society, Marine Turtle Newsletter and SEATURTLE.ORG.

Recommendations

7.1.2.1. Harvest legislation recommendations

While the Cayman Islands have relatively sophisticated regulations to monitor marine turtle harvest, this harvest must be accompanied by meaningful, long-term and systematic monitoring programmes to ascertain trends in turtle abundance. TCOT makes the following recommendations:

- a. Prohibit the capture of all adult marine turtles in Cayman waters. Ensure permanent and complete prohibition of the harvest of reproductively active turtles by extending the closed season to include the 1st of April to the 30th of November inclusive.
- b. 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 that should be stipulated in any amended legislation.
- c. 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 stipulated in any amended legislation.
- d. Ensure prohibition of the harvest of loggerhead and leatherback turtles. The DoE have also expressed that they would recommend prohibition of any future take of hawksbill turtles.

7.1.2.3. Endangered Species Trade and Transport Law

TCOT recommends that the CIDoE be adequately resourced to implement the provisions of the recently enacted Endangered Species Trade and Transport Law, and that the necessary commencement orders be issued by Cabinet as soon as possible. When this legislation comes into effect, it will fully transpose CITES to domestic law.

7.1.4. Maximise the role of the Cayman Turtle Farm in marine turtle conservation

The CTF is ideally and uniquely suited to promoting the conservation of marine turtles in the CI. One key area is in the maximization of the proportion of production that is sold to local people. Since recent production cuts at the CTF, there has been a relative scarcity of turtle meat relative to demand. This has an intrinsic potential to drive the trade in both legal and illegally captured turtle meat from the wild. It is strongly advised that, where possible, production is increased and/or re-routed towards the local market, whether it be through supermarkets or restaurants catering largely to local people, in preference to those most frequented by island visitors. It is recommended that the sale of farmed turtle products be controlled under the Trade and Transport Law to prevent illegal trade in wild turtle products through commercial establishments.

7.8. Indirect Use

7.8.1. Turtle watching on beaches

Although CIDoE occasionally carries out intensive nocturnal monitoring of nesting beaches (e.g. 2002 efforts to confirm the identity of live tagged individuals or 2003 and 2004 efforts to locate study animals as part of a satellite tagging project), nesting numbers are so small as to make the chances of seeing a turtle very low. Nesting turtle numbers would need to increase 5 to 10-fold before any valid turtle watching enterprises could be considered. At this point, given the highly developed tourism in the Islands, any turtle watching enterprise would need to be carefully regulated.

7.8.2. Dive/snorkelling tourism

To put the Cayman dive industry in context, the CI Watersports Association estimate that there are ca. 30 companies, directly employing approximately 500 people in the Cayman Islands, that have diving at the core of their business. In addition, the Land and Sea Co-op offers snorkelling trips to the Cruise Industry and has 25 individual boat owners/companies employing ca. 60 people. It should be noted that these are the direct jobs associated with the industry, and the impact is far more significant once service and support industries are taken into consideration.

Dive tourism undoubtedly plays a huge role in the Caymanian economy. CI Dept Tourism figures show that, in 2000, international tourist arrivals into the Cayman Islands totaled

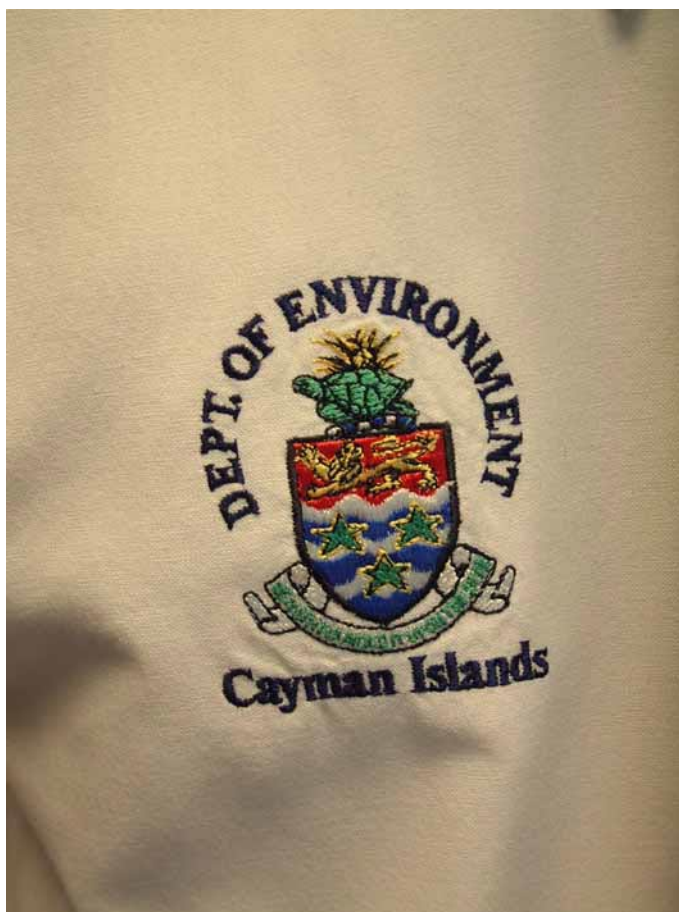


Photo 7.15. CIDoE logo incorporating Cayman Islands coat of arms (Photo S. Ranger).

1,437,477 (406,620 air arrivals; 1,030,857 cruise ship arrivals) largely from North America and Europe. A more recent survey (June- Nov 2003) has suggested that 54% of cruise ship arrivals (survey sample 132) go snorkeling and 10.6% go diving, whereas of the air arrivals (survey sample 459), 74% go snorkeling and 49% go diving. These very basic figures allow us to estimate that, each year, over 1 million different people snorkel and over 300,000 people dive in the marine environment of the Cayman Islands (source: CI Department of Tourism). These numbers concur with estimates given in Tratalos and Austin (2001). TCOT staff found that there was good take-up of Caribbean Turtlewatch and the four dive operators surveyed in TCOT SEQ identified turtles as 'somewhat important' to their business.

In recent years, a turtle feeding station has evolved at the northern end of Seven Mile Beach. Green turtles have been hand fed from shore at this site for up to 10 years, according to anecdotal reports. They are being fed a wide variety of foodstuffs ranging from cinnamon bagels to mincemeat and squid. Based on size estimates, it is likely that all the turtles seen today are not the same turtles that were being fed ten years ago and that new turtles are recruiting to these 'feeding stations'. Anecdotal evidence also suggests that, after November 2001 and Hurricane Michelle (which was responsible for the loss of turtles at CTF), numbers of green turtles being fed at these locations increased from less than 5 to as many as 10, although the number of turtles appearing on a daily basis fluctuates. Three of these turtles have been tagged by the DoE. One of the most obvious problems being caused by feeding is the alteration of natural behaviour. Recently turtles have been reported to be biting people and becoming aggressive in an attempt to get more food. CIDoE has advised that feeding be discontinued.

7.8.3. Aquaria holding captive turtles

Other than CTF, there are no other public aquaria displaying captive marine turtles, although CIDoE have confiscated and released a small number of green turtles kept in a private aquarium.

7.8.4. Other marketing/cultural uses

The level of use of turtles as insignia and logos in the Cayman Islands is without parallel in the Caribbean Overseas Territories. Sea turtles have a central place in the history, economy and culture of the Cayman Islands and this importance is apparent in the prominence of the sea turtle image in the Coat of Arms (Photo 7.15), National Flag, 10-cent coin, and watermark for all currency notes.

The economic importance of turtles continues to this day, as turtles are used as a marketing tool and attraction throughout the islands. This includes the logos of the National Airline (Sir Turtle), the national power company (Sparky the Turtle; Photo 7.16), and the Cayman Islands Tourism Association, as well as names or logos for dozens of hotels, inns, condominiums, water sports operations, and other businesses, ranging from building supply to travel agencies. A few examples: Turtle Nest Inn, Turtle Beach



Photo 7.16. Sparky the turtle (Photo S. Ranger).

Villas, Turtle Walk, Sea Turtle Villa, Turtle Reef Divers, and Tortuga Rum (a major exporter).

Tourism is a mainstay of the Cayman economy, with SCUBA diving and other water sports providing a primary attraction. Within the tourism industry, images of turtles are common in advertisements, posters, and leaflets promoting diving and snorkelling, submersible and semi-submersible tours, cruises, and other activities. Cayman sea turtles are often featured in Dive, Travel, Airline, and Tourism magazines, and are one of the primary examples of the charismatic megafauna that attract divers, snorkelers, and boaters.

Webpages devoted to the sighting of a sea turtle on a Cayman holiday are common, and websearches for "Cayman Turtle" produce thousands of hits. Jewellery, ornaments, figurines, T-shirts, photos, paintings, and other souvenirs featuring turtles are ubiquitous in local craft-shops and art galleries.

Sea turtle images are utilised by a cross-section of the community, catering to both a local and a tourism market. This prominence illustrates the continuing importance of these species to the culture, economy, and sense of identity of the Cayman Islands.

Of 106 respondents to the TCOT SEQ, 21 suggested that they used turtles indirectly in their business. Fourteen used turtles for advertising, 11 as an attraction and 13 in a professional manner (NB respondents could answer multiple

times). Their sectors included: scuba, tourism, marketing, conservation, hospitality, taxidermy, education, turtle farm, fishing, and retail. Of these, 18 felt they could assess how important this use was to their business: very important (n=3), somewhat important (n=13) and unimportant (n=2). Interestingly, 2 of the 3 businesses that identify their use of turtles (in advertising and as an attraction) as 'very important' also retail turtle meat.

7.9. 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 full details of responses to these questions have been circulated to local partners, basic results are summarized here. The most common response is cited. In general, most respondents agreed that:

- The government needs to actively work to protect sea turtles (92%)
- Turtles should be protected, regardless of their use to humans (92%)
- It is important that sea turtles exist in the wild in the future (90%)
- Turtles are culturally valuable in this OT (90%)
- Some income from tourism should be used to support sea turtle conservation (87%)
- Turtles play an important ecological role in our natural environment (86%)
- Turtles are an economically valuable resource in CI (84%)
- As turtles are migratory, they should be managed in cooperation with neighbouring states (77%)
- The government needs to do more to ensure that existing laws regarding marine turtles are effectively enforced (75%)
- Turtles should be used both as a tourist attraction and as a source of food (54%)
- Local people should be allowed to purchase sea turtle meat (55%)
- Turtle fishing should be stopped until more information is known on the size and health of the populations (53%)
- Turtles should be used as a tourist attraction rather than as a source of food (44%)
- Existing laws protecting marine turtles are effectively enforced (44%)
- Local people should be allowed to catch and eat sea turtles, provided it doesn't threaten the regional population (44%)
- Tourists should be allowed to purchase sea turtle meat (42%)

Approximately equal numbers of people agreed and disagreed that:

- Turtle fishing should be stopped completely (36% yes, 34% no)

A majority of respondents disagreed that:

- Turtle fishing should be unregulated (66%)
- Tourists should be allowed to purchase sea turtle shell and take it home with them (45%)



Photo 7.17. Catherine Bell gives Cayman country report at TCOT workshop (Photo S. Ranger).

These results suggest that there is wide support for the idea of sea turtle conservation in Cayman 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 how conservation might be achieved, and specifically the roles of consumption and tourism in conservation programmes. In these instances, opinions are more divided, and the majorities in favour of responses are always slight.

Initial and cursory analysis of responses to these questions by stakeholder group suggests that, while there are some areas of disagreement amongst stakeholders, these are few. For example, turtle fishers as a group generally agree with the responses of the surveyed population as a whole. There are only 4 questions for which the majority of fishers feel differently:

- Turtles should be used as a tourist attraction rather than as a source of food (50% of turtle fishers had no opinion)
- Turtle fishing should be stopped until more information is known on the size and health of the populations (50% of turtle fishers had no opinion)
- Turtle fishing should be stopped completely (50% of turtle fishers disagreed with this statement)
- Tourists should be allowed to purchase sea turtle meat (turtle fishers were divided, with 38% for and against this statement)

The instances in which turtle fishers had no opinion should be treated with caution, as expressing 'no opinion' about an issue that clearly affects the respondent may reflect the respondents discomfort with the question. Due to the non-random sampling employed in this survey, interpreting the results of these opinion questions in particular should be done with caution, as respondents are not representative of the Cayman population. In particular, due to the seemingly high number of young adults surveyed by a friend or family member enrolled in an environmental college course, it is likely that this segment of the population is over-represented, and that older long time consumers are under-represented.

7.10. Capacity Building and Outreach Activities During TCOT

7.10.1. Capacity building

At the start of TCOT, capacity was already high within CDoE, but this has been built upon both as part of the TCOT Training Workshop in Cayman (all staff involved with turtles attended and supported; Photo 7.17), Bermuda Training Course (Catherine Bell 2002; Joni Solomon 2003; Photo 7.18), the ongoing MTRG supervision of Janice Blumenthal and Catherine Bell in graduate studies, and grant raising. This has also included support in the inception of the Cayman Island's Sea Turtle Satellite Tracking Programme.



Photo 7.18. Joni Solomon takes part in Bermuda training course (Photo J. Gray).

Recommendations

7.1.1. Increase capacity for marine turtle management in Cayman Islands

TCOT has significantly contributed to the skills and technical knowledge of the CDoE officers. Although CDoE are relatively well resourced in OT terms, additional resources would further improve the magnitude and quality of the work currently being undertaken. It is essential that the CDoE receives adequate resources to effectively carry out their custodianship of Cayman Islands' highly valuable marine and coastal resources, on which the country's economy so heavily depends.

7.1.1.1. Increase the capacity of the CDoE

It is vital to ensure CDoE has the capacity, staff and resources to carry out research, monitoring and enforcement duties relevant to marine turtle management, including data collection and analysis for turtle monitoring programmes. CDoE staff are well trained and highly motivated, but have a limited research budget which constrains current efforts. It is recommended that national and international funding is sourced to support ongoing research and monitoring efforts as the work being carried out in the Cayman Islands is potentially of profound regional importance and CDoE has capacity to match support.

a) Increased presence in Cayman Brac/Little Cayman. Given the importance of Little Cayman as a foraging and nesting site, and that Cayman Brac has recently been discovered to host nesting and foraging

populations of unknown magnitude, but has long been a centre of turtle exploitation, it is recommended that CDoE have a more significant presence on these sister islands. Although CDoE have one enforcement officer for each of the two Islands, it would seem that, at minimum, a sister islands field base and sufficient operating resources are warranted to facilitate more extensive research, monitoring and community outreach by DoE scientific staff.

7.1.1.2. Establish a multi-stakeholder marine turtle management process

To date there have been 5 years of dedicated marine turtle research on wild marine turtles in the Cayman Islands and marine turtle conservation and management in the Cayman Islands is now of significant public interest. It is essential that public compliance with marine turtle management measures continues and, to facilitate such compliance, it is necessary that stakeholders feel they have meaningful input into the decision-making progress.

It is therefore recommended that the CDoE coordinate a Marine Turtle Working Group to include representatives of relevant stakeholders (e.g. government agencies and departments such as CDoE, Cayman Turtle Farm, Planning and Tourism; NGOs such as CI National Trust; hoteliers; dive operators etc.). The working group should meet regularly to discuss marine turtle management issues and to provide input to government's management and regulatory processes. The group would also function as a public education resource, promoting marine turtle conservation and informing their respective stakeholder groups on marine turtle management issues.

7.1.3.4. Consideration be given to acting as a regional training centre

The combined inwater and nesting monitoring programme of the CDoE would be an excellent training platform for a range of interns, including fisheries officers, from throughout the wider Caribbean region.

7.10.2. Outreach activities

CIDoE have been very proactive in this regard with a range of activities carried out independent of TCOT. These have focussed on the local community, especially school children (Photo 7.19). A central part of these efforts was the satellite tracking of 3 turtles in 2003 and 5 in 2004 (Photo 7.20). Additional support has been given by TCOT staff in the drafting and distribution of press releases resulting in a wide range of media outputs.

Recommendations

7.1.5.1. Encourage and implement sensitive practices at existing nesting beaches

- a) Continue coordinating the established network of hoteliers, beach residents and other beach users to ensure swift reporting of nests 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. Key issues to be addressed are lighting, vehicular traffic, and the use of heavy beach cleaning equipment.
- b) Develop a network of interested beachfront residents and beach/sea users willing to report any turtle strandings and ensure CIDoE has the capacity to collect, necropsy and document all strandings. This network could be supported by a toll-free hotline.
- c) Raise awareness through the continuation and expansion of the campaign to sensitise Caymanians 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) Update and expand distribution of guidelines for beachfront property owners with respect to minimising adverse impacts on nesting turtles and hatchlings.
- e) Ensure continued and enhanced school participation in relevant marine turtle conservation programmes to sensitise children to the importance of rookery protection.

7.1.5.2. Implement general awareness programmes regarding marine turtle conservation in the Cayman Islands

- a) Raise awareness among Caymanians of the presence of distinct foraging and nesting 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) Enhance existing CIDoE programme of awareness raising presentations and workshops in local 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 Cayman Islands specific turtle-related educational materials, and expand them to include further curriculum linked, multi-media educational materials where appropriate.

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.



Photo 7.19. School children partake in fieldwork (Photo CIDoE).



Photo 7.20. Samia the loggerhead heads to sea with satellite transmitter (Photo CIDoE).

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