An Assessment of the Status and Exploitation of Marine Turtles in Montserrat

Foreign & Commonwealth Office

defra
Department for Environment Food and Rural Affairs

This document is part of a larger publication and should be cited as:
Godley BJ, Broderick AC, Campbell LM, Ranger S, Richardson PB (2004) 8. An Assessment of the Status and Exploitation of Marine Turtles in Montserrat. In: An Assessment of the Status and Exploitation of Marine Turtles in the UK Overseas Territories in the Wider Caribbean. pp 155-179. Final Project Report for the Department of Environment, Food and Rural Affairs and the Foreign and Commonwealth Office.

The full report is hosted in PDF format at the Project website: http://www.seaturtle.org/mtrg/projects/tcot/finalreport/

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.

8. Status and Exploitation of Marine Turtles in Montserrat

Contents

8.1. Summary and Recommendations

8.1.1. Summary

Montserrat hosts critically small but regionally important nesting populations of green and hawksbill turtles. (see table 8.1) Occasional nesting activities of loggerhead and leatherback turtles have also been recorded. Although there is a local perception that numbers may be increasing, numbers of nesting turtles in Montserrat are at critically low levels and likely to be remnant of once larger populations. Little is know regarding the status of marine turtles resident in the waters of Montserrat. Green and hawksbill turtles are the most numerous species, but are of unknown magnitude, and smaller numbers of loggerheads are also likely to be present. Based on the data gathered, direct extraction of eggs and adults from the nesting beaches appears to be minimal, and undertaken mostly for personal consumption rather than sale. Levels of extraction at sea are also low, although most former turtle fishers did sell their products, they estimated the value of this to their overall activities as somewhat or not important. Current commerce in marine turtle meat exists, but we only interviewed one current fisher who reported selling it. Turtle meat is the only product consumed and consumers have noticed a decrease in availability over time.

Summary of Recommendations

TCOT recommends that the Government of Montserrat takes all necessary steps to ensure the sustained existence of nesting and foraging populations of marine turtles in Montserrat and to facilitate their recovery.

This will require actions under the following general headings:

8.1.1. Increase capacity for marine turtle management

8.1.1.1. Increase the capacity of the Government of Montserrat.
8.1.1.2. Increase the capacity of the Montserrat National Trust.
8.1.1.3. Establish a multi-stakeholder biodiversity management process.

*8.*1.2. Amend legislation and policy to facilitate marine turtle population recovery

8.1.2.1. Revise Turtle Ordinance Cap 112 1951.
8.1.2.2. Establish Marine Protected Areas.
8.1.2.3. Consider Marine Turtles as part of Planning Policy and Beach Management.
8.1.2.4. MEA legislation recommendations.

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

8.1.3.1. Establish systematic monitoring efforts at index nesting beaches.
8.1.3.2. Establish a systematic in-water monitoring programme.

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

8.1.4.1. Encourage and implement sensitive practices at existing nesting beaches.
8.1.4.2. Implement general awareness programmes regarding marine turtle conservation in Montserrat.

Species	Nesting	Foraging	Harvest
Green Turtle (*Chelonia mydas*)	Small numbers	Juveniles present In very small numbers	Still present at reduced levels targeting large juveniles and adults. Legal and possibly illegal Low levels of egg take-illegal and possibly legal
Hawksbill Turtle (*Eretmochelys imbricata*)	Small numbers	Juveniles and possibly some adults present in small numbers	Still present at reduced levels targeting large juveniles and adults Low levels of egg take
Leatherback Turtle (*Dermochelys coriacea*)	Occasional nest	Rarely encountered	Unlikely
Loggerhead Turtle (*Caretta caretta*)	Small numbers	Rarely encountered	Unlikely

Table 8.1. Marine turtle species present and summary of exploitation in Montserrat.

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

8.1.1. Increase capacity for marine turtle management in Montserrat

TCOT has contributed to the skills and technical knowledge of the Government of Montserrat Fisheries Department and contributed to Montserrat National Trust events. However, the enforcement patrol, research and monitoring capacity of the Government of Montserrat (GoM) is currently compromised due to an extreme shortage of staff, equipment and a very limited budget. It is essential that GoM apportions adequate resources to effectively carry out their custodianship of Montserrat's highly valuable marine and coastal resources on which the country's future so heavily depends. In addition, Montserrat National Trust would be the ideal organisation to deal with awareness raising programmes and support marine turtle research, but at present is also significantly below capacity for this role, with no current project officer for biodiversity conservation.

8.1.1.1. Increase the capacity of the Government of Montserrat

a) Ensure GoM has the capacity, staff and resources to carry out enforcement and monitoring duties relevant to marine turtle management, including data collection, entry, management and analysis for turtle monitoring programmes.
b) Ensure that key staff in GoM have the skills to apply for external funding to support biodiversity related projects.
c) Ensure that all new Fisheries Officers are adequately trained in marine turtle biology, as well as research and conservation techniques.
d) Ensure that adequate expertise is in place to allow for the process of legislative review.

8.1.1.2. Increase the capacity of the Montserrat National Trust

As part of a general increase in staffing and resources of the Montserrat National Trust, one of the urgent needs is for a project officer who can lead outreach campaigns, and support/ liaise with the many international organisations currently involved in biodiversity work in Montserrat. This officer's duties should include coordinating these various efforts, whether they involve provision of funds, staff, equipment, training or advice.

8.1.1.3. Establish a multi-stakeholder biodiversity management process

Identify and establish a Biodiversity Working Group to include representatives of all interest groups and stakeholders (e.g. government agencies and departments including Planning and Tourism; NGO's; hoteliers; dive operators; construction industry representatives, fishers, schools and specially-interested members of the public). The working group should meet regularly to discuss, decide and advise government on biodiversity management issues working to implement Montserrat's Environment Charter, marine turtles being one key subject area. With regard to marine turtles, particular attention should be paid to direct and indirect fishery interactions, habitat protection, exploring possibilities for sourcing funding, further research/population monitoring, as well as investigating potential economic benefits of marine turtle conservation, and external advice should be sought from appropriate experts. There may be a need to provide support for participation by some sectors (i.e. cover travel costs to meetings). In other OTs, it has been recommended that a specific group be assembled for marine turtles, but it is felt that at this stage a single focus group is more likely to succeed and make significant inroads, given limited resources on Montserrat.

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

The current legislation that regulates the harvest of marine turtles and their eggs in Montserrat does not facilitate the sustainable management of the country's nesting and foraging populations of marine turtles.

TCOT recognises that cessation of all turtle fishing would significantly contribute to the recovery of depleted turtle populations. TCOT also recognises that turtle meat is a component of the traditional Montserratian diet and a moratorium is unlikely to receive enough support from the fishing community, especially given the current economic situation in Montserrat. However, we make a suite of recommendations to allow future harvest of turtles to be carried out in a highly regulated and controlled manner, minimising its impact on the local nesting populations. We suggest programmes to monitor stock abundance and mechanisms to reduce or close the fishery in response to measured future decreases in turtle stock. The fishing community should be involved in this process, and their

interest in doing so was expressed as part of the TCOT SEQ results (see section 8.9). Furthermore, given that GoM will be responsible for the management of a future turtle fishery, it is vital that they have the skills, as well as the human, technical and financial resources to effectively monitor the fishery.

Regulation of use alone will not serve the sustainable management of these turtle populations. TCOT therefore also makes recommendations to facilitate protection of critical marine turtle habitat in Montserrat.

8.1.2.1. Revise Turtle Ordinance Cap 112 1951

We recommend the following based on the draft revisions drawn up by the GoM as "the Turtle Act 2002" (not yet gazetted). It should be noted however, that additional amendments to the "Turtle Act 2002" are needed:

i) Ensure permanent and complete prohibition of the harvest of nesting female turtles and turtle eggs.

ii) Ensure a closed season from the 1st of March to the 30th of November inclusive, to be reviewed every five years (to facilitate legislative adaptation to possible nesting season shift caused by climate change).

iii) Ensure permanent and complete prohibition of harvest of any large, reproductively valuable turtles by instigating a maximum size limit. A suggested maximum would 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.

iv) 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 that should be stipulated in any amended legislation.

v) Establish a limited turtle fishing licensing scheme, whereby especially licensed turtle fishers agree to abide by strict regulations regarding fishery practice, limited quotas and catch recording, including compulsory reporting to, and catch biometric measurement/ sampling by, the Government of Montserrat of all turtles caught, in advance of slaughter. Quotas should be reactive and based on number of licensed turtle fishers and stock assessments established through the monitoring regimes.

vi) Ensure permanent and complete prohibition of all turtle capture methods except hand capture and use of turtle nets, with strict specifications for legal net structure and use.

vii) Ensure prohibition of the harvest of loggerhead and leatherback turtles.

NB. Any continuing turtle fishery must be accompanied with systematic monitoring regimes as described below, along with a programme to monitor Catch per Unit Effort of licensed fishers, and biometrics of turtle catch, which should also be implemented by the GoM. Fisheries regulations should be revised to provide statutory powers to react to the ongoing results of the abundance trend monitoring programmes. In the event of declining abundance trends or declining Catch per Unit Effort below pre-established thresholds, the GoM must have the power to temporarily or permanently close the turtle fishery.

8.1.2.2. Establish Marine Protected Areas

Montserrat does not currently have any marine protected areas. It is advised that, based on holistic assessment of the marine biodiversity of Montserrat, key areas be set aside for protection.

8.1.2.3. Consider Marine Turtles as part of Planning Policy and Beach Management

Montserrat's nesting marine turtles probably represent remnants of depleted populations and are at critically low levels (see section 8.5). However, the adverse impacts of increased beachfront development on the nesting populations using Montserrat's mainland beaches must be considered in addition to the potential adverse impacts of turtle harvest. Every effort should be made to protect the remaining turtle nesting habitat in Montserrat, and therefore TCOT recommends the following policies:

a) Ensure all development, other than non-permanent structures designed for daytime beach use, is 100m landward of the high tide mark.

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

c) Ensure marine turtles are considered in the current beach sediment extraction projects being carried out in support of Montserrat's reconstruction. Extraction form major nesting beaches should be permanently discontinued.

8.1.2.4. MEA legislation recommendations

The Endangered Animals and Plants Ordinance, 1976, should be amended to prohibit commercial import and export of turtles and all turtle products of all wild marine turtle species, so that this legislation fully transposes CITES to domestic law.

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

Montserrat hosts nesting populations of green and hawksbill turtles, and occasional nesting by loggerhead and leatherback turtles is likely. In addition, coastal waters host foraging populations of green and hawksbill turtles of unknown magnitude, with occasional loggerhead turtles also reported. Montserrat's nesting turtle populations are probably remnant and at critically low levels (see section 8.6). 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 that the following monitoring programmes be established, under the guidance of the proposed Biodiversity Working Group, as a matter of priority:

8.1.3.1. Establish systematic monitoring efforts at index nesting beaches

Establish a sustained programme of morning nesting beach monitoring at index beaches to determine nesting abundance trends and to facilitate genetic analysis of nesting populations, through nest excavation and sampling. Ideally, monitored beaches should be visited at minimum three times per week to ensure species identification, and surveying should be carried out across the duration of the known nesting season and with constant effort.

NB. This programme should preferably engage local interest groups and residents and could eventually be developed, under the guidance of the proposed Biodiversity Working Group, into seasonal, revenue-generating tourist turtle walks in order to raise funds to sustain marine turtle management efforts.

8.1.3.2. Establish a systematic in-water monitoring programme.

In the first instance this would assess species composition and distribution, highlighting key areas of abundance. Building upon this, effort related surveying should be carried out to allow trends in abundance to be assessed, and sampling for genetic profiling should be undertaken.

NB. Under the guidance of the proposed Biodiversity Working Group, steps should be taken to encourage the involvement of interested local fishers in all monitoring programmes (e.g. CPUE monitoring), and financial incentives should be considered so long as they fit within the remit of a sustainable programme.

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

Increased awareness of turtles and their conservation requirements in Montserrat 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 Biodiversity Working Group, to facilitate public contribution to marine turtle conservation:

8.1.4.1. Encourage and implement sensitive practices at existing nesting beaches

a) Develop a network of hoteliers, residents and other beach users to ensure reporting of nests not on index beaches, so that they can be marked, protected and monitored.

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

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

d) Ensure school participation in any rookery monitoring programmes to sensitise children to the importance of rookery protection.

8.1.4.2. Implement general awareness programmes regarding marine turtle conservation in Montserrat

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

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

e) Develop Montserrat specific turtle educational materials, and expand them to include further curriculum linked, multi-media educational materials where appropriate.

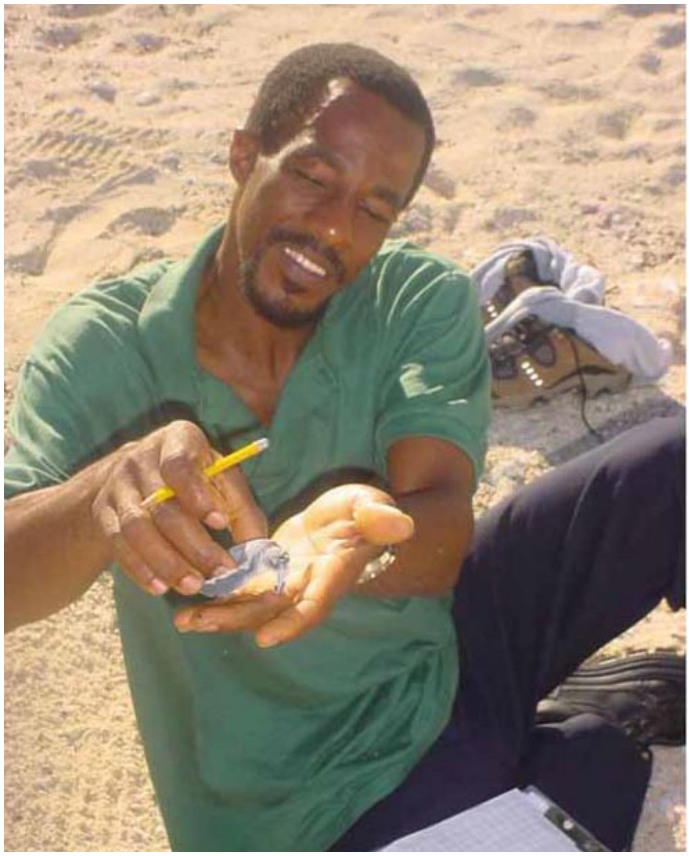

Photo 8.1. John Jeffers with a green turtle hatchling (Photo B. Godley).

8.2. Geographic Overview

Montserrat (16º45'N, 62º 12' W) is a small volcanic island situated in the Leeward Antilles (See Fig 8.1). Montserrat has suffered a series of natural disasters in recent years, including hurricanes and volcanic eruptions. Although reducing at the time of writing, some areas of the island have at times been no-go areas as a result of the eruptions. It has a total land area is 104 km^2 with a coastline of 40km. The population is much reduced following an estimated 8,000 refugees leaving the island following the volcanic activity in 1995 and 1996/1997. Some have returned. The population prior to 1995 was estimated at 12,000. Montserrat has a GDP per capita of US$3,400 (2002 est.), the lowest of all the OTs. Natural disasters of recent years have affected the island economy based upon tourism, rum production, textiles and electronics. Prior to the eruption, 30,000 tourists visited Montserrat annually accounting for 25% of the GNP. In the year 2000, only 15,000 visited.

8. 3. Historical Overview

Montserrat was subject to human habitation from pre-historic times and colonised by Europeans in the early 17th century. Steadman *et al.* (1984) have unearthed evidence of hawksbill turtle (presumed adult) exploitation by the Saladoid culture, a people who colonized the Lesser Antilles *ca.* 2000 years ago. Other than this reference, we have not uncovered any information regarding turtle exploitation before the 1940s. However, it is likely that it has been ongoing since settlement.

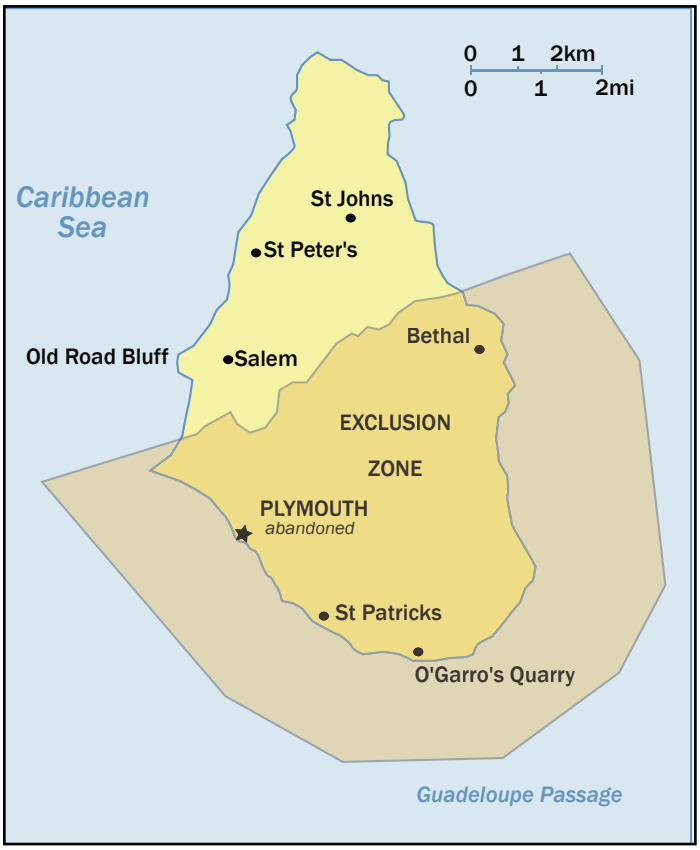

Figure 8.1. The island of Montserrat.

Photo 8.2. Fox's Bay, Montserrat (Photo B. Godley).

Photo 8.3. Rendezvous Bay, Montserrat (Photo B. Godley).

8.4. Organisations Involved with Marine Turtle Monitoring and Conservation in Montserrat

The Department of Fisheries has a staff of 4, has access to government pool road vehicles, but no marine vessel. A Police launch is used occasionally for surveillance. The department is responsible for all aspects of marine fisheries, including marine turtles, and the Fisheries Assistant, Mr. John Jeffers (J.J.), has assumed the mantle for marine turtle monitoring for a number of years (Photo 8.1).
The Montserrat National Trust employs a staff of 5; including a Director, a museum curator, a secretary and 2 botanical gardens assistant. Marine turtles have featured in awareness raising materials, but there are no staff actively involved with marine turtle fieldwork.

8.5. Status of Nesting Marine Turtles in Montserrat

8.5.1. Data from nesting beach monitoring

Four species of sea turtles have been reported nesting in Montserrat. Seminal studies suggested that green and hawksbill turtles nested in small numbers, whilst loggerhead and leatherback turtle nests were only occasionally encountered (Groombridge & Luxmoore 1989; John 1984;

Meylan 1983). Meylan (1983) reported that nesting levels were low, presumably because of constant human activity on the island's beaches (that were widely used for boat storage and recreational purposes). Whether nesting levels were reduced at this time is a matter from conjecture, but given direct exploitation has occurred for some 2000 years, it is likely that numbers were reduced by the 1980's.

The island is of volcanic origin, and all but one of its sandy beaches consists of black volcanic sand (Photo 8.2); white calcareous sand dominates at Rendezvous Beach (Photo 8.3) near the northern tip of the island (Anonymous 1993). Apart from Trant's and Farm beaches (east coast), all of Montserrat's sandy beaches are located on the western side of the island (Figure 8.1.). Since the recent volcanic activity, a great deal of sediment run-off means that some beaches are growing (e.g. Isles Bay) and much of the south coast has become a sandy coastline.

Although marine turtle monitoring had been ongoing since studies in the 1980s (John 1984; Meylan 1983), almost all relevant data were lost along with many government records in the volcanic activity that engulfed Plymouth in 1997.

Daytime monitoring of marine turtle nesting

The Fisheries Department of Montserrat's Agriculture Ministry has been coordinating monitoring of the island's beaches for turtle activities since 1999. Although, ad-hoc, day-time beach monitoring has been carried out by dedicated island residents, with these individuals regularly checking their local beach for turtle emergences and nests, the bulk of the monitoring effort has been carried out by the Fisheries Department (J.J.). Monitoring frequency of nesting beaches has been uneven and especially patchy on the beaches located in the exclusion zone (Figure 8.1.). Safe, accessible beaches were walked and checked for turtle tracks and nests. Sites subject to volcanic risk were checked from an offshore boat with binoculars. Beach monitoring sheets were filled by staff (J.J.) each time a beach was visited, and by other island residents only when they had detected nesting activities on their local beach. Nests (N), i.e. adult emergences resulting in clutch deposition, were individually counted. Non-nesting emergences (NNE) were not counted individually, but instead their presence or absence on any given survey day was recorded. No distinction was made among species based on track morphology.

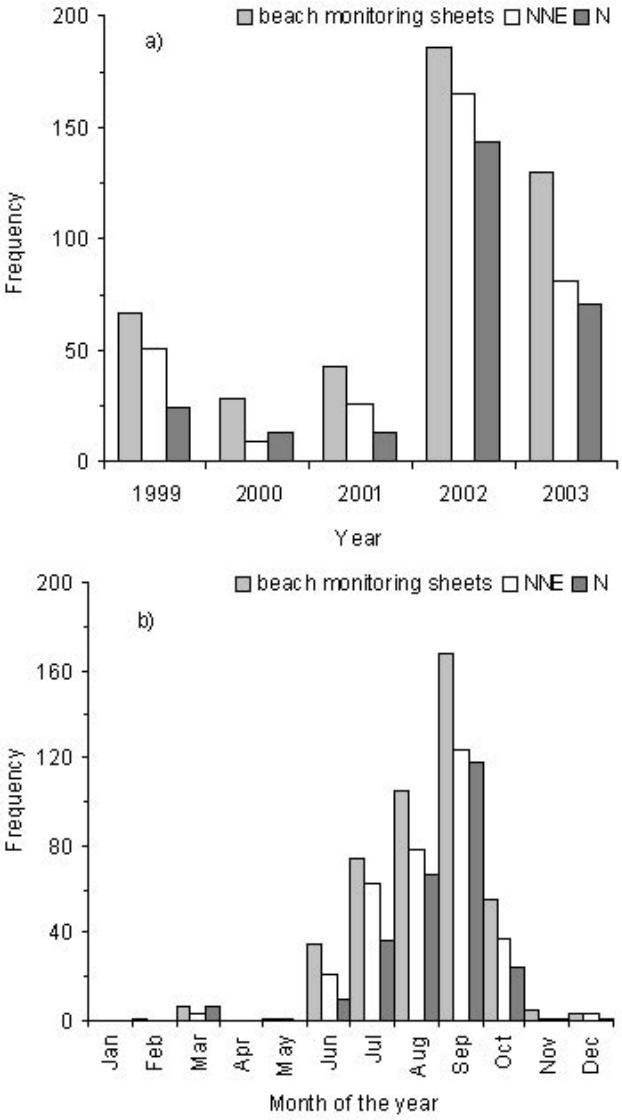

Figure 8.2. a) The total numbers of completed beach monitoring sheets, records of non-nesting emergence (NNE) and nests (N), for the period 1999 to 2003. **b)** The total numbers of completed beach monitoring sheets, records of non-nesting emergences (NNE) and nests (N), by calendar month (1999 to 2003).

Photo 8.4. Track of hawksbill turtle (Photo C. Martin).

In 2003, all beaches were monitored a minimum of once per week for one month (mid-August/mid-September). Beaches were either walked or checked from a distance with binoculars (e.g. from a helicopter or boat). Special permission was granted from the authorities to access and walk some of the beaches of the exclusion zone (Trant's, Farm, Fox's, Bransby Point, Hot Water Pond). In these surveys, individual non-nesting emergences and nests were counted and species identification from tracks morphology was undertaken where possible (following Pritchard & Mortimer 1999; Photo 8.4).

Data originating from a total of 453 beach monitoring forms were analysed (Table 8.2). The mean annual total of nests

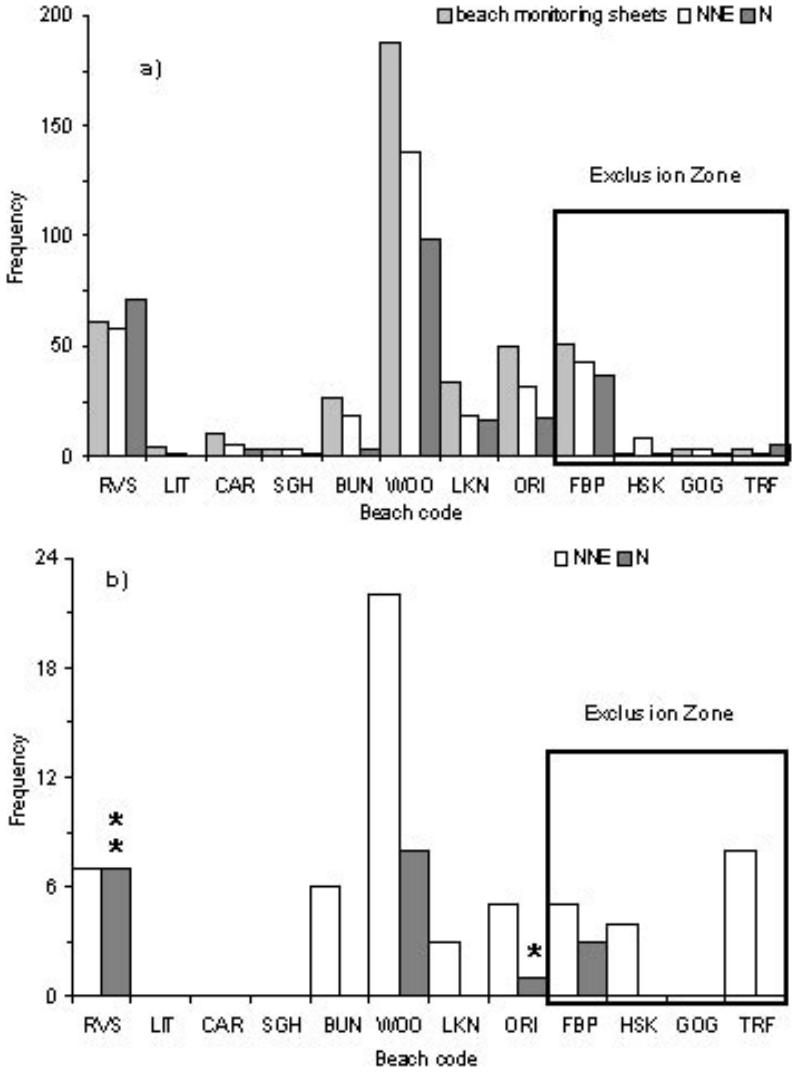

Figure 8.3. a) The numbers of completed beach monitoring sheets, records of non-nesting emergences (NNE) and nests (N), per beach (1999 to 2003). For beach codes see Table 8.2. **b)** Individual non-nesting emergences (NNE) and nests (N), per beach (mid-August/mid-September 2003) (* and ** indicate one and two hawksbill turtle nests, respectively).

recorded for the period 1999 to 2003 was 53 (±24.9 SD, range: 13–143). Annual numbers of non-nesting emergences and nests are highly correlated with associated monitoring frequency when one considers annual totals (Figure 8.2.a) or the combined monthly totals of nesting activity (Figure 8.2.b). During the monitoring period, Woodlands beach demonstrated the greatest nesting intensity of all beaches, but was also the most monitored beach of the island (Figure 8.3.a). The three other key nesting beaches appeared to be Rendezvous, Fox's Beach/Bransby Point and Old Road/ Iles Bay beaches (Figure 8.3.a). Nesting activities followed a strong seasonal pattern, with 97% of turtle activities (non-nesting emergences and nests) being recorded between June and October, clearly peaking in September (Figure 8.2.b). The seasonality of nesting activities closely followed the pattern of the monitoring intensity.

For mid-August/mid-September 2003, there were a total of 60 nesting emergences and 19 nests recorded (Table 8.3). There were 21 non-nesting emergences and six nests of green turtles, and 17 non-nesting emergences and three nests of hawksbill turtles. Because of their relatively large widths, four asymmetrical tracks observed on Trant's beach were attributed to loggerhead turtle(s), despite no nest being observed. The spatial distributions of non-nesting emergences and nests for mid-August/mid-September 2003 (Figure 8.3.b) showed patterns similar to those shown when all data are pooled from the five year long dataset (Figure 8.3.a). Moreover, the numbers of non-nesting emergences for mid-August/mid-September 2003 were highly correlated with the total numbers of recorded non-nesting emergences for the period 1999 to 2002 (Spearman's rank correlation R_s= 0.84, P < 0.01). Such a relationship was also detected between the numbers of nests for mid-August/mid-September 2003 and the total number of nests for the period 1999 to 2002 (R_s 0.57, P<0.05).

Night-time beach monitoring

In 2002 and 2003, logistics permitting, beaches were monitored at night for the presence of nesting adult turtles. When possible, nesting turtles were measured (Curved Carapace Length, CCL) and tagged with Passive Integrated Transponders (PIT's). In 2002 and 2003, a total of 28 individual nesting turtles were measured: 16 green turtles (12 in 2002 and 4 in 2003; mean CCL (cm) = 106.9 ±6.3SD, range: 103–118) and 11 hawksbill turtles (9 in 2002 and 2 in 2003; mean CCL (cm) = 87.8 ±6.8SD, range: 79–103). A total of 9 hawksbill (8 in 2002, 1 in 2003) and 13 green turtles (11 in 2002, 2 in 2003) were PIT tagged. All were tagged on Woodlands beach, with the exception of 3 hawksbill turtles that were tagged on Carr's beach (2 in 2002, 1 in 2003). In 2002, 2 green turtles (Photo 8.5) were re-sighted on Woodlands beach after having been PIT tagged on that beach earlier in the season, 11 and 12 days earlier respectively. These data were supplemented by 1 sighting (by a member of the public) of a loggerhead turtle nesting on Woodlands beach in August 2002, and hatchling leatherback turtles being discovered on the same beach in the mid 1990's (Jeffers unpublished data). In addition, since the advent of TCOT, project efforts are made to record the hatching of nests and undertake excavation to monitor hatching success and gather genetics vouchers.

Status of nesting populations

When monitoring efforts are intermittent and uneven we should show caution before making any wide ranging recommendation regarding status. There are, however, a few key points that can be elaborated from the existing data. Green and hawksbill turtles nest in modest yet regionally important numbers in Montserrat, probably every season. Leatherback and loggerhead turtles also appear to nest, but these events are undoubtedly relatively rare. This is in concord with the wider literature that suggests that green and hawksbill turtles are the most common species of

	1999		2000		2001		2002		2003	
	NNE	*N*	*NNE*	*N*	*NNE*	*N*	*NNE*	*N*	*NNE*	*N*
RVS	7	6	1	3	4	3	23	25	22	34
LIT	0	0	0	0	0	0	0	0	1	0
CAR	1	0	0	0	0	0	2	3	2	0
SGH	1	1	0	0	1	0	1	0	0	0
BUN	2	0	0	0	0	0	11	2	5	0
WOO	4	4	1	0	4	4	93	70	36	21
LKN	0	0	0	0	1	0	10	16	7	0
ORI	9	4	1	4	9	3	11	7	2	0
FBP	20	5	4	5	7	3	10	15	5	10
HSK	3	4	2	1	0	0	4	5	0	0
GOG	3	0	0	0	0	0	0	0	0	0
TRF	0	0	0	0	0	0	0	0	1	5
Total	50	24	9	13	26	13	165	143	81	70

Table 8.2. Breakdown of the number of events when non-nesting emergences (NNE) were recorded and the numbers of nests (N), per beach and year. Beach codes: RVS: Rendez-vous, LIT: Little Bay, CAR: Carr's Bay, SGH: Soldier Ghaut, BUN: Bunkum Bay, WOO: Woodlands Beach, LKN: Lime Kiln Bay, ORI: Old Road/Iles Bay, FBP: Fox's Bay/Bransby Point, HSK: Hot Water Pond/Sugar/Kinsale, GOG: German's/O'Garro's, TRF: Trant's/Farm Bay).

	Green		Hawksbill		Loggerhead		Undetermined	
	NNE	*N*	*NNE*	*N*	*NNE*	*N*	*NNE*	*N*
RVS	0	1	0	2	0	0	7	4
LIT	0	0	0	0	0	0	0	0
CAR	0	0	0	0	0	0	0	0
SGH	0	0	0	0	0	0	0	0
BUN	1	0	3	0	0	0	2	0
WOO	14	4	5	0	0	0	3	4
LKN	0	0	3	0	0	0	0	0
ORI	0	0	4	1	0	0	1	0
FBP	2	1	0	0	0	0	3	2
HSK	2	0	2	0	0	0	0	0
GOG	0	0	0	0	0	0	0	0
TRF	2	0	0	0	4	0	2	0
Total	21	6	17	3	4	0	18	10

Table 8.3. Breakdown of the number of non-nesting emergences (NNE), and nests (N), per beach and species, for the period mid-August to mid-September (2003). For beach codes see Table 8.2.

nesting sea turtles in the Lesser Antilles, whilst leatherback and loggerhead turtles tend to nest in comparatively lower numbers (e.g. d'Auvergne & Eckert 1993; Chevalier & Lartiges 2001; Eckert & Honebrink 1992; Eckert *et al*. 1992; Fuller *et al.* 1992; Meylan 1983; Scott & Horrocks 1993; Sybesma 1992).

Magnitude of nesting data recorded was closely correlated with survey frequency in time and space. It is likely that recorders more frequently carried out surveys at times and locations when the probability of recording turtle nesting activity was higher. Although this may have resulted in some spatial and temporal biases in the data set, the seasonality of the Montserrat nesting season as described by the data set is plausible, running primarily from June to October. Although due to the nature of the data it was not possible to discriminate between the seasonality of the different species, the temporal distribution of the data are consistent with seasonality of nesting reported for green turtles (Fuller *et al*. 1992; Hirth 1997) and hawksbill turtles (Corliss *et al*. 1989; Eckert & Honebrink 1992; Scott & Horrocks 1993) in the region. Additionally, the data collected during the period of intensive monitoring in 2003 generated a spatial distribution of nesting broadly similar with that of previously collated data.

The key nesting beaches for green and hawksbill turtles in Montserrat appeared to be Woodlands (so far unreported in the literature), Rendezvous, Fox's/Bransby Point and Old Road/Iles Beaches. Even though green turtles left tracks on many of the island's beaches, actual nesting by this species was only confirmed for Rendezvous, Woodlands and Fox's/Bransby Point beaches. Meylan (1983) reported that green turtles might also be nesting at Little and Iles beaches.

Photo 8.5. Dyonne Dewberry filming return to sea of a green turtle (Photo C. Martin).

Actual nesting by hawksbill turtles was solely confirmed for Rendezvous and Old Road/Iles Beaches, although Meylan (1983) also quotes Carr's, Little and Soldier Ghaut beaches as nesting sites for this species. On Trant's beach, tracks possibly belonging to loggerhead turtles were reported, in agreement with the belief that loggerhead turtles occasionally nest on the island (John 1984).

8.5.2. Data from the TCOT SEQ

All survey respondents were asked about perceived changes in abundance of nesting marine turtles by species, in the last 5 years and since they could remember (Q105a-c). Views of former and current egg collectors are considered separately, and views of all respondents are summarized in Table 8.4. Of the 6 former and 1 current egg collectors interviewed as part of the TCOT SEQ, only 1 respondent believed there has been a change in abundance of nesting turtles (1 felt there was no change, 4 didn't know, and 1 did not respond). He felt that turtles in the OT have increased both in the short and long term for green, loggerhead, leatherbacks and hawksbill. He also cited the increases in both time periods for turtles in general.

Only 15 of the 71 respondents to TCOT SEQ noticed a change in abundance of nesting turtles (9 noticed no change, 44 didn't know, and 3 didn't answer the question). As Table 8.4 shows, few respondents commented on individual species. Most respondents believed that nesting numbers for turtles had increased over both time periods, and most of the few who comment on individual species also believed there have been increases for all species in both time frames.

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 increases included: fewer people fishing, increased monitoring, no longer catching during breeding season, fewer people on island, and education. Reasons for perceived decreases included: changing habitat due to volcanic activity, and over-harvest.

8.5.3. Threats to nesting marine turtles

Montserrat presents a relatively narrow coastal shelf, dropping off rapidly to nearly 200 m only 650 m from the shoreline along the southern half of the island, whilst in the north, northeast and west, the shelf slopes more gently (the 200 m contour is approximately 5 km offshore; Gell & Watson 2000). The result is a high energy, erosion prone coastline, with mostly intermittent beaches (Anon 1993).

In the last 5 years…

	Increasing	Decreasing	Same	Don't know	NR
Green	3	1	0	0	11
Leatherback	2	0	0	0	13
Loggerhead	2	0	0	0	13
Hawksbill	3	1	0	0	11
General	8	3	0	1	3

Since you can remember…

	Increasing	Decreasing	Same	Don't know	NR
Green	3	3	0	0	11
Leatherback	2	0	0	0	13
Loggerhead	2	0	0	0	13
Hawksbill	3	1	0	0	11
General	8	3	0	1	3

Table 8.4. Perceptions of change in abundance of sea turtles nesting (by species and in general), in the last five years and since you can remember (n=15 respondents who perceive change)

Photo 8.6. Ash crust on Fox's Bay (Photo C. Martin).

The quality of Montserrat's beaches with regards to sea turtle nesting appears to be naturally poor. As a result, beach erosion may periodically prevent gravid turtles from nesting, as well as destroy incubating nests

Additional factors of concern to marine turtles linked to the volcanic eruptions include ash deposits and beach mining. Occasional ash deposits cover nesting beaches (Photos 8.6 and 8.7), render them less suitable or wholly unsuitable for nesting until they are manually cleared or cleared by heavy storms. For Montserrat's rebuilding, extraction of beach sediment deposits, largely of volcanic origin has been undertaken at Trant's (Photo 8.8) and Isle's Bay (Photo 8.9), but has now been discontinued at the latter site (C. Gerald (GoM) pers. comm. 2004). It is important that the integrity of these two beaches is maintained and that ongoing turtle monitoring, preferably daily, of these sites ensures that any clutches deposited in "at risk" locations are moved to safety.

Nest predation by feral pigs and dogs is also of concern, but has not yet been documented in detail (J. Jeffers (Montserrat Dept. Fisheries) pers. comm. 2004)**.** It is felt that predation by feral pigs has lowered the suitability of Fox's Bay as a nesting habitat in 2004 and the Department of Agriculture has taken steps to control feral pigs there (C. Gerald (GoM) pers. comm. 2004).

8.5.4. Genetics of nesting turtles

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

For wild green turtles, haplotypes described in **nesting** turtles/hatchlings from the Montserrat have not yet been described. All three degraded samples failed.

For hawksbill turtles haplotypes described in **nesting** turtles/hatchlings from Montserrat have been described from **foraging** grounds in Anguilla, BVI, Cayman Islands, Cuba, Puerto Rico, TCI. These haplotypes have also been described from **nesting** aggregations in Antigua, Barbados, Brazil, Cuba, Puerto Rico, TCI, USVI.

For loggerhead turtles no genetics vouchers were collected.

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. Data will be disseminated as part of the recently funded cross territory Overseas Territories Environment Programme (OTEP) project that will focus on Marine Turtle Conservation, the Environment Charter and Multilateral Environment Agreements.

8.5.5. Nesting overview

Montserrat hosts nesting populations of green and hawksbill turtles with occasional nesting by loggerhead and leatherback turtles likely. Although, according to local perceptions, numbers may be increasing, Montserrat's nesting turtle numbers are at critically low levels and likely to be remnant of once larger populations.

Photo 8.7. Turtle tracks on ash crust (Photo C. Martin).

Photo 8.8. Sand extraction at Trant's Bay (Photo C. Martin).

Recommendations

8.1.2.3. Consider Marine Turtles as part of Planning Policy and Beach Management

Montserrat's nesting marine turtles probably represent remnants of depleted populations and are at critically low levels (see section 8.5). However, the adverse impacts of increased beachfront development on the nesting populations using Montserrat's mainland beaches must be considered in addition to the potential adverse impacts of turtle harvest. Every effort should be made to protect the remaining turtle nesting habitat in Montserrat, and therefore TCOT recommends the following policies:

a) Ensure all development, other than non-permanent structures designed for daytime beach use, is 100m landward of the high tide mark.

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

c) Ensure marine turtles are considered in the current beach sediment extraction projects being carried out in support of Montserrat's reconstruction. Extraction from major nesting beaches should be permanently discontinued.

8.1.3.1. Establish systematic monitoring efforts at index nesting beaches

Establish a sustained programme of morning nesting beach monitoring at index beaches to determine nesting abundance trends and to facilitate genetic analysis of nesting population, through nest excavation and sampling. Ideally, monitored beaches should be visited at minimum 3 times per week to ensure species identification, and surveying should be carried out across the duration of the known nesting season and with constant effort.

***NB.** This programme should preferably engage local interest groups and residents and could eventually be developed, under the guidance of the proposed Biodiversity Working Group, into seasonal, revenue-generating tourist turtle walks in order to raise funds to sustain marine turtle management efforts.*

8.1.4.2. Implement general awareness programmes regarding marine turtle conservation in Montserrat

a) Raise awareness among Montserratians 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 MEAs.

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

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

e) Develop the Montserrat specific turtle educational materials, and expand them to include further curriculum linked, multi-media educational materials where appropriate.

Photo 8.9. Isle's Bay with disruption from extraction (Photo B. Godley).

8.6. Status of Foraging Marine Turtles in Montserrat

8.6.1. Information gathered from literature/fishery records

Adult and juvenile hawksbill and green turtles are found in Montserrat's inshore waters (John 1984; Meylan 1983). Local fishers are encouraged to report any sea turtle (along with their fish catches) to the fisheries authorities (see section 8.6.6 below). In addition, some former turtle fishers now collaborate with authorities on research initiatives (Photo 8.10). The harvest information suggests that a wide size range of green and hawksbill turtles are present year round in Montserrat's waters. Although no loggerhead turtles were officially recorded as captured, TCOT staff did see one relatively fresh carapace, which had been removed from a loggerhead turtle stranded dead in 2000. All other prepared carapaces encountered by TCOT staff were of green and hawksbill turtles. These are the most common species of sea turtles found in the waters elsewhere in the Lesser Antilles, with leatherback and loggerhead turtles tending to be present in comparatively lower numbers (e.g. d'Auvergne & Eckert 1993; Carr *et al.* 1982; Chevalier & Lartiges 2001; Eckert & Honebrink 1992; Eckert *et al*. 1992; Fuller *et al*. 1992; Meylan 1983; Scott & Horrocks 1993; Sybesma 1992).

Species	*<25cm*	*26-50cm*	*51-75cm*	*>76*	*Unknown size*	*Total*	*Site*
Green	0	0	0	0	1	**1**	1
Hawksbill	1	4	1	0	0	**6**	2, 3, 4, 5
Loggerhead	0	0	1	0	1	**2**	6, 7
Leatherback	0	0	0	0	0	**0**	
Unidentified	0	7	0	0	1	**8**	6, 2, 5

Table 8.5. Summary of species and size class of individual turtles observed by divers in Montserrat Jan-Sept 2003. Key to locations: 1Virgin Island, 2Little Bay, 3Porato Hill Reef, 4Rendez-vous Reef, 5Woodlands, 6Carr's Bay; 7Little Bay and Cam Bay.

8.6.2. Information from *Caribbean Turtlewatch*

Data on the in-water abundance of marine turtles were gathered via a series of methods. One of these was *Caribbean Turtlewatch,* a questionnaire designed to be completed by recreational divers/snorkelers. A copy of the form and information package are given in Appendices 2.2-2.4. More detailed methodology is given in the section 2.

There was only one dive operator in Montserrat during the duration of this project (Sea Wolf Diving School). During the period January-September 2003, Sea Wolf Diving School and their clients filled out 36 *Caribbean Turtlewatch* forms, detailing dives and turtle sightings. On 17 of these 36 occasions turtles were observed. One report was made by an independent snorkeler who observed a loggerhead turtle in water. See table 8.5 for summary of results.

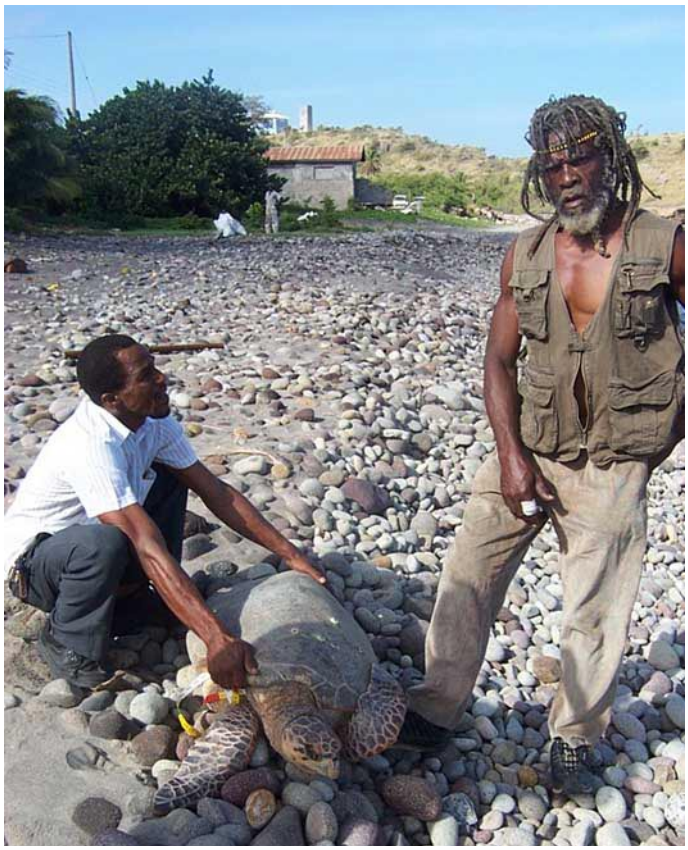

Photo 8.10. Recording of turtle capture with collaborating fisherman (Photo J. Jeffers).

The completed *Caribbean Turtlewatch* surveys have illustrated that green, loggerhead and hawksbill turtles (Photo 8.11) are found in the waters of Montserrat. The latter is the most common species observed by divers. The majority of all turtles observed by divers were of juvenile/ sub-adult size and not thought to be breeding individuals.

Divers were asked: *Did the chance of seeing a turtle influence your decision to choose this particular dive?* Of the 16 individuals that responded, 6 said answered yes, 9 answered no and one was unsure. When asked the questions: *How important was your turtle sighting to the enjoyment of the dive?* Nine individuals responded that the experience was very important, one responded that it was of no importance. These results combined suggest that while many divers do not set out specifically to see turtles, turtles are highly appreciate when seen.

8.6.3. Data from in-water monitoring

Personnel and logistical constraints mean that, at present, no in-water monitoring has been carried out in Montserrat other than the recording of marine turtle capture data (see section 8.7.4 below).

8.6.4. Data derived from the TCOT SEQ

All respondents were asked about perceived changes in abundance of turtles found in OT waters (Q104a-c). Responses of turtle fishers are isolated in Table 8.6 below,

Photo 8.11. Hawksbill turtle, Montserrat (Photo W. Krebs).

while all responses are shown in Table 8.7. Of the 12 former and 3 current turtle fishers, 12 noticed a changed, 1 did not and 2 didn't know. As Table 8.6 shows, most turtle fishers commented on turtles in general, with fewer commenting on green and hawksbill numbers, and only 1 commenting on leatherbacks and loggerheads. In general, most fishers felt that turtles were increasing, in general and by species, for both time periods.

Of the 71 TCOT SEQ respondents, 32 noticed a change overall in in-water abundance, 9 did not, 27 didn't know, and 3 didn't answer the question. As Table 8.7 shows, patterns for the group that noticed changes are similar to those shown by fishers. Most people comment on turtles in general, and believe their abundance has increased. While the same holds true for trends in individual species, the numbers of respondents commenting are lower.

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 increases included: fewer people fishing, increased monitoring, no longer catching during breeding season, fewer people on island, and education. Reasons for decreases included: changing habitat due to volcanic activity, and over-harvest.

8.6.5. Status of marine turtle habitats and in-water threats to marine turtles

Relatively little is known of the current state of Montserrat's marine and coastal habitats with regards to suitability as marine turtle foraging areas. Its coastal shelf is relatively small (140 km^2) and only generalized distributions of primary types are available (Anon 1993; Meylan 1983). Before 1995, coral communities (foraging habitats for hawksbill turtles) were found in small patches interspersed with sand and sediment on the north, south and west coasts (Gell & Watson 2000). The harmful consequences of sediments on coral reef communities and associated organisms have previously been well documented (e.g. Rogers 1990). In Montserrat, volcanic sediments are thought to have had a severe impact on reef growth, particularly in the east and southwest of the island (Gell & Watson 2000). Direct deposits of ash and waterborne sediments have led to some coral bleaching and disintegration of large sponges. Some reef areas, however, are thought to be recovering (W. Krebs. (SeaWolfe) pers. comm. 2003). In recent times, Montserrat had only 3 main sea grass beds, with the largest, 750 ha, being located at the northern tip of the island (Gell & Watson 2000), and the others on the east and west coasts. It is thought that these beds suffered considerable damage from Hurricane Hugo in 1989, although the effect on the foraging habitat for the green turtles is not known.

8.6.6. Genetics

TCOT genetic analyses have shown that the haplotypes of samples from foraging turtles collected in Montserrat have also been described in a number of other nesting sites and foraging areas (see section 10.4.5)**:**

For wild green turtles, haplotypes described in **foraging** turtles in Montserrat have been described in **foraging** aggregations in Anguilla, Bahamas, Barbados, BVI, TCI, USA and West Africa. These haplotypes have also been described from **nesting** aggregations in Costa Rica, Mexico, USA, and Venezuela.

For hawksbill turtles, haplotypes described in **foraging** turtles in Montserrat have been described from **foraging** grounds in Anguilla, BVI, Cayman Islands, Cuba, Puerto Rico, TCI. These haplotypes have also been described from **nesting** aggregations in Anguilla, Antigua, Barbados, Brazil, Cuba, Montserrat, Puerto Rico, TCI, and USVI.

In the last 5 years…

	Increasing	Decreasing	Same	Don't know	NR
Green	4	1	0	0	8
Leatherback	1	0	0	0	11
Loggerhead	1	0	0	0	11
Hawksbill	4	1	0	0	8
General	6	1	0	0	5

Since you can remember…

	Increasing	Decreasing	Same	Don't know	NR
Green	4	1	0	0	7
Leatherback	1	0	0	0	11
Loggerhead	1	0	0	0	11
Hawksbill	4	1	0	0	7
General	5	2	0	0	5

Table 8.6. Perceived change in abundance of turtles in OT waters (in general and by species) in the last 5 years and since you can remember (n=12 fishers who noticed change)

In the last 5 years…

	Increasing	Decreasing	Same	Don't know	NR
Green	19	5	0	2	6
Leatherback	5	1	0	0	26
Loggerhead	2	0	0	0	30
Hawksbill	5	0	0	0	30
General	5	1	0	0	26

Since you can remember…

	Increasing	Decreasing	Same	Don't know	NR
Green	16	8	0	1	7
Leatherback	5	1	0	0	26
Loggerhead	2	0	0	0	30
Hawksbill	2	0	0	0	30
General	5	1	0	0	26

Table 8.7. Perceived change in abundance of turtles in OT waters (in general and by species) in the last five years and since you can remember (n=32 respondents who noticed change).

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. Data will be disseminated as part of a cross-territory FCO Overseas Territories Environment Programme (OTEP) –funded project that will focus on turtle Conservation, the Environment Charter and Multilateral Environment Agreements.

8.6.7. Summary

Foraging populations of green and hawksbill turtles are found in Montserrat's inshore waters, but are of unknown magnitude. Smaller numbers of loggerheads are also likely to be present.

Recommendations

8.1.3.2. Establish a systematic inwater monitoring programme

In the first instance this would assess species composition and distribution, highlighting key areas of abundance. Building upon this, effort related surveying should be carried out to allow trends in abundance to be assessed, and sampling for genetic profiling should be undertaken.

NB. *Under the guidance of the Biodiversity Working Group, steps should be taken to encourage the involvement of interested local fishers in all monitoring programmes (e.g. CPUE monitoring), and financial incentives should be considered so long as they fit within the remit of a sustainable programme.*

8.1.2.2. Establish Marine Protected Areas

Montserrat does not currently have any marine protected areas. It is advised that, based on holistic assessment of the marine biodiversity of Montserrat, key areas be set aside for protection.

8.1.2.3. Consider Marine Turtles as part of Planning Policy and Beach Management

Montserrat's nesting marine turtles probably represent remnants of depleted populations and are at critically low levels (see section 8.5). However, the adverse impacts of increased beachfront development on the nesting populations using Montserrat's mainland beaches must be considered in addition to the potential adverse impacts of turtle harvest. Every effort should be made to protect the remaining turtle nesting habitat in Montserrat, and therefore TCOT recommends the following policies:

a) Ensure all development, other than non-permanent structures designed for daytime beach use, is 100m landward of the high tide mark.

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

c) Ensure marine turtles are considered in the current beach sediment extraction projects being carried out in support of Montserrat's reconstruction. Extraction from major nesting beaches should be permanently discontinued.

8.1.2.4. MEA legislation recommendations

The Endangered Animals and Plants Ordinance, 1976, should be amended to prohibit commercial import and export of turtles and all products of wild marine turtle species, so that this legislation fully transposes CITES to domestic law.

8.7. Direct Use of Marine Turtles in Montserrat

8.7.1. Overview

The main domestic legislation that covers marine turtle exploitation in Montserrat is the Turtles Ordinance Cap. 112 1951 (Appendix 3.5). This states that nesting females and eggs can be harvested, possessed, bought and sold from October through to May inclusive. Although there are no quotas or species restrictions, turtles captured must weigh at least 20lbs (9.07kg). In 2002, the Government of Montserrat produced a document entitled 'Turtle Act 2002' (Appendix 3.5) that has yet to be gazetted. This Act, if passed as law, will prohibit the harvest of nesting females, the harvest, sale, purchase and possession of turtle eggs, and will restrict the open season for turtle harvest to the months of December, January and February. The Act would also increase the minimum size limit of harvested turtles to 50 lbs (22.68kg). Data on use of marine turtles were gathered by combining published information, data provided by project partners, and the data gathered using the TCOT Socioeconomic Questionnaire or SEQ (See Section 2; Appendix 2.1). In Montserrat, 71 questionnaires were completed and a breakdown of information gathered on marine turtle exploitation is digested in Table 8.8.

8.7.2. Harvests of adults on the nesting beaches

Fisheries Officers responsible for nesting beach monitoring believe that the take of turtles from nesting beaches is ongoing, although at a very low, highly opportunistic, level (1-2 turtles per year; J. Jeffers (Montserrat Dept. Fisheries) 2004). Indeed under the current legislation, such take is not illegal during periods when it might be possible to encounter them on the nesting beach, e.g. in October or May. This low level of take was confirmed by interviewees during the TCOT SEQ survey; only 1 respondent reported formerly collecting female turtles (until 15 years ago), preferring hawksbill turtles, with green turtles as second choice. The interviewee also formerly fished for turtles. His views on changes in abundance were contradictory; for one question, he stated there had been a general decline in marine turtles since he had stopped fishing in the early 1990s, as a result of over-fishing. However, on a later question, he suggested that turtle populations had increased in both the short and long term, because there are fewer fishers.

8.7.3. Harvest of eggs

As with capture of adult females, egg take is not illegal at some times of the year. Egg take continues at a low level, with eggs reputed to have aphrodisiac properties, although

Measures of direct exploitation	Past	Present	Never	NR or NA
By life stage				
Females on beaches	1	0	-	-
Eggs from beach	6	1	-	-
Turtles in water (intentional)	12	3	-	-
Turtles in water (incidental)	11	-	-	-
By product				
Meat				
Fishers who sell meat	12	1	-	-
Meat vendors	2	0	-	25
Meat consumers	32	16	-	20
Eggs				
Collectors who sell eggs	0	0	-	-
Egg vendors consumers	0	0	-	-
Egg consumers	14	1	-	-
Non-edible				
Fishers who sell shells	10	1	-	-
Shell vendors	0	0	-	-
Shell consumers	16	0	-	-
Measures of indirect exploitation				
Turtles indirectly used in business	7			
Total interviews	**71**			

Table 8.8. Numbers of users of marine turtles (consumptive and non-consumptive) in the past and present. Key: NR - No Response; NA - Not Applicable.

none of the egg consumers report using eggs for this reason (most report that they fry them with spices and flour for food). Buley (2001) reported that officials estimated the take to be 5-10 nests per year, taken illegally during the peak of the season. It is widely known within the society that there are a few individuals who illegally take eggs. Of the 2 individuals suggested by other interviewees as those who regularly take eggs, 1 refused to be interviewed, but the other freely admitted to taking eggs (and specified that he did so during summer months) and granted an interview.

Six former egg collectors were interviewed for the TCOT SEQ. Reasons collectors stopped included lack of interest (2), lack of opportunity (1), and in respect of the law (1). Three of the respondents stated they stopped collecting eggs more than 20 years before the survey. Of the 6, 2 collected hawksbill eggs, 1 collected green turtle eggs, and 1 didn't distinguish between species. One respondent gave his preference as hawksbills and the other 5 did not answer. None of the 6 had previously sold their eggs. The 1 current collector noted that he has not collected eggs since 2000. He collects eggs opportunistically when he sees them, rather than searching for them. He does not distinguish between species or sell eggs taken. Contrary to existing law, the interviewee reported collecting eggs in the summer months. It appears, therefore, that egg harvest does indeed carry on at a low level, but that it is not a major economic activity.

8.7.4. Harvests of turtles at sea

Rebel (1974) states that the turtle fishing industry in Montserrat is irregular, with fisheries statistics suggesting 12 nets were used in the northern district and 4 in Plymouth in 1948. A figure of 70 turtles landed at Plymouth in 1948 is given. John (1984) reported the catch of hawksbill and green turtles using spear guns and nets at Plymouth, Carr's Bay, Bunkum Bay, Sugar Bay and Farm Bay, with meat/shell/shell products being sold locally, often at Plymouth market on a Saturday.

As part of the TCOT SEQ, we interviewed 12 former turtle fishers (5 intentional, 2 opportunistic and 5 opportunistic/intentional). Greens and hawksbills were caught both intentionally and opportunistically by most fishers, and 1 fisher reported catching loggerheads. When asked what species they preferred to catch, 7 fishers preferred green turtles, 2 preferred hawksbills, 2 had no preference and 1 did not answer. None of the respondents recorded catching leatherback turtles. Methods were mostly the same for capturing greens and hawksbills, with most fishers using and spear guns (n=7) and a few using nets (n=2). One fisher reported capturing hawksbill turtles by hand.

Eleven of the 12 former fishers provided data on the magnitude of capture, either for specific species or for turtles in general. The highest number reported by any fisher was 64 (green) turtles per year, and the lowest was 1 (species unspecified). The total number of turtles caught by the 11 fishers is estimated at 224 per annum. Green turtles appear to have been the more important species, with an average of 22 turtles caught per year by 7 fishers. The average number of hawksbills caught was 3 by 4 four fishers. For turtles in general, the average caught was 6 by 7 fishers. One fisher reported catching 4 loggerheads per year.

Some fishers provided average sizes for turtles caught. For green turtles, reported sizes ranged from 100 to 450 lbs. The average of size was 276 lbs. For hawksbills, reported sizes ranged from 80 to 225 lbs, and the average size was 145 lbs. The one fisher who caught loggerheads reported a minimum size of 200 lbs and a maximum size of 300 lbs. All fishers identified October – May as the season they fished turtles. All 12 of the former turtle fishers reported selling some part of their catch. Meat, whole shell, and shell pieces were items most commonly sold. Turtle products were sold to markets (n=8), sold on streets (n=4), at the fish landing site (n=4), directly to people (n=3), and to restaurants (n=2). Of these former turtle fishers, the following were cited as reasons for cessation: job change (n=3); lack of opportunity (n=3); conservation (n=2); retirement (n=2), lack of time (n=1), lack of interest (n=1).

In spite of the seemingly low overall catch rates, the economic importance of turtles to former fishers varied: 1 ranked turtles as very important, 9 as somewhat important, and 2 as not important.

We also interviewed three current turtle fishers (2 opportunistic and 1 intentional/opportunistic). Two of these stated a preference for green turtles, and all 3 use spearguns. Rates of capture are very low (1, 2.5 and 5 turtles per season) and only one fisher provided an estimate of economic importance, who ranked turtle fishing as not important (the other two didn't answer). Only one fisher sells the meat, at a price of $5EC per lb, directly to the consumer. We suspect some fishers are selling meat to restaurants, as 1 and possibly 2 restaurants occasionally sell dishes containing turtle meat (one restaurant owner reputed to sell turtle meat refused to be interviewed). This retail seems to be on an *ad hoc*, occasional basis and very much for local consumption.

For the period 1993 to 2003, the harvest of only 10 individual turtles were declared to the Fisheries Department (Figure 8.4.), hence a mean of 0.9 harvest per year (±1.22SD, range = 0–4). All captures took place during the open season (October-May). One green turtle (9.1 kg) and seven hawksbill turtles (13.6 kg, 18.1 kg, 29.5 kg, 45.4 kg, 45.4 kg, 63.1 kg, 90.9 kg; mean mass (kg) = 43.7 ±26.9SD) were declared to the authorities. There were two declared captures for which the species was not recorded. Using a published regression equation between mass and CCL for Hawksbill turtles ($Log_{10}(mass) = 2.8966 \times Log_{10}(CCL) - 3.8534$, with mass in kg and CCL in cm, Limpus *et al*. 1983), the masses of nesting hawksbill turtles that were measured in Montserrat were estimated to range from 43.9 to 94.8 kg. When compared to the masses of harvested turtles, it appeared that 4 out of the 7 harvested hawksbill turtles declared to authorities could have been adult turtles.

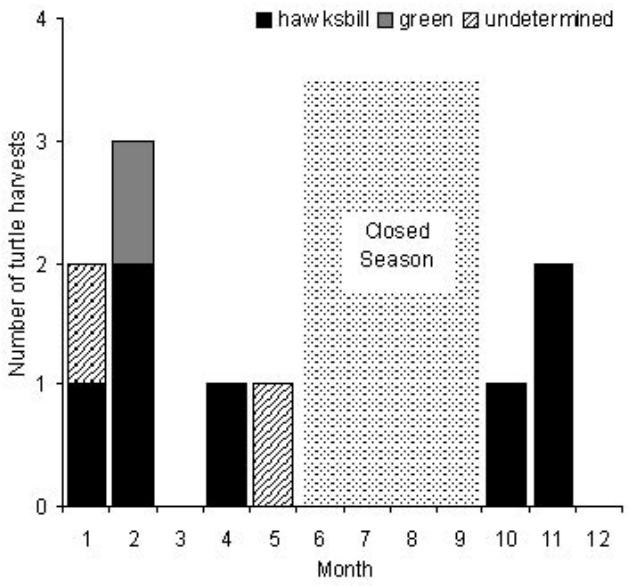

Figure 8.4. The temporal distribution of reports of turtle captures (1993-2003; N = 10 turtles). Highlighted are the closed season and the seasonal profile of nesting as recorded by the data in this study.

It is thought that the turtle fishery has declined significantly in magnitude since the extensive emigration from the island in recent years. Superimposed upon these patterns may be one of decreasing demand from some consumers (although all but 1 meat consumer interviewed as part of the TCOT survey believed that availability of turtle meat had decreased in the past 5 years and since they can remember, i.e. less turtles are being caught, butchered and sold rather than a decrease in demand). Only 10 turtles were declared to the fishing authorities for the period 1993 to 2003. Popular accounts, and the TCOT SEQ results, suggest that it is likely that this low total is the result of significant under-reporting and that clandestine harvest is carried out during the closed season. Fishers are said to avoid declaring their catch to the authorities by butchering turtle carcasses at sea, both in and outside the open season. Of great concern, as evidenced by the temporal distribution of declared turtle capture records and the fact that potential breeding adults are being captured, is that the open season for the turtle fishery overlaps significantly with the nesting season. We estimate that the total catch is likely to be 10-30 animals per year.

Of the 71 respondents surveyed, 37 formerly consumed and 16 currently consume marine turtle products. Of the former consumers, 12 stopped due to lack of availability, 7 because of conservation reasons, 5 because they had no interest, 3 because they stopped fishing, and 1 because of religion. Three didn't answer the question and 4 provided unspecific reasons, stating only that they had eaten meat 'a long time ago.' Those that stated preferences preferred green (n=5) and hawksbill meat (n=1).

Of the 16 current consumers, the only stated preference was for green turtle meat (n=4). Four current consumers purchase meat (and reported doing so during the season), while 7 do not purchase (5 provided no answer). Those that don't purchase meat either get it as a gift or catch it themselves. The cost of purchase (provided by the 3 respondents who answered this question) was EC$5/lb, i.e. the same price fishers report selling it. Consumption is infrequent for most current consumers; 7 respondents consume meat once a year, 5 less than once a year, 2 on a monthly basis, and 1 on a weekly basis.

8.7.5. Trade in shells and shell products

Although polished turtle shells and worked items were once for sale in Montserrat (and 10 former sellers of shell/curios were interviewed), we could not find any such products for sale during TCOT field visits, although examples were shown by local people (Photo 8.12). Only 2 artisans once involved in the turtle shell industry could be traced, 1 was interviewed and another refused. Neither makes turtle shell products any longer as there is no local demand. Indeed one shell was found discarded in a garden (Photo 8.13). Others involved in this industry appear to have emigrated from Montserrat as a result of the volcanic crisis.

8.7.6. Incidental catch in marine fisheries

The commercial fishery sector in Montserrat is quite small and no detailed profile has been carried out since the upheavals of the volcanic crisis. There are currently approximately 60 fishers using 33 small artisanal boats (M. O'Garro (Montserrat Dept. Fisheries) 2004). There are no legal industrialised vessels in Montserratian waters, but charges of illegal fishing in Montserrat's territorial waters have been levelled at USA long-liners, and Anguillan authorities have seized Taiwanese vessels that illegally set long-lines in nearby Anguillan waters (Weidner *et al*. 2001).

Eleven out of the 30 fishers surveyed reported accidentally catching turtles when fishing for something else. Of those, 7 told us what they did with accidentally captured turtles,

Photo 8.12. Johnique Fenton with decorated turtle carapace as was once produced in Montserrat (Photo C. Martin).

and most of these identified multiple actions, depending on the state of the turtle and the season. While 3 fishers would always release a turtle (1 for conservation reasons, 1 for religious reasons, and 1 with no reasons provided), the other 4 stated they would release them during closed season, but keep (to sell, use or gift) them during the open season, depending on the state of the turtle. All 11 fishers provided vague estimates of numbers of turtles caught, most of which were low. The highest number reported was 3-4 turtles per year, while the lowest was 1 in a lifetime (other responses included 'a few times in my life', 'once in a while', etc.). Methodologies likely to interact were given as gillnets (n=5), seines (n=2), fish traps (n=2), garnets (n=1). Of the 30 fishers surveyed, 21 believed that other fishers accidentally caught turtles. The fate of these turtles was described in similar terms, i.e. turtles would be released during closed season, but kept (for use, sale, and gift) during the open season (depending on the state of the turtle).

Turtle fishers were asked for their views on potential fisheries management options, and the results are shown in Table 8.9. As this table shows, there is wide support for particular types of regulations (on species caught, fishing gear, size limits and seasons). There is less support for geographic restrictions on fishing. The result re: support for size limits should be treated with caution, as no size limit (maximum or minimum) was stated. As the fishery currently has a minimum size limit, fishers may be confirming their support for this, rather than for size limits in general (i.e. they may resist a change to maximum size limits). Whatever the policies adopted, fishers see themselves and government authorities as central to policy making.

8.7.7. Summary

Based on the data gathered, direct extraction of eggs and adults from the nesting beaches appears to be minimal, and undertaken mostly for consumption. Levels of extraction at sea are also low; although most former turtle fishers did sell their products, they estimated value of this to their overall activities as somewhat or not important. Current commerce in marine turtle meat exists, but we only interviewed 1 current fisher who reported selling it. Turtle meat is the only product consumed and consumers have noticed a decrease in availability over time.

Recommendations

8.1.2.2. Establish Marine Protected Areas

Montserrat does not currently have any marine protected areas. It is advised that, based on holistic assessment of the marine biodiversity of Montserrat, key areas be set aside for protection.

8.1.2.4. MEA legislation recommendations

*The **Endangered Animals and Plants Ordinance, 1976**, should be amended to prohibit commercial import and export of all wild marine turtle species and their products, so that this legislation fully transposes CITES to domestic law.*

Recommendations

8.1.2.1. Revise Turtle Ordinance Cap 112 1951

We recommend the following based on the draft revisions drawn up by the GoM as the "Turtle Act 2002" (not yet gazetted). It should be noted however, that additional ammendments to the "Turtle Act 2002" are needed:

i) Ensure permanent and complete prohibition of the harvest of nesting female turtles and turtle eggs.

ii) Ensure a closed season from the 1st of March to the 30th of November inclusive, to be reviewed every 5 years (to facilitate legislative adaptation to possible nesting season shift caused by climate change).

iii) Ensure permanent and complete prohibition of harvest of any large, reproductively valuable turtles by instigating a maximum size limit. A suggested maximum would 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.

iv) 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 that should be stipulated in any amended legislation.

v) Establish a limited turtle fishing licensing scheme, whereby especially licensed turtle fishers agree to abide by strict regulations regarding fishery practice, limited quotas and catch recording, including compulsory reporting to, and catch biometric measurement/sampling by, the Government of Montserrat of all turtles caught in advance of slaughter. Quotas should be reactive and based on number of licensed turtle fishers and stock assessments established through the monitoring regimes.

vi) Ensure permanent and complete prohibition of all turtle capture methods except hand capture and use of turtle nets, with strict specifications for legal net structure and use.

vii) Ensure prohibition of the harvest of loggerhead and leatherback turtles.

***NB.** Any continuing turtle fishery must be accompanied with systematic monitoring regimes as described below, along with a programme to monitor Catch per Unit Effort of licensed fishers, and biometrics of turtle catch, which should also be implemented by the GoM. Fisheries regulations should be revised to provide statutory powers to react to the ongoing results of the abundance trend monitoring programmes. In the event of declining abundance trends or declining Catch per Unit Effort below pre-established thresholds, the GoM must have the power to temporarily or permanently close the turtle fishery.*

a	**There should be regulations for which species of turtle can be caught**				
	yes	no opinion	no	not app	nr
n	10	1	0	3	1
%	67	7	0	20	7
b	**There should be regulations for the type of fishing gear and methods that can be used to catch turtles**				
	yes	no opinion	no	not app	nr
n	9	2	1	2	1
%	60	13	7	13	7
c	**There should be regulations for the number of turtles that can be caught**				
	yes	no opinion	no	not app	nr
n	2	4	5	3	1
%	13	27	33	20	7
d	**There should be size limits for turtles caught**				
	yes	no opinion	no	not app	nr
n	8	4	1	2	0
%	53	27	7	13	0
e	**Open and closed zones should be set for turtle fishing**				
n	yes	no opinion	no	not app	nr
%	1	6	5	2	1
	7	40	33	13	7
f	**Open and closed seasons should be set for turtle fishing**				
n	yes	no opinion	no	not app	nr
%	11	1	0	2	1
	73	7	0	13	7
g	**Who should be involved in the setting regulations (multiple responses allowed)**				
	fishers	gov't authorities	experts	police	community
n	11	10	2	1	1
%	73	67	13	7	7

Table 8.9. Turtle fishers' views of turtle fisheries management options. Key nr - no response; not app - not applicable.

8.8. Indirect Use of Marine Turtles in Montserrat

8.8.1. Turtle watching on beaches

There is no organised turtle-watching, although several individuals do visit the beaches regularly in the hope of sighting turtles. Within the very small tourist sector in Montserrat, TCOT surveys revealed some awareness that, despite the relatively small local populations of foraging and nesting turtles, turtle-watching offered one more tangible attraction for the type of tourists most likely to come to post-eruption Montserrat. There was widespread interest for informational materials and the Government of Montserrat has begun the process of producing a video on the Marine Turtles of Montserrat. The main obstacle to setting up a turtle-watching initiative is that the low levels of nesting might seed high levels of disappointment during all but the peak season

Given the number of nesting turtles, and the possible restrictions on beach access, tourist participation in viewing nesting turtles is likely to proceed in an informal fashion. Information on correct behaviour around nesting turtles should nevertheless be publicized and distributed in the tourism sector, and tourists can be engaged in monitoring and reporting of sea turtle nesting activity.

8.8.2. Dive tourism/snorkel tours

The reefs around Montserrat are thought to be in relatively good condition (W. Krebs (SeaWolfe) pers. comm. 2004), but until recently there has been only 1 dive operator working on a part-time basis (SeaWolfe). This operator recently put the business up for sale and others on the island have expressed an interest in setting up operations. Turtles are found in Montserrat's waters at low densities, but undoubtedly contribute to the dive experience. There is 1 dive operator who will occasionally run snorkel tours if required, and turtles are occasionally sighted.

8.8.3. Aquaria holding captive turtles

There are no aquaria holding turtles in Montserrat.

8.8.4. Other marketing uses

Turtle themed curios made from non-turtle materials outside Montserrat are to be found for sale in souvenir shops, but turtles do not feature prominently as a logo other than their presence on Eastern Caribbean currency notes.

8.9. Attitudes to Conservation

TCOT SEQ sought to assess overall attitudes towards conservation of marine turtles, and options for marine

Photo 8.13. Discarded turtle carapace from garden of interviewee (Photo C. Martin).

Photo 8.14. John Jeffers giving Montserrat presentation at TCOT workshop (Photo S. Ranger).

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 are have been circulated to TCOT partners, basic results are summarized here. The most common response is cited. In general, most respondents agreed that:

- It is important that sea turtles exist in the wild in the future (87%)
- As turtles are migratory, they should be managed in cooperation with neighbouring states (82%)
- Turtles play and important ecological role in our natural environment (82%)
- The government needs to actively work to protect sea turtles (76%)
- Turtles should be protected, regardless of their use to humans (72%)
- Local people should be allowed to purchase sea turtle meat (66%)
- Local people should be allowed to catch and eat sea turtles, provided it doesn't harm the regional population (63%)
- Existing laws protecting marine turtles are effectively enforced (56%)
- Some income form tourism should be used to support sea turtle conservation efforts (55%)
- Turtles should be used both as tourist attractions and as a source of food (55%)
- Turtles are culturally valuable in this OT (54%)
- Turtles should be used as a tourist attraction rather than as a source of food (49%)
- Tourists should be allowed to purchase sea turtle meat (46%)
- Tourists should be allowed to purchase sea turtle shell and take it home with them (41%)

Close to an equal number of respondents agreed and disagreed with the following statement:

- Government needs to do more to ensure that existing laws regarding marine turtles are effectively enforced (38% agree, 32% disagree)

Most respondents disagreed with the following statements:

- Turtle fishing should be unregulated (62%)
- Turtles are economically valuable in this OT (62%)
- Turtle fishing should be stopped completely (55%)
- Turtle fishing should be stopped until more information is known on the size and health of the populations (44%)

The results above suggest that there is most agreement among respondents on general conservation statements, i.e. it is important that sea turtles exist in the wild in the future. There is also considerable support for local capture, consumption, and sale of sea turtle meat, and for regulation of the turtle fishery. There is less strong support for tourists consuming marine turtle products.

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, though their support (or lack there of) if often stronger. There are only 2 questions for which the majority of fishers feel differently:

- Some income from tourism should be used to support sea turtle conservation efforts (73% of turtle fishers had no opinion)
- Government needs to do more to ensure that existing laws regarding marine turtles are effectively enforced (40% had no opinion, 40% disagreed)

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 Montserrat population.

Recommendations

8.1.4.2. Implement general awareness programmes regarding marine turtle conservation in Montserrat

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

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

e) Develop the Montserrat specific turtle educational materials, and expand them to include further curriculum linked, multi-media educational materials where appropriate.

8.10. Capacity Building and Outreach During TCOT

8.10.1. Capacity building

Mr John Jeffers (J.J.) of Department of Fisheries took part in the TCOT training workshop in Grand Cayman in August 2002 (Photos 8.14 and 8.15), but unfortunately no representative was available to attend the training course in Bermuda in August 2003 (the spare place was allocated instead to BVI). Montserrat partners were subject to all the generic TCOT assistance (see Section 11), but communications were at times difficult as local partners typically had poor online access and J.J. had no direct access to e-mail. The personnel deficit for turtle work in Montserrat was dealt with in three ways: 1. At the request of local partners, Dr. Corinne Martin spent one month on Montserrat, allowing an intensive marine turtle nesting survey to be undertaken as well as the execution of the socioeconomic questionnaire. 2. TCOT awareness raising events were used as a catalyst to mobilise volunteers from the local community. 3. A limited proportion of the TCOT travel and subsistence budget was used to pay local student volunteers to help with beach monitoring.

8.10.2. Outreach activities

Montserrat has been part of the generic dissemination outputs of the TCOT project (see section 12), but in collaboration with project partners we were particularly successful in attaining media items. This was particularly true of the multi-taxon awareness raising week organised by RSPB in June 2002. As part of this week, some 30 local people who had not previously observed turtle nesting

Photo 8.15. Taking part in inwater monitoring session (Photo S. Ranger).

Photo 8.16. Biodiversity people with Montserrat schoolchildren.

participated in an interpreted turtle walk and witnessed the nesting of a hawksbill turtle. A number of community and school groups (Photo 8.16) met with a range of biodiversity professionals, local and overseas, to discuss the importance of Montserrat's biodiversity and a modest display was created, which now forms part of the exhibits in Montserrat National Trust (Photo 8.17).

Recommendations

8.1.1.1. Increase the capacity of the Government of Montserrat

a) Ensure GoM has the capacity, staff and resources to carry out enforcement and monitoring duties relevant to marine turtle management, including data collection, entry, management and analysis for turtle monitoring programmes.

b) Ensure that key staff in GoM have the skills to apply for external funding to support biodiversity related projects.

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

d) Ensure that adequate expertise is in place to allow for the process of legislative review.

8.1.1.2. Increase the capacity of the Montserrat National Trust

As part of a general increase in staffing and resources of the Montserrat National Trust, one of the urgent needs is for a project officer who can lead outreach campaigns, and support/ liaise with the many international organisations currently involved in biodiversity work in Montserrat. This officer's duties should include coordinating these various efforts, whether they involve provision of funds, staff, equipment, training or advice.

8.1.1.3. Establish a multi-stakeholder biodiversity management process

Identify and establish a Biodiversity Working Group to include representatives of all interest groups and stakeholders (e.g. government agencies and departments including Planning and Tourism; NGO's; hoteliers; dive operators; construction industry representatives; fishers; schools and specially-interested members of the public). The working group should meet regularly to discuss, decide and advise government on biodiversity management issues working to implement Montserrat's Environment Charter, marine turtles being one key subject areas. With regard to marine turtles, particular attention should be paid to direct and indirect fishery interactions, habitat protection, exploring possibilities for sourcing funding, further research/population monitoring, as well as investigating potential economic benefits of marine turtle conservation, and should seek external advice from appropriate experts. There may be a need to provide support for participation by some sectors (i.e. cover travel costs to meetings). In other OT's it has been recommended that a specific group be assembled for marine turtles, but it is felt that, at this stage, a single focus group is more likely to succeed and make significant inroads, given limited resources on Montserrat.

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 8.17. Turtle display at Montserrat National Trust (Photo B. Godley).

8.11. Acknowledgements

The TCOT staff would like to thanks the staff of the Montserrat Fisheries Department, Montserrat Governors Office, Montserrat Ministry of Agriculture, Montserrat National Trust, Montserrat Volcano Observatory, Royal Society for the Protection of Birds, Sea Wolf Diving School, and the following individuals: Crystal & Dean Archer, Mrs Hilda Blake, Helen & Gerard Cooper, Bo Dalsgaard, Mr & Mrs Darby, Alfred Edwards, Lexvern Fenton, Anne-Marie & David Graham, Gerard Gray, Linda Green, John Jeffers, John Keller, Mr & Mrs Krebs, Steve Macnamara, Melissa O'Garro, Geoff Patton, Joe Philips, Sarah Sweeney , Mr & Mrs Walker. The TCOT SEQ was largely administered by Corinne Martin. James Abbott, Liz English, Andrew Kesteloot, Zoë Meletis, and Jennifer Silver all assisted with TCOT SEQ under the supervision of Lisa Campbell. We thank the following for constructive reviews of an earlier version of this manuscript: Eudora Fergus, Vin Fleming, Claude Gerald, John Jeffers, Jean Kelsick, Wolfe Krebs, Corinne Martin, Mike Pienkowski.

8.12. References

Anonymous, 1993. Environmental Profile, An Assessment of the Critical Environmental Issues Facing Montserrat with an Action Agenda for the Future. United Nation Development Program (UNDP), Project No. MOT/92/002/A/01/99

Auvergne d' C. Eckert KL (1993) WIDECAST Sea turtle Recovery Action Plan for St Lucia, CEP Technical Report n°26. In: UNEP Caribbean Environment Programme: 1-70 (K. L. Eckert, Ed.). Kingston, Jamaica

Blankenship JR (1990) The wildlife of Montserrat (including an annotated bird list for the island). Montserrat National Trust, Montserrat, West Indies

Buley KR (2001) Montserrat mountain chicken population and habitat assessment and a preliminary assessment of the other herpetofauna of Montserrat. Herpetology Department, Durrell Wildlife Conservation Trust. 26pp

Carr A, Meylan AB, Mortimer J, Bjorndal KA, Carr T (1982) Survey of sea turtle populations and habitats in the Western Atlantic. NOAA Technical Memorandum NMFS-SEFC 91

Chevalier J, Lartiges A (2001) Les Tortues Marine des Antilles, Etude Bibliographique. Office National de la Chasse et de la Faune Sauvage, CNERA Faune d'Outre Mer

Corliss LA, Richardson JI, Ryder C, Bell R (1989) The hawksbills of Jumby Bay, Antigua, West Indies. In: (Eckert SA, Eckert KL, Richardson TH (eds) Proceedings of the Ninth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Tech. Memo. NMFS-SEFC-232. U. S. Department of Commerce pp.33-35

Eckert KL, Overing JA, Lettsome BB (1992) WIDECAST Sea turtle Recovery Action Plan for British Virgin Islands, CEP Technical Report n°15. In: Eckert, KL. UNEP Caribbean Environment Programme: 1-116 Kingston, Jamaica

Eckert KL, Honebrink TD (1992) WIDECAST Sea turtle Recovery Action Plan for St Kitts and Nevis, CEP Technical Report n°17. In: Eckert KL (ed) UNEP Caribbean Environment Programme: 1-92. Kingston, Jamaica

Fuller JE, Eckert KL, Richardson JI, (1992) WIDECAST Sea turtle Recovery Action Plan for Antigua and Barbuda, CEP Technical Report n°16. In: Eckert KL (ed) UNEP Caribbean Environment Programme: 1-88 Kingston, Jamaica

Gell F, Watson M (2000) UK Overseas Territories in the Northeast Caribbean: Anguilla, British Virgin Islands, Montserrat. In: Sea at the Millennium: an Environmental Evaluation (C. Sheppard, Ed.). Pergamon, Elsevier Science Ltd, United Kingdom

Groombridge B, Luxmoore R (1989) The green turtle and hawksbill (Reptilia: Cheloniidae) world status, exploitation and trade. Lausanne, CITES

Hirth HF (1997) Synopsis of the biological data on the Green turtle *Chelonia mydas* (Linnaeus 1758). Biological Report 97(1), Fish and Wildlife Services, U.S. Department of Interior

John CT (1984) The national report for the country of Montserrat. In: Bacon P, Berry F, Bjorndal K, Hirth H, Ogren L, Weber M (Eds.). Proceedings of the Western Atlantic Turtle Symposium: 3.332-3.328, volume 3, appendix 7, the national reports University of Miami Press: Miami.

Limpus CJ, Miller JD, Baker V, McLachlan E (1983) The Hawksbill turtle, *Eretmochelys imbricata* (L.), in the North-Eastern Australia: the Campbell Island Rookery. Australian Wildlife Research, 10, 185-197

Meylan AB (1983) Marine turtles of the Leeward Islands, Lesser Antilles. Atoll Research Bulletin, 278: 1-43

Pritchard PCH, Mortimer JA (1999) Taxonomy, External Morphology, and Species Identification. In: Eckert KL, Bjorndal KA, Abreu-Grobois FA, Donnelly M (eds.) Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4

Proctor, D., Fleming, L.V. 1999. Biodiversity in the Overseas Territories. Peterborough, JNCC.

Rebel, T.P. 1974. *Sea* turtles and the turtle industry of the West Indies, Florida, and the Gulf of Mexico. University of Miami Press, Coral Gables FL. 250pp

Rogers C (1990) Responses of coral reefs and reef organisms to sedimentation. Marine Ecology Progress Series 62: 185-202

Scott N, Horrocks JA (1993) WIDECAST Sea turtle Recovery Action Plan for St. Vincent and the Grenadines, CEP Technical Report No. 27. In: UNEP Caribbean Environment Programme: 1-80 (K. L. Eckert, Ed.). Kingston, Jamaica

Steadman DW, Watters DR, Reitz EJ, Pregill GK (1984) Vertebrates from archaeological sites on Montserrat, West Indies. Annals of the Carnegie Museum 53: 1-29

Sybesma J (1992) WIDECAST Sea turtle Recovery Action Plan for the Netherlands Antilles, CEP Technical Report No 11. In: UNEP Caribbean Environment Programme: 1-63 (K. L. Eckert, Ed.). Kingston, Jamaica

Weidner DM, Guillermo EL, Folsom WB, Serrano J (2001) “Caribbean Islands”, Part B, Sections 1-4 in “Latin America”, World Swordfisheries: An Analysis of Swordfish Fisheries, Market Trends, and Trade Patterns, Vol. IV, NMFS: Silver Spring, Maryland