

SECTION 5: THREATS AND RECOMMENDED MANAGEMENT

In an evaluation of the status of the Ascension Island green turtles, Mortimer (1992) listed the following problems:

- 1) Sand mining
- 2) Artificial lighting
- 3) Disturbance by turtle watchers
- 4) Impact of beach huts
- 5) Predation by feral cats

The *Ascension Island Management Plan* (Pickup 1999) lists the following as essential work required to protect marine turtles on Ascension Island;

- 1) Control of invasive vegetation on nesting beaches
- 2) Monitoring of turtle breeding populations
- 3) Establishment of a conservation officer.

The following were classified by Pickup (1999) as of medium priority:

- 4) Restriction on mining of beach sand
- 5) Control of light pollution
- 6) Control of human recreational disturbance
- 7) Eradication of feral cats and control of pet cats
- 8) Continuation of ban on harvest of turtle products

We give an account of all threats and recommended solutions below. This is an exhaustive account given in a systematic manner. Prioritisation as to the most important aspects is given in *Section 1: Executive Summary and General Recommendations*.

5.1 General Habitat Degradation

5.1.1. Mining of Beach Sand

5.1.2. Light Pollution

5.1.3 Threat of Fuel Spill

5.1.4 Construction of Roads

5.2. Threats to Turtles on the Nesting Beach

5.2.1. Stranded Females

5.2.2. Disturbance to Nesting Females

5.2.3 Litter on Nesting Beaches

5.3. Threats to Eggs/Nests

5.3.1. Invasive Vegetation

5.3.2. Increasing Temperatures

5.3.3. Erosion/Inundation by the Sea

5.3.4. Nesting Activities of other Females

5.4. Threats to Hatchlings

5.4.1. Light Pollution

5.4.2. Predation by Cats and Dogs

5.4.3. Predation by Frigatebirds

5.4.4. Predation by Land Crabs

5.4.5. Predation by Fish

5.5. Threats to Adult Turtles in Nearshore Waters

5.5.1. Boating Activity In Clarence Bay

5.6. Threats to Turtles on the High Seas

5.7. Threats to Turtles at the Feeding Grounds

5.1 GENERAL HABITAT DEGRADATION

5.1.1. Mining of Beach Sand

In the past, large amounts of sand have been removed from nesting beaches on Ascension for construction work (Fletemeyer 1986; Mortimer 1986; Mortimer 1992). Although natural cyclical erosion and accretion occurs on the nesting beaches with sand being eroded from one area and deposited in another, it is likely that most of the sediments remain in a limited local “pool”. Removal of sand results in a net loss of sand from the island and at critical levels of loss will undoubtedly result in detrimental effects to turtle reproductive efforts (Shabica 1982). As beaches become narrower, turtles effectively lay closer to the sea putting nests at greater risk of inundation (See **section 5.3.3**). Moreover, as the beach platform is lowered by sand mining the eggs are more susceptible to being drowned in standing water, because they are closer to the level at which water ‘pools’ during periods of heavy ‘roller’ activity. As they become less sandy, beaches may be unable to support nesting or be more likely to have turtles stranded on uncovered rocky outcrops (See **section 5.2.1**). Anecdotal accounts of island residents suggest that the removal of large quantities of sand from Long Beach has resulted in a permanent narrowing and lowering of the beach platform.

Recommendations

- Continuation of the current unofficial moratorium on removal of sand from all beaches on the island.
- Creation of legislation preventing sand extraction in the future.
- Sand for future development should be imported.

5.1.2. Light Pollution

Artificial light cast onto the nesting beaches affects the orientation of both adult and hatchling turtles (Mrosovsky & Kingsmill 1985; Peters & Verhoeven 1994; Salmon & Wyneken 1994; Witherington 1992). Sea turtle hatchlings generally emerge from their nests at night (Mrosovsky 1968). As hatchlings leave the nest to find the sea they are under the influence of several cues that aid their navigation. Principally they are attracted to light, the horizon over the sea being the brightest point in the natural environment when no anthropogenic light exists. The use of beach huts and their associated night time lighting during the hatching season inevitably disturbs hatchlings, as they are attracted to the artificial lights, away from the sea. Hatchling misorientation has been recorded as a result of recreational activity at Southwest Bay, Turtleshell, Long Beach and English Bay. In addition, it has been recorded at Beach 17 by the Power Station and is likely at the POL plant at Catherine Point (Beaches 6-8), which exhibits a high light level.

Adult turtles are also affected by lighting visible from the beach. Nesting females tend to avoid beach sections with bright lights. This has the potential to increase density of nests on beach areas with less artificial lighting. Increased nest density can result in greater nest destruction by nesting turtles themselves, and the increased concentration of nests creates a situation where more nests are susceptible to a single threat, such as predation or tidal inundation. It is worthy of note that a greater proportion of adult turtles have used Long Beach in recent years than in the 1970's (Table 1). This was first noted in a partial survey by Mortimer (1992) and is likely to be the result of the lighting in Georgetown having been changed from white lighting to sodium vapour lamps in 1984.

Photopollution is a major issue in the coastal areas of the SE USA and elsewhere, and consequently significant research and development of suitable lighting systems has been undertaken (Witherington & Martin 1996). A copy of this manual and associated US ordinances on light pollution is housed with the Ascension Island Conservation Officers for consultation. Low-pressure sodium vapour lights (SVL) have been shown to be less attractive to green turtle hatchlings. Thus, one management solution is to replace current incandescent or fluorescent lighting with SVL or “turtle friendly.” lighting. Existing USAF buildings near the shore at beach 1 and 3 have these lights and appear not to cause misorientation.

Recommendations

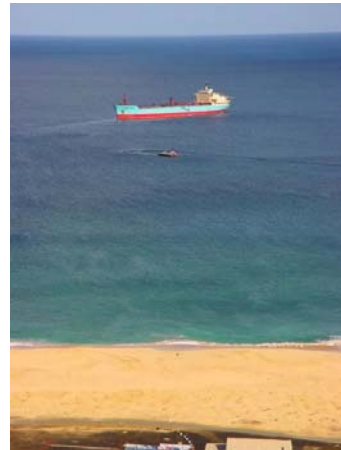
- Given the relatively low usage of beach huts it is suggested to owners/management that as lights are replaced these yellow lights are used.
- Future planning permission for construction of new buildings or modification of existing structures for commercial or residential use near any nesting beaches should be contingent on suitable lighting being used.
- It is suggested that steps are taken at both the POL and the Power Station to reduce ambient light and regular monitoring for hatchling misorientation is undertaken.
- A light ordinance to be used in conjunction with future planning regulations should be created.

5.1.3 Threat of fuel spill – action plan

Fuel oil for the power station, aircraft and road vehicle fuel all arrive by ocean tanker. Some aircraft fuel is also stored aboard a resident oil tanker that anchors in Clarence Bay (adjacent to Long Beach). Whilst the resident tanker is unlikely to be present in the long term, the threat of fuel spill from tankers, visiting vessels or storage facilities (which are close to the shore) is real. Currently there is no contingency plan in place for action in event of a fuel spill. Given the importance of Ascension Island for sea turtles and seabirds, an elaboration of such a plan and the presence of necessary equipment are viewed as a priority.

Recommendations

- Elaboration of a fuel spill contingency plan for the moored and visiting fuel tankers, marine pipeline, POL (Petroleum Oil & Lubrication) storage depot and associated pipeline and the Power Station.



Photos 5 & 6: The proximity of the POL storage depot and the fuel tanker to nesting beaches.

5.1.4 Construction of roads

Construction of roads and tracks has been carried out behind several nesting beaches (1,3, 6-11,12,14,15). When these are clinker based (Beach 6-8, 12) it results in clinker spilling onto the beach. This has potential of changing the prevailing colour of the beach, increasing sand temperatures to unnatural levels (See **section 5.3.2**).

Recommendations

- No further clinker aggregates should be used on tracks behind beaches.
- The creation, maintenance and any changes to existing routes should be subject to planning legislation.

5.2. THREATS TO TURTLES ON THE NESTING BEACH

5.2.1. Stranded Females

Natural causes

One of the major threats to adult turtles on Ascension Island is the stranding of females on the rocks whilst they endeavour to make their way back to the sea. The main hotspots for stranded females are at Catherine Point near Georgetown (Beaches 6-8), Turtleshell (Beach 2), Porpoise Point (Beaches 21-26) and the English Bay (beaches 14-17) beaches. This is a factor which is likely to be a natural part of the ecology of the species, although unchecked anthropogenic effects could play a role (e.g. sand extraction leading to increased rockiness: see **section 5.1.1**; photopollution leading to misorientation: as per **section 5.1.2**).

In an attempt to reduce the chance of mortality as a result of stranding we have co-ordinated the formation of a network of volunteers that can be contacted to assist females back to the water. By regular checking of key trouble spots at dawn, prompt reporting from the public and the quick reactions of Turtle Wardens, Works and Services, Police and US Base personnel many of these females can be returned to the water. For example in 2001, 29 females were returned to the water and only 3 females died as a result of stranding, significantly less than in previous years.

Anthropogenic causes

Additional turtles are trapped each year among man-made structures in and under the surface of the sand. These are the landward ends of submarine pipes and cables, which as a result of their superficial positioning, the actions of nesting turtles and dynamic processes shaping the beaches are seasonally uncovered. We were informed that the most hazardous pipes have recently been removed by the USAF contractor on Ascension (pers. comm. Major Jim Fisher, USAF Commander) but uncovered cables are still visible on Southwest Bay (beach 1), Turtleshell (beach 2) and at the POL at Catherine Point (beaches 6-8). High seas in late January however uncovered three sets of pipes on Southwest Bay which had been covered by sand and these were promptly removed by the USAF contractors with little if any impact on the nesting beach. Additionally, there is one pipeline on Beach 17 at the Power Station, which may become a hazard if not fully covered. **See photos below:**



Photo 7: Rescuing stranded female



Photo 8: Cable at Turtleshell Beach



Photo 9: Pipes at Power Station Beach



Photo 10: Pipes at Southwest Bay, since removed.

To give an international perspective on these problems it is worth considering how they would be dealt with in the USA. In Florida, USA (where green turtles also nest and are protected under the Endangered Species Act), if an existing structure has caused “take” due to a problem that was not previously documented or that was previously not an issue at the site in question, the entity who owns the land that the structure is on (and in most cases the owner of the structure itself) would be required to enter into a Section 7 consultation with USFWS to determine the best methods of minimizing future take and implement an incidental take permit (ITP). The repercussions of causing the death of a green turtle would then depend on what was authorized in the ITP issued by USFWS. If there was violation of the ITP, or there was knowledge that the take would result and an ITP wasn't enacted, penalties would be applicable. Under Florida law a person may be imprisoned for a period of up to 60 days or fined up to \$500 plus an additional penalty of \$100 for each unit of marine life (turtle) taken or destroyed. Under the ESA, any person who knowingly violates any provision of the Endangered Species Act may be assessed a civil penalty of up to \$25,000 or criminal penalty of up to \$100,000 and up to one year imprisonment.

Recommendations

- The Stranding Network should be continued, co-ordinated by Ascension Island Turtle Group, Ascension Island Society of the Prevention of Cruelty to Animals and Ascension Island Government Conservation Officer.
- Any future structures in or around nesting beaches should be subject to environmental impact assessment.
- Construction/removal of structures should be during the period when nests are least likely to be incubating (September to October)
- All structures should be firmly anchored and flush with the bedrock whilst on land and in the near shore environment to the 30m isobath.
- It is preferable that structures are laid using directional drilling.
- Given the stringency of US Federal regulations regarding such “take” issues, the US Air Force should be urged to ensure that all existing cables can not cause entanglement and threat of mortality to endangered marine turtles.
- The pipeline at beach 17 by the power station should be more completely covered. All Island organisations should be urged to remove all their effete structures from nesting beaches.

5.2.2. Disturbance to nesting females

If disturbed during the early phases of nesting, females may abandon their efforts and return to the sea. At Ascension, disturbance of nesting females is low as few people visit the

beaches for reasons other than turtle watching and Island residents are relatively well aware of how to behave when turtle watching. There has been a successful outreach programme where public meetings have been held, numerous press articles have been published and field visits have involved all children on the island through the school or youth groups.



Photos 11 & 12: Scouts and Guides assist with nest excavations

Occasionally however, visitors to the island, sometimes unwittingly, cause disturbance of nesting females by their behaviour on the beach. Long Beach is the main venue used for the observation of turtles. Along the back of the beach runs a rough track which leads to the Saints' Club Beach Hut, the track is often used by people in motor vehicles who come down to the beach looking for turtles. This presents a threefold threat:

1. Lights from the vehicles disturb nesting females.
2. As turtles often cross the track there is a collision hazard
3. Hatchling turtles can also be attracted away from the sea toward car headlights.

Recommendations

The beach usage and absolute level of disturbance is currently low and does not mandate draconian measures. As there are many nesting females, for much of the season disturbance is limited to the early part of the night. There are several steps, however, which should be taken to improve the current situation.

- Closure of the road at night: We proposed that this track be closed to vehicles at night to prevent these threats. The issue was raised at a public meeting and the Administrator and the Police agreed at which point the road would be closed. A gate with accompanying signs has now been produced thanks to the donation of materials by the RAF and expertise and labour by SERCO. Management of the barrier is still an issue that needs to be resolved, but it is hoped that this will be achieved for the 2001/2002 nesting season.
- Continued Improvement of Public Awareness: An informational leaflet (see photo 19 below) produced as part of the Darwin project is in its second printing (sponsored by FCO and Cable and Wireless). This details rules of conduct as pertaining to sea turtles and is widely distributed at all ports of entry and should contribute to minimisation of disturbance.
- Through the wardening system set up under the current FCO sponsored project (see **Section 6**), visitors are given an informal slide/video show about the turtles and then accompanied to the beach for turtle watching. Through perpetuation of this scheme, accidental unintentional disturbance will be reduced.



Photo 13: Gate and sign at Long Beach.



Photo 14: Turtle track crossing road at Long Beach.

5.2.3 Litter/debris on nesting beaches

The nesting beaches of Ascension, compared to many other areas of the world, are remarkably free from litter but given the size of the local human population, some of the beaches are nevertheless subject to quite a high level of domestic refuse left by beach users. Beaches most used by people are sequentially subject to cleanup campaigns and the environmental damage is likely little more than aesthetic. Anthropogenic debris including unnaturally situated lava boulders are however likely to be a problem at several sites; beach 4 (Payne Point), beach 12 (Long Beach) and Beach 17 (Power Station). In 2001, the USAF contractor requested tasking for a clean-up of beach 4 but it was refused by fiscal authorities. This leaves significant amounts of debris in the sand column, which could cause obstruction or even damage to nesting turtles.

Recommendation

- Continued environmental awareness,
- A litter collection service should be instigated at the most densely used beaches.
- USAF should instruct contractors to fully clean the beach area of Payne Point to greater than one metre deep, to avoid potential impact on sea turtles or their nests.
- Merlin should remove any debris from beach 17 at the Power Station.
- All debris on Long Beach should be removed, however responsibility for debris may be difficult to assign.
- Ongoing surveillance is necessary to highlight structures that become sequentially uncovered.

5.3. THREATS TO EGGS/NESTS

5.3.1. Invasive vegetation

Mexican thorn bushes (*Prosopis juliflora*) on the island pose a problem and can rapidly spread across the upper parts of beaches. The bushes themselves can act as an obstacle to adult and hatchling turtles. In addition, their root systems will remove moisture from the sand and can directly invade incubating eggs. Pictured below are the last few thorn trees removed from a cove at English Bay.

Continuing from the work of several island residents, a programme of removing all bushes and vegetation from the beaches has been undertaken during the FCO sponsored project. All nesting beaches are now free of bushes and their root systems have been treated to prevent new growth. Minimal work will now be needed to maintain control of this pest species with respect to marine turtles. This is something however that needs constant attention but would be easily dealt with if one or two days every 6-8 weeks were dedicated to removing all young plants from the beaches.



Photo 15: Scouts removing thorn trees



Photo 16: Beach cleared of vegetation.

Recommendations

- Beaches are kept clear of Mexican thorn trees

5.3.2. Increasing temperatures

The sex of hatchling marine turtles is determined by temperature (Temperature-dependent sex determination/TSD). At temperatures above 29°C a greater proportion of a clutch of eggs will be female and at lower temperatures more males are produced. Studies at Ascension suggest a female biased sex ratio of the order of 75% female (Godley *et al.* 2002a). With the prospect of an increase in temperatures resulting from global warming a real possibility is that an even greater proportion of females will be produced. At some other breeding sites turtles may shift their nesting location to cooler beaches but at Ascension this would not be possible. Alternatively females may nest at cooler times of the year and thus shift the nesting season. Whatever the outcome of global warming this situation needs to be continually monitored. It is worthy of note that changing the colour of beaches by the addition of clinker used to make roads behind nesting beaches may have the potential to exasperate this situation (see **Section 5.1.4**)

Recommendations

- Monitoring of sand/nest temperatures should be continued in the future so as to facilitate recognition of any incipient problem and to feed results into political decision-making processes addressing climate change.
- There should be a cessation of road making using clinker behind important nesting beaches.

5.3.3. Erosion/Inundation by the Sea

Many nests are lost as a result of erosion/inundation by waves from proximate storms or the rollers generated at distant sites. A small level of such losses is to be expected as part of natural processes, however sand removal (See **section 5.1.1**) may increase this threat with the sand platform being unable to withstand the waves leading to inundation of the whole beach. This occasionally occurs on Long Beach and is possibly the result of past sand mining as observed by Mortimer (1992) at this site. Current hatching success seems to be high however as most nests incubate at times when few of these inundation events occur.

Recommendations

- Continued monitoring should highlight any emerging problems but it should be noted here that the prohibition of sand removal from beaches should be continued with supporting legislation to embody this in law. Should the population be in decline thought might be given to increasing hatching success through the translocation or relocation of “at risk” nests.

5.3.4. Nesting Activities of other females

The high density at which clutches of eggs are laid on the beaches of Ascension make it inevitable that some clutches will be excavated by other females as they dig or camouflage their nests.

Recommendations

- As this is a natural phenomenon resulting from high nesting densities there is little that can be recommended at the current time. This is a factor, however, which would be worsened by sand extraction, artificial lighting and any other factors which result in the effective shrinkage of the available nesting habitat. Thus, continued protection of current nesting habitats is a priority.

5.4. THREATS TO HATCHLINGS

5.4.1. Light Pollution

As detailed above hatchlings are attracted to manmade light and misorientation can occur on land (see **section 5.1.1**). It is also possible that lights from anchored vessels in Clarence Bay could aggregate hatchlings at night. This would leave them open to increased predation risk from fish that aggregate under vessels.

Recommendations

- Preliminary research is undertaken to investigate the possibility of hatchling aggregation
- Ships are asked to keep their lights to a safe minimum, with preference to sodium vapour lamps.

5.4.2. Predation by Cats and Dogs

Although there is evidence that both domestic and feral cats and dogs kill hatchlings, the number of hatchlings killed is likely to be low. This unnatural mortality will be reduced as part of the current FCO funded RSPB/AIG cat eradication plan currently underway.

5.4.3. Predation by Frigatebirds

Frigatebirds (*Fregata aquila*) take many hatchlings from the beaches and at sea, however this predation is natural and although may appear severe, frigatebirds will only affect the very small proportion of those hatchlings that emerge at dusk or dawn.

5.4.4. Predation by Land Crabs

On some beaches on the north east of the island land crabs (*Gecarcinus lagostoma*) descend at certain times of the year, when this coincides with the hatching season, the crabs will take hatchlings. As with the frigatebirds this predation is part of the natural food chain and not a matter of concern at the present time. With increased vegetation of the island, it is conceivable that land crab populations may increase but it is unlikely that they could reach a level to be of great concern to the reproductive success of the turtles.

5.4.5 Predation by fish

Ascension's waters host a diversity and abundance of fish, many of these are predatory and have potential as hatchling predators, certainly grouper caught by local fishermen during the hatching season often contain hatchlings. This is undoubtedly a natural part of the ecology but should predatory fish be artificially elevated or concentrated this could conceivably lead to excessively high predation rates. Although no quantitative studies have been carried out to date the possibility that dumping of food wastes in inshore waters could cause such perturbations in the local ecology should be considered. Contractors to the USAF currently dump food wastes in large quantities at Payne Point.

Recommendation

- It is recommended that a study be undertaken to confirm which fish species take hatchlings and the likely impact of the USAF food dumping at Payne Point.

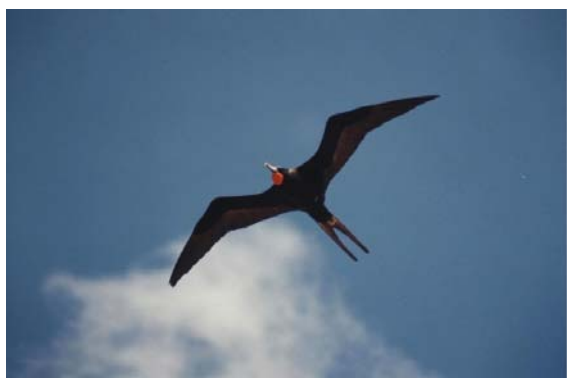


Photo 17: Ascension Island Frigatebird



Photo 18: USAF food dumping site at Payne Point.

5.5. THREATS TO ADULT TURTLES IN NEARSHORE WATERS

5.5.1. Boating activity in inshore waters

Significant aggregations of turtles are found in the inshore waters throughout the breeding season and particularly in Clarence Bay, off Long Beach and to a lesser extent in Southwest Bay and Northeast Bay. This is especially true during the mating season (November-March) (Godley *et al.* 2002a; Hays *et al.* 2001). Mating turtles often pair at the surface and all must surface regularly to breathe, thus placing them at risk from being hit by boats. In addition, females nest several times during the season and between nests they rest in nearshore waters spending most of their time in shallow waters (<30m; Hays *et al.* 1999; 2000; Mortimer & Portier 1989)

Recommendations

- Although there are few high-powered boats in use at Ascension a speed limit should be considered in key areas within a set distance of the shore. Should tourism increase, a survey would be necessary to properly instigate any legal framework

but at present, all high-speed boat operators could be requested to idle within 500m of shore and stay out of Clarence Bay, Southwest Bay and Northeast Bay.

5.6. THREATS TO TURTLES ON THE HIGH SEAS

The turtles which breed at Ascension traverse the Atlantic from feeding grounds in Brazil crossing many hundreds of kilometres of international waters (Luschi *et al.* 1998). Whilst very difficult to control what happens in the high seas the level of illegal fishing and its effects on the ecology of the season within the EEZ of Ascension Island and St Helena are not known. It is noted here that as long as there is no monitoring and enforcement of fishing methods and bycatch that a possible threat to marine turtles in the migratory phase exists.

Recommendation

- Institution of surveys and monitoring of fishing effort within the EEZ of Ascension Island and St. Helena. Contacts and networks should be established with fisheries and fishermen, to facilitate the sharing of information regarding marine turtles and their accidental capture in the high seas.

5.7. THREATS TO TURTLES AT THE FEEDING GROUNDS

Although adults from the Ascension population are thought largely to forage in Brazilian coastal waters (Carr 1975; Luschi *et al.* 1998), the life cycle of juveniles involves extended periods in pelagic ocean current systems (Musick & Limpus 1997) and they probably share coastal foraging areas with juveniles from other populations (Lahanas *et al.* 1998). This life cycle may expose this population to a number of fisheries. Although small-scale traditional fisheries for marine turtles once existed in Brazil (Pritchard 1976), they are no longer in operation (Marcovaldi & Marcovaldi 1999), and all marine turtle species are legally protected. Turtles are, however, still incidentally caught in fishing gear. A national programme of marine turtle conservation now exists in the Brazilian feeding grounds where the mortality resulting from catch by artisanal fisheries at some sites has been reduced (Marcovaldi *et al.* 1998). Unquantified bycatch and consumption however do still exist (pers. comm. Eduardo Lima, TAMAR)

Recommendation

- The British Government support Brazilian efforts to understand and reduce marine turtle capture. This would involve further studies of marine turtle habitat usage, an extensive survey of bycatch of marine turtles including genetics analyses to confirm the genetic makeup of stocks subject to bycatch which will build on that already undertaken by Projecto TAMAR in Brazil.
- The Brazilian Government be encouraged to fulfil its obligations under international conservation agreements and domestic conservation legislation