Current Threats to Marine Turtles and Post Rehabilitation Success with Satellite Tracking

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Abstract

All six species of marine turtles living in the Great Barrier Reef region are listed as vulnerable or endangered. Some major causes of marine turtle population declines in Australia are; injury or death from entanglement in discarded nets, ingestion of marine debris, accidental capture and drowning by commercial fishing activities, and currently starvation due to loss of foraging habitats.

There is currently a threat of starvation for green turtles that inhabit the waters between Cape Flattery and Mackay, especially the region between Cairns and Townsville. Events over the past few years including Category 4 cyclone Larry, Category 5 cyclone Yasi and a 'wet' dry season, with flooding in Queensland that carried an unprecedented amount of silt, has resulted in many sea grass beds being lost to cyclone damage or silt cover. This has led to an increased number of standings'. Experts are suggesting a 500% increase in standings' continuing for at least 12 -24 months. As a result, starving turtles may become opportunistic feeders and consume marine debris which will ultimately lead, in many cases, to an impaction in the gut and 'floaters disease' which inhibits the turtles from diving to feed.

Rehabilitated turtles are now released fitted with satellite trackers for collection of behavioural and environmental information including the locations of feeding grounds, distances covered and dive and surface times. Different trackers will now be purchased and deployed to determine depths of feeding grounds.

In July 2008, a marine turtle named Princess spent an extended period of time in rehabilitation in the Cairns Turtle Rehabilitation Centre following horrendous injuries from entanglement in a discarded fishing net. Her journey was followed 132 days until the tracker ceased functioning. Following the success of Princesses journey 10 more rehabilitated turtles from Cairns have had trackers attached to monitor their success.

Satellite tracking

Marine turtles are well-known to be long-distance navigators. With the aid of micro technology, the use of transmitters and satellites makes it possible to track the movement of turtles that traverse the ocean. Satellites can supply information regarding location, depth, speed, recent dives, dive duration and depths. Environmental indicators such as water temperature and salinity can be logged and transmitted to computers. The data from the transmitters provides a rare insight into marine turtle navigation and migration and also their feeding habitats (Gulko and Eckert, 2004). In recent times the effectiveness of trackers attached to marine turtles has been demonstrated. Turtles come to the surface to breathe and consequently can transmit radio signals. Radio transmitters, called PTT (platform transmitter terminal) are placed on the upper shell of the turtle. Signals are transmitted in the polar orbit of the Argos satellite system. Several times a day the satellite confirms the position of the emitter, sending relevant environmental data to earth (Taillade, 1992). A switch suppresses transmission when the turtles are under the water. The information and migration pattern data obtained is dependent on the duration of the battery which lasts for several months.

Marine turtles are known to travel hundreds or thousands of kilometres through varying environmental conditions from their natal beaches to habitat grounds. Some of these environments present challenges to their health. Migrating turtles are able to traverse the open ocean with complete lack of any geographic reference points, although mechanisms used to navigate are still unknown. Female turtles return to the same beach every year or in alternate years to lay eggs over several days, although they may migrate to these small isolated regions from diverse residence grounds. Trials with trackers have also shown that when turtles are displaced they can proficiently reach their feeding grounds, even after being transferred to distant unfamiliar areas (Taillade, 1992).

Although data about migratory patterns of some species are available, there has been little research regarding movements of marine turtles upon release after spending extended

periods of time in rehabilitation centres. The use of satellite tracking systems to follow marine turtles after rehabilitation is a gap in knowledge that needs to be filled by further research.

Rehabilitation

The rehabilitation of sick or injured animals is becoming an important tool in the conservation of marine turtle species. The most common problems found in rescued turtles are traumatic injuries or illness resulting from ingestion of fishing hooks, monofilament and plastic marine debris, or from entanglement in fishing lines or nets. Internal and external injuries also occur when boat propellers hit turtles when they surface to breathe. Entanglement from discarded fishing nets and monofilament line can cause amputations or horrific wounds that can lead to infection and ultimately death. Fishing hooks and monofilament line that are ingested can cause severe stomach, oesophageal and intestinal tears and lesions. External damage can also occur when turtles are speared and injured by fishermen (RAC/SPA. 2004).

Obstruction in the gastrointestinal tract can occur upon ingestion and accumulation of non-biodegradable marine debris. Turtles mistake marine debris for food and when ingested, blockages occur, resulting in a build up of gas preventing the turtles from diving to feed. This is termed 'floaters disease'. These animals are brought into the rehabilitation centre in an extremely debilitated and undernourished state and can even be comatose or anoxic (Bentivegna et al. 1993; 2002). Animals that are brought into the rehabilitation centre suffering from 'floaters disease' can spend up to two years in rehabilitation before they are able to be returned to the wild.

In recent months there has been a 500% increase in turtle standings' due to the decimation of the seagrass beds on the far north Queensland inshore coastline. The turtles are being brought in suffering from starvation with sunken plastrons and eyes. A necropsy is done on all turtles that are found dead or die in care. The results of recent post- mortems have shown that there is no body fat present. Recent necropsies undertaken in the past 3 months with 14 turtles have shown that in two cases these animals had no food in their gut.

The main objective of the rehabilitation of marine turtles is to contribute to their conservation by releasing them to the wild after they are fully recovered. To assist in this objective the turtles are treated by veterinarians. Thorough maintenance and husbandry protocols are adhered to with respect to the animal's biology and physiology (Bentivegna *et al*. 1993; 2002).

During rehabilitation all treatments are recorded and observations are made to confirm progress in swimming ability and the control of buoyancy.

However, there remains a large gap in knowledge regarding techniques of rehabilitation and success. Turtle rehabilitation is expensive and therefore there are a limited number of centres worldwide. Research is required to establish whether rehabilitation is successful to demonstrate whether it is a worthwhile tool for conservation and survival of turtle species. Ten turtles released from Cairns turtle rehabilitation centre have been followed using satellite trackers to date. These turtles sustained horrendous injuries sustained after entanglement in 'ghost nets', were all treated to health for extended periods and has demonstrated the successful reintroduction and their survival in the wild.

Take home message

By gaining information on released and captured turtles including their feeding grounds, habitat and distance travelled we will better understand which areas need to be protected further for future turtle generations. This information is now imperative if we are to designate suitable protected areas to ensure the survival green turtle populations in particular.. Turtles form an integral part of the environment of Reef and Peninsula waters. These are endangered or vulnerable species and therefore are threatened by many dangers. Rehabilitating these species assists them in surviving through perpetuity and maintains ecosystem balance. However, without knowledge of their post-rehabilitation success we cannot be completely sure of the survival of rehabilitated animals and therefore of their entry into the breeding population.

The benefit to the community through this project will be:

Community members can monitor the progress of the turtles on the internet throughout the post rehabilitation satellite tracking at seaturtle.org . Community members, particularly Indigenous groups, rangers and volunteers at the Cairns Turtle Rehabilitation Centre, are an integral part of rehabilitation and release of turtles. Knowledge of the survival of the animals engenders community support for this important work as well as providing knowledge that can assist conservation authorities in their goals of preserving the species and their habitat.

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