



**Australian Government**

**Department of the Environment, Water, Heritage and the Arts**

## **Marine and Tropical Sciences Research Facility Milestone Report, January 2009**

**Program 4: Species and Communities of Conservation Concern**

**Project 1.4.1: Condition, trends and projected futures of marine species of conservation concern**

**Project Leader: Dr Mark Hamann, James Cook University (JCU)**

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### **Report Summary**

**Objective (a) (Sea turtle nesting success):** Now completed and final reports delivered.

**Objective (b) (Communication of project results):** We have continued to make good progress with Objective (b). A second foraging area training trip was co-run with the Torres Strait Regional Authority (TSRA) and Yam Council in July with ten Islander participants. A third turtle training camp was held in December 2008 to provide training for Torres Strait people in tagging nesting turtles (and western-based methods – eight Torres Strait Islanders (TSRA project officers) were trained at the Dowar camp and ten at the Bramble Cay camp. During the nesting season trips we (1) developed estimates of nesting success for green turtles, and (2) sought to refine data on nest site selection and the thermal variation in the beach. This trip roughly coincided with the Queensland Environmental Protection Agency's trip to Raine Island. In addition, PhD student Mariana Fuentes conducted a field trip to Milman Island with the support of the Agency to investigate nesting patterns of green turtles.

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### **Project Results**

#### ***Description of the results achieved for this milestone***

Project 1.4.1 is on track according to contracted milestones. Objectives (a) and (c) are complete. For Objective (b), Year 3 field based activities are on track. For details of the results of the December 2008 turtle tagging trip, see Appendix 1 to this report.

#### ***Schedule of field activities [Objective (b)]***

##### **Mer (Murray Island):**

- Field trip 1 – 23 November to 28 December (completed);
- Field trip 2 – Planned for late January / February 2009. This trip was cancelled due to issues with aircraft availability.

##### **Raine Island and Moulter Cay (Queensland Parks and Wildlife Service / Environmental Protection Agency co-investment):**

- Queensland Parks and Wildlife Service ran a trip to Raine Island and Moulter Cay in the first two weeks of December 2008. On this trip they continued the long term turtle project.

### **Milman Island:**

Late January 2009 (in cooperation with Queensland Parks and Wildlife Service). The aims of this trip were to:

- Collect baseline biological data on nesting green turtles;
- Quantify the nesting success of female green turtles; and
- Download and re-deploy temperature transmitters to measure the incubation regime for green turtle nests.

### **Bramble Cay:**

- Field trip 1 – 30 November to 2 December (completed);
- Download and re-deploy temperature transmitters to measure the incubation regime for green turtle nests.
- Training of TSRA turtle and dugong project staff.

### **Proposed schedule of training events for Murray Island Indigenous participants:**

We will run a community liaison trip to Murray Island in mid 2009. On this trip we will present and explain the results of our work and seek opportunities to continue our work with members of the TSRA turtle and dugong project. In addition, we seek advice and expertise from the Islanders about Traditional turtle monitoring techniques. Aspects will cover:

- Turtle tagging and measuring results;
- Beach morphology survey results;
- Assessing the success of turtle nests to produce hatchlings; and
- Results of beach temperature profiles.

### **Strategic planning for turtle monitoring in Torres Strait:**

We will seek to develop a specific training plan/manual which spells out expectations, roles and responsibilities and it will be discussed with the Murray Island Council and TSRA Land and Sea Management Unit before being finalised.

## **Explanation of Activity Changes**

No changes to activity planning, personnel or project execution have occurred, or are expected to occur for Objective (b).

## **Problems and Opportunities**

**Objective (b):** We experienced difficulties with regard to the availability of aircraft for our December trip. The result was that we had to travel a week earlier than expected. The upside was that Mariana Fuentes was able to travel out to Bramble Cay and expand the data collection for that cay.

The January/February 2009 trip had to be cancelled because as late as mid December there was still uncertainty regarding flights to outer islands for January.

## **Communications, Major Activities or Events**

### ***During this milestone reporting period***

- Liaison with Dr Mark Read of the Great Barrier Reef Marine Park Authority is regular (bi-monthly) and ongoing;

- Liaison with Dr Colin Limpus of the Queensland Environmental Protection Agency is regular (approximately fortnightly) and ongoing;
- Liaison with TSRA staff (Frank Loban) is regular (approximately weekly) and ongoing. In addition, phone discussions with Stephen Ambar (Hammond Island), Kenny Bedford (Erub) and Moses Wailu (Mer) are conducted regularly (approximately fortnightly).

***During next milestone reporting period***

Objective (b):

- Scientific publications will be submitted for peer-reviewed publication by Mariana Fuentes (PhD student) and Mark Hamann on the sand characteristics and vulnerability of sea turtles to cyclones;
- Long-term Queensland Parks and Wildlife Service datasets on green turtles collected from Milman Island will undergo initial analyses (in Liaison with Ian Bell and Col Limpus);
- We will complete the purchase of satellite imagery for Raine Island and other island rookeries of the northern Great Barrier Reef and Torres Strait;
- A community feedback trip is planned for Mer, Erub and Yam in mid 2009;
- A third foraging area trip is tentatively planned for mid 2009 (note – it may occur after this milestone); and
- Climate data collection will be completed.

## Appendix 1

### Results of the turtle tagging trip to Mer (Dowar Island) and Bramble Cay

#### **Background**

The Islands in the Mer group (Mer, Dowar and Waer) and Bramble Cay are the most significant green turtle rookeries in Torres Strait (TS) and are main sites for the TS and northern Great Barrier Reef (GBR) genetic population. While there are long term data sets for the rookeries in the GBR, little quantitative data exists for turtle rookeries in TS (Limpus *et al.* 2001; 2003). In December 2008 we conducted our third annual nesting turtle trip to Dowar Island and second nesting turtle trip to Bramble Cay. This report deals with the results from these two field trips and results are discussed in relation to data from 2006 and 2007.

The Queensland Parks and Wildlife Service (QPWS) collected complementary data from Raine Island and Moulter Cay and this data is still being analysed and is thus not presented.

In December 2008, Project 1.4.1 [Objective (b)] aimed to:

- Determine the patterns, rates and causes of sand loss from Raine Island;
- Calculate reproductive parameters for nesting green turtles at Raine Island, Moulter Cay, Dowar Island and Bramble Cay (size range, nesting success, mortality rates [of nesting turtles] and egg production);
- Determine factors influencing nesting success of sea turtles.

#### **Methods**

**Turtle nesting surveys:** Surveys were conducted on Dowar Island and Bramble Cay and these surveys followed the methods of the QPWS turtle conservation project and those used in 2006 and 2007. Tagging data will be entered to the QPWS State-wide relational database. At the end of the night a track count was conducted on at least two of the three beaches at Dowar Island to determine the number of turtles that had emerged for the night. Two independent observers completed track counts and the average of the two counts was used. This number is likely to be an underestimate because turtles arriving later in the night covered some tracks.

**Clutch disturbance:** We calculated the clutch equivalent egg mortality using the methods of Limpus *et al.* (2003). In short, CEEM = (egg mortality per clutch disturbed \* clutch disturbance)/mean clutch size.

**Temperature monitoring:** Sand temperature data loggers have been deployed at:

- Dowar Island (three beaches);
- Bramble Cay;
- Hammond Island (north beach);
- Raine Island;
- Milman Island;
- Sand bank 7;
- Sand bank 8; and
- Green Island.

In addition, air temperature data loggers have been deployed at Dowar Island, Bramble Cay, Milman Island and Sand bank 7. Water temperature data loggers have been deployed at Dowar Island.

**Beach profiles:** We conducted beach elevation profiles at Dowar Island and Bramble Cay using standard survey techniques.

## **Results**

### **Nesting turtles:**

*Number of turtles nesting per night:* In December 2008 we monitored the three nesting beaches on Dowar Island (one of the three islands in the Mer group). This period coincided with QPWS surveys to Raine Island, Moulter Cay and Sand banks 7 and 8. At all locations we only recorded nesting by green turtles.

*Nesting success of females:* The overall nesting success at Dowar Island and Bramble Cay (percentage of female turtles that emerge each night the lay eggs) was 55% and 50% respectively.

### **Migration recaptures:**

We recaptured two turtles that were tagged as part of another turtle tagging project. One female was tagged while nesting at Milman Island in 2001. This represents an inter-annual change of rookery of ~ 150 km. The second turtle was tagged by QPWS researchers in the northern GBR during a foraging area trip.

### **Clutch disturbance:**

Negligible clutch disturbance was recorded at either Dowar or Bramble Cay.

### **Egg and hatchling predation:**

Unlike in 2006 and 2007, at Dowar Island we witnessed predation of one clutch of incubating eggs by goannas (*Varanus indicus*).

### **Climate change (temperature):**

Data loggers were deployed between December 2006 and March 2007. The trips to download data will occur between February and July 2009.

### **Beach profile mapping:**

Beach profile data was collected from Bramble Cay, Dowar Island and Milman Island. These data are yet to be analysed.

## **Discussion**

### **Biological data**

There are seven main rookeries used by turtles of the northern GBR and TS green turtle population. Regular and semi-regular data exist for four of these rookeries (Raine Island, Moulter Cay and Sand banks 7 and 8) and a comprehensive assessment is provided in Limpus *et al.* (2003). In addition, there are data from the late 1970s and occasional brief surveys for Bramble Cay (see Limpus *et al.* 2001 and 2003) and green turtle data has been

collected opportunistically during hawksbill turtle surveys at Milman Island. The Islands of the Mer group represent the only major 'non coral cay' nesting habitat for the population. This study, starting in 2006, represents the first quantitative assessment of the Dowar Island green turtle rookery.

One of the key threats that have been identified for green turtles in the northern GBR and TS population is poor ability of females to dig nesting sites and successfully lay eggs. Indeed at Raine Island the percent nesting success is generally very low in years with above average numbers of females breeding and in recent years has been regularly less than ten percent (Limpus *et al.* 2003, Limpus *et al.* 2005; Col Limpus personal communication), even in late season nesting and in nights following rainfall (QPWS unpublished data and Hamann personal observation). In 2006/2007 we recorded variable nesting success among the two of the three beaches at Dowar Island. At the southern beach we recorded low nesting success in December 2008 (32%) and this increased to 55% in February 2009 once regular nightly rainfall had begun and the number of females ashore each night had declined. In 2007 nesting success was 62% which most likely reflects the smaller and less dense nesting aggregations.

Future directions should include:

- Examining nest site selection (using Dowar and Milman Island data);
- Modelling of green turtle trend data using Milman Island as an index site;
- Sediment budgets (Raine Island and Bramble Cay);
- Examination of recruitment (all sites);
- Hatchling production (as many sites as possible); and
- Examining juvenile recruitment.

## Appendix 2

### Tudu Summary

Four days were spent catching turtles at Tudu, Dungeness and southern Warrior Reefs. There were four boats with at least three people searching and catching.

### Turtles

We observed and caught three species (green, hawksbill and loggerhead). A total of one hundred turtles were caught:

- Five loggerheads;
- 26 hawksbills; and
- 74 green turtles.

### Recaptures of turtles

One adult female loggerhead was caught that was already tagged. Upon reporting the tag numbers to Col Limpus at QPWS he advised that the turtle was tagged while she was ashore nesting at Wreck Rock Beach (near the town of Agnus Waters ~100km north of Bundaberg) in 2000. The turtle was tagged on the beach by a group of Community Volunteers. This was a valuable recapture because most recaptures of loggerhead turtles occur through fisheries bycatch (i.e. they are dead).

Of the turtles caught, eighty percent had their sex determined through laparoscopy. The sex ratio for hawksbill turtles was three females to one male, and for green turtles twelve females to one male. We propose a further one to two years' of similar trips to try to collect more turtles to see if these ratios continue.

Most of the turtles were juveniles, but this could be a result of us doing most of our catching up on the reef flat.

Of the juvenile green turtles, roughly five percent were classed as new recruit turtles to the reef (i.e. they had recently arrived from the ocean, had very clean shells with sharp edges around their carapaces and had dark staining in the mouth from eating oceanic prey).

One juvenile green turtle was reported with fibropapilloma and no other turtles had signs of damage or disease.

Skin samples were collected for a genetic study and results will come out early in 2009.

Four sand temperature, data loggers were buried at Tudu to monitor sand temperatures at the cay for one year.