

A Ranger's Handbook

Marine Turtle Monitoring

Managing Feral Pigs for Biodiversity Conservation in Cape York



Balkanu
Cape York Development Corporation P/L



This series of handbooks helps you choose suitable methods for the control of feral pigs and the monitoring of their impacts on biodiversity in your region. The techniques it describes have been used on Cape York Peninsula, Australia, but the ideas can be applied in similar environments in other regions.

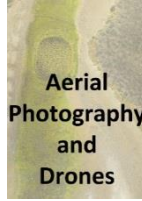
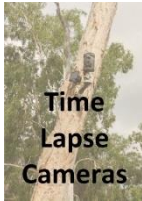
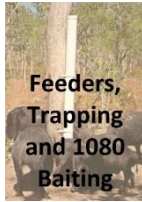
To choose what will work best in your area, it is important to understand the techniques that are available and their limitations. These handbooks provide a brief overview of the available options.

There are multiple techniques for both control and monitoring. Often the best approach for successful control is a combination of techniques (as opposed to just one). Knowing what impacts you want to monitor will drive your decision for a monitoring technique.

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Handbooks in this series:



Marine Turtles



A tiny olive ridley hatchling in a ranger's hand.

Background

Four species of marine turtle nest on beaches in Cape York; the hawksbill, olive ridley, flatback and green. For thousands of years before settlers arrived in Australia these turtles nested and hatched successfully, with only minimal predation from dingoes and goannas during the egg incubation phase. Following the introduction of pigs in the 1800s, turtle rookeries began to witness a new pressure: nest predation caused by pigs. Possibly 90-100% of nests in pig populated regions were now destroyed by pigs, dingoes/dogs or goannas. Studies across Cape York show that without intervention (predator control or nest protection), nest predation rates are often 100%. The consistent pressure from predation in the incubation phase, and the naturally high mortality rates from hatchling to breeding age paint a very grim picture for the long-term survival of marine turtles in Cape York without intervention.

If we want to protect the natural values of turtles and for them to survive for our children's children, then we need to act seriously and immediately. How you can help is outlined below.

The turtles we now see nesting on Cape York beaches may be a very small and fragile remnant population.

There are several methods for monitoring the turtle rookeries, controlling feral animals and improving the survival chances for hatchling turtles that have been employed by Indigenous ranger groups across Cape York. Some groups have reduced nest predation successfully from 100% to under 25% using these methods.

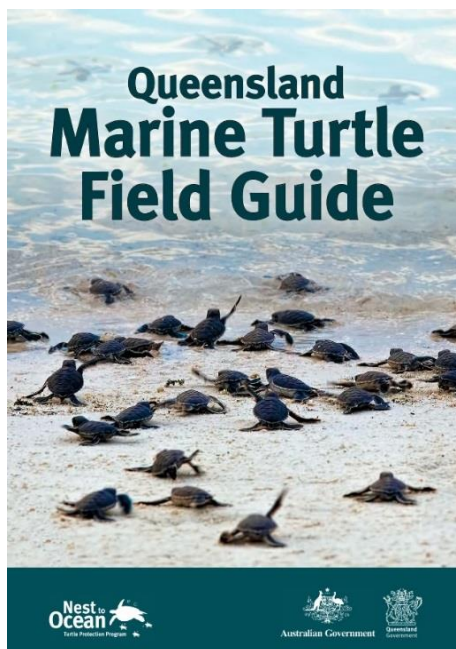
First Steps

Identify Important Sites

It is assumed that if you are beginning a turtle monitoring or protection program, that you already have some information about the nesting population on your beaches. If you don't already, it is critical to conduct a baseline study of your beaches and find where your highest density nesting is and focus your efforts there. The Queensland Department of Environment and Heritage Protection (EHP) can provide some information on nesting in most areas of Queensland and should be contacted first. If starting your project with a small amount of funding, it would be ideal to just focus on a 10 km stretch of beach in the first year to establish the situation.

Operational and Access Limitations

It is important to understand the limitations which may exist due to lack of vehicles, training or access to sites. Field work for turtles must be conducted during the nesting season for the species that occur on your beaches. At times this may not line up with the dry season, therefore, access must be via boat. Otherwise an All-Terrain Vehicle (ATV) is needed (a quad bike is okay, but less practical than an ATV).



One of the best current resources for marine turtle identification and monitoring is the QPWS Marine Turtle Field Guide. It can be found at: <https://www.ehp.qld.gov.au/wildlife/pdf/marine-turtle-field-guide.pdf>

Morning Track and Nest Surveys



The ideal monitoring vehicle, a side-by-side ATV, is capable of carrying all the necessary tools for monitoring. Hatchling tracks from a recently hatched nest can be seen in the sand.

Background

Morning track and nest surveys provide critical information on the health of a turtle rookery. The data taken during these surveys maps the species abundance and distribution of nesting turtles and helps inform management programs and other research.

Purpose

These surveys provide information describing:

- Species present on the beach
- Abundance and distribution of nests on the beach
- Nesting and hatching success in relation to predation, natural or human causes
- The significance of the beach in terms of international conservation for marine turtles
- Potential management strategies to maintain a healthy nesting population.

They are done to provide the information needed to make effective management decisions.

Prerequisites

- Access to a beach with known rookery
 - Via road ideal, sea/air access is okay
- ATV's to conduct the monitoring
- Trained staff in the identification of turtle tracks
- A method of recording and storing the data.

Planning and Site Selection

Selecting your site should be based on previous EHP surveys or other baseline rookery data for your area. If you are not sure if your beach has an active rookery, contact the EHP to find out.

Selecting a camp near to the beach and planning your surveys is very important. Having a camp that is a short distance from the beach provides shelter, comfort and water which is critical to project endurance and success. A camp closer to your beach means you will be able to get to the beach early in the morning, as well as conduct night surveys (described later under 'Turtle Tagging' section).

Planning your beach surveys are important. Surveys should be conducted at regular intervals with not too many days in between surveys. Wind can wipe out smaller turtle tracks (e.g. olive ridley) within a few days and, therefore, the chance of missing nests is higher when surveys are less frequent. Ideally surveys would be conducted with no more than 3-4 days in between.

Method

Turtle track and nest surveys are best conducted at first light in the morning. The earlier part of the day provides light at a better angle for detecting tracks (as it casts shadows). The morning is also cooler and more pleasant to do surveys. We recommend positioning yourself on the beach to be starting the survey at first light. In cases where the beach is long (20 km +) and nesting density high, it is



often best to travel to the furthest point of the beach in the dark and work back towards the beach entrance. This also will increase encounters with potential nocturnal nest predators, like pigs and dogs, providing a chance to control them.

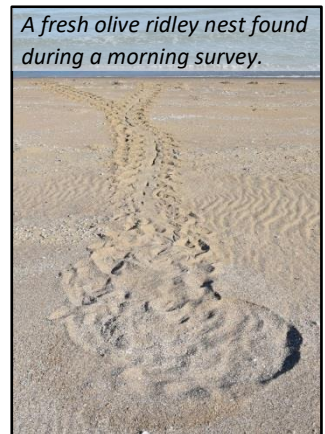
Using an ATV (a 2-seater side by side with a tray works best), two rangers head to the beach at first light. The beach may be divided into manageable sections, depending on how much can be done each day. Two people riding an ATV can conduct approximately 20-30 km of morning survey per day. A recording device of some sort is needed to record nests (either a GPS and pen/paper, or a tablet and application). We recommend an app developed by the Biodiversity Fund project for this specific purpose called 'Nestor' (see under 'Nestor' section).

Travelling along the beach at a maximum of 40 km/h (the faster you go the more nests will be missed), rangers will look out for any turtle tracks. Turtles can be identified by their track and nest characteristics and it is important not to walk on any tracks. All new tracks should be investigated. Tracks will either be a:

- False crawl (a failed attempt to nest), or a
- Nest.

False crawls are recorded but not marked with a peg. Nests are recorded and marked (unless the nest is predated, hatched or inundated). Nests that have been previously marked (in the current nesting season) should be investigated for damage or hatching status. Any nest that is found predated, hatched or inundated should be recorded and then the peg removed. Keeping a record of any interesting observations for each nest is often important, e.g.

'the high tide mark was 1m below the nest on the 13th March 2015'. Nestor (final section) can be used to check the status of a nest. If a nest is partially depredated, it can be covered with cool sand and monitored until it either hatches or is fully depredated.



When the morning survey is done, it is important to return to camp, clean up and ensure the notes and data are up to date and backed up. It is also important to rest, as night surveys and other morning surveys can be draining.

Nest Protection and Predator Control



Background

If you have noted that nests have been dug up by pigs, dogs or goannas in the early part of the nesting season, it is likely this will continue to occur throughout the season. Having a method to protect the nests or remove the problem (the predators) is important to secure the future of your turtle rookery.

Purpose

Nest protection and predator control is ultimately for increasing the survival rate of turtle hatchlings ensuring the rookery has a chance to survive for future generations.

Prerequisites

- As in 'Morning Track and Nest Surveys' section
- Garden mesh and 45 cm PVC pegs
- Quad-bike and trailer or ATV with tray to transport gear.

Planning and Site Selection

If you have noticed predation is occurring at your rookery, it is essential to develop a plan to mitigate the impacts. There are options to protect a nest or control the

predator, but a combination of both is very effective. The more nests that can be protected with meshing the better, however, this has resource limitations. It is more critical to plan and choose your predator control in relation to your beach layout. Chemical fencing (see the 'Feeders, Trapping and 1080 Baiting' handbook) works very well for the removal of problem pigs from nest predation.

Method

Any of the control methods listed in the control handbooks are acceptable, however, the most effective are chemical fencing, aerial shooting and spit fencing. Strategic aerial bait drops are also effective.

Nest protection can be achieved by applying mesh over the top of the egg chamber and using four pegs to peg the corners down (Figure 1). Meshing is important for olive ridleys due to their shallow clutches and works best when the exact egg chamber location is known. The mesh may cover an area of around 1.5 x 1.5 m. In the Biodiversity

In the Biodiversity Fund Project, nest meshing, spit fencing, aerial shooting and chemical fencing (1080 bait stations) were all used to reduce turtle nest predation from 100% to 24%.



Figure 1: A type of basic mesh used in Cape York. Any mesh is good to start protecting nests, and as your projects grows you can upgrade to more robust and expensive mesh.

Fund project, we used nylon coated, wire garden mesh, with squares of 10 cm². This was effective at preventing some predation from dogs and pigs, but a later study found that some goannas could fit through the squares. Pormpuraaw Rangers have successfully prevented predation with specially-made aluminium cages with slots for hatchlings to escape.

Night Surveys and Turtle Tagging



A ranger tags an olive ridley turtle with guidance from Balkanu staff. Tagging allows us to study individual turtles and their habits e.g. growth, time between returning to lay and clutch size.

Background

Night time is when most turtles are likely to come ashore to lay their eggs. This is when marine turtles are mostly easily found. Night surveys help to understand how tracks and nests are made, the habits of each turtle species and also aids in identifying tracks during morning track and nest surveys. Night is also the best time to tag turtles, as it is cool, the chance of coming across one is higher and a boat or entrance into the water is not required (especially in croc country).

Purpose

Night surveys are mostly to see live turtles, understand their movements and habits and to tag turtles. Tagging allows scientists to estimate the populations and sources of marine turtles using a capture-recapture method. By tagging turtles on your beach you are contributing to conservation and international research on marine turtles. Tagging will help to understand if the turtle population is stable and if turtles return to the same beach for nesting.

Prerequisites

- As in 'Morning Track and Nest Surveys' section
- Training in turtle tagging

- Turtle tagging pliers, tags and record sheets
- Current turtle research approval.

Planning and Site Selection

The site will be at the current rookery you are working on, however, the area covered may vary each night. Planning the timing and the team members will be important. Being on the beach at last light is critical, as nesting turtles often wait in the gutters near the beach during the day, and many come ashore as darkness falls. Another important time is high tide at night. Understanding when the important times are at your beach will take time, but it often involves 3 things:

- First darkness
- High tide
- Light from the moon.

Olive ridley and flatback turtles both nest multiple times in the season, and will not return to nest again for years. Olive ridley turtles will nest up to 4 times in a season every 14 days and will return to nest after 1-3 years. Flatback turtles nest 3 times in a season every 16 days and will return after 2-3 years.

Method

Night surveys are ideally started at last light. High tides right after first light often create high nesting nights. Driving an ATV or several people walking separate sections are both options. Care, according to the location, must be given for crocs and erosion ledges (that the ATV may fall off). In general, rangers will be looking for fresh sets of tracks over any old ATV tracks and tide lines – the giveaway that a turtle is nesting is only one set of tracks heading up the beach, but not returning.

If driving an ATV, drive right above the water line if possible. It is ideal to drive with lights off (where possible) at around 30 km/h. Turtles may become nervous and retreat to the ocean if lights are shone on them as they approach a nesting site. They may also be hesitant to come ashore if lights are shone whilst they are in the water. If lights are needed on a very dark night, keep them on low beam (to minimise the distance the light travels) and turn them off instantly when a turtle is found. Turn the quad off, making sure it is up the beach enough (away from any rising tide or crocs). If walking, it is helpful to have an ATV to drop people

off at intervals, for example, four people could be dropped off 5 km apart to walk beach sections themselves, which would take an hour (Figure 2).

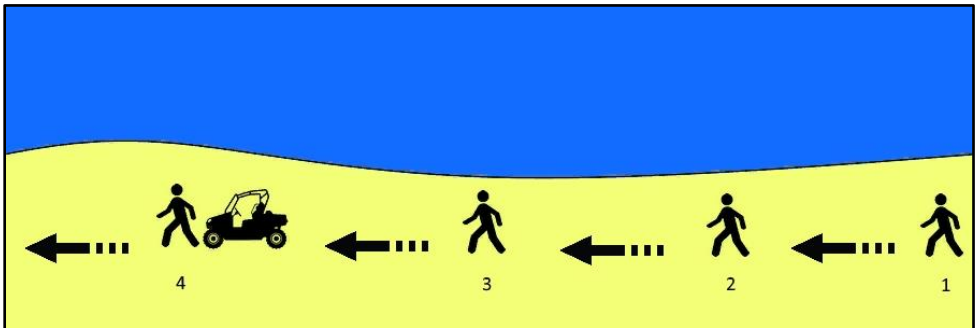


Figure 2: To cover 20 km of beach, person 4 drives the ATV and drops persons 1, 2 and 3 off 5 km apart. Person 4 then parks the ATV 5km from person 3, and also walks. Person 3 then picks the ATV up when they are done their 5 km and picks the rest up.

Tagging must only be done when a turtle has finished covering the nest and is returning to the ocean. Tagging will not be described here as it can only be done by trained and licensed individuals. Please refer to the EHP tagging document that would have been received in your tagging kit and research approval.



Strandings and Dead Turtles

It is important to record any marine mammal strandings and dead turtles in your area. If possible record the GPS location of the animal and identification, take several photos and a length measurement. If there are tubes with preservative liquid on hand, take a small 1cm² sample of flesh also. This information should be sent to your nearest EHP department office.



A dead false killer whale washed up on western Cape York.

Permits



In Cape York many turtles are eaten or injured by crocodiles. The shell of this hawksbill turtle has been crushed by a croc's jaws and partially eaten.

Permits or approvals must be obtained through the EHP for any data from turtle work to be officially recognised and are an absolute must for any turtle tagging or catching. Training is available for Indigenous rangers at Mon Repos with the EHP turtle research team. Here rangers will receive information on all aspects of the marine turtle life cycle; hatching, across-sea dispersal, feeding, breeding and egg laying. These courses are incredibly valuable for rangers that work in regions with potential turtle rookeries.

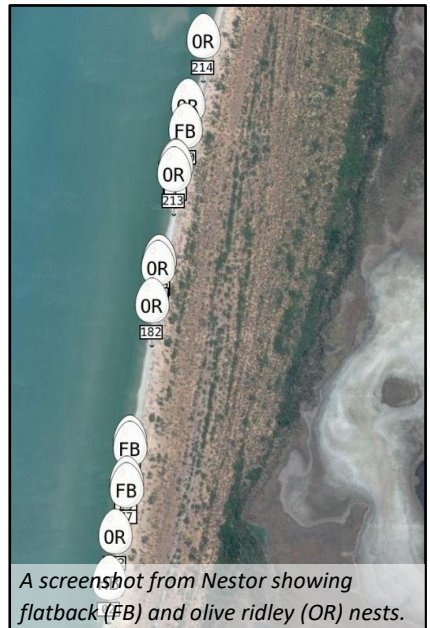
Nestor

Being able to actively view nests on a map and check their status makes nest monitoring easier and more efficient. The map shows if a nest is hatched, depredated, about to hatch and more.



Nestor is an application for iPad only that has been specifically developed for morning track and nest surveys for marine turtles. It was designed for use in Cape York but will apply to other areas. The application removes the need for a GPS, pen and paper. It also removes the lengthy process of inputting data into the computer.

Nestor is designed to be user friendly and intuitive. It provides live GPS tracking with an inbuilt map and live locations of current nests. It enables fast recording of new tracks and nests and includes images and identification guides of each turtle species and their track and nest characteristics.



A screenshot from Nestor showing flatback (FB) and olive ridley (OR) nests.

The application can be downloaded from the iTunes AppStore. A comprehensive, up to date guide can be provided by the authors upon request.

Using Nestor

Once Nestor has been opened on the iPad, a site must first be created and named, e.g. 'North Beach'. Within the site, a survey can be created, e.g. '2017 Season'. A list of all recorded events (nests, false crawls) will show in the left pane and all records will show on a map in relation to your position (see image on page 14). Filters can be used to hide unwanted records like false crawls and show only desired records, such as nests and nests about to hatch.

Nest details

Initial observation

Species: None **Flatback** Olive Ridley Green Hawksbill Loggerhead Leatherback Unknown Turtle tag: left | right

Notes:

Observation type: **Nest** False crawl Adult Other NestID: FB301 Body pits: 0 Age: New **Old** Unknown Flagged for monitoring?: **Yes** No

Vegetation: Bare sand **Grass area** Under shrub Under tree Rubble zone Timestamp: 2017-07-13 08:24:02 Latitude: -13.685961 Longitude: 141.501808 Observer: B Ross

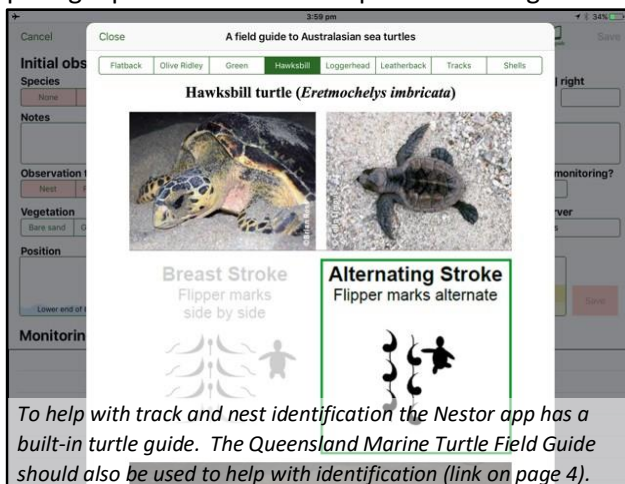
Position: L B S V Update location

Lower end of beach, close to tide line Beach Slope of dune Above vegetation line **Save**

Monitoring + Add monitoring event

2017-07-13 08:27:56 B Ross Hatching

Pressing the home screen '4' button will open the 'add record' screen (shown above). At first, all fields requiring input will be shown in pink. The image above shows a record input for a Flatback Nest (Nest ID FB301), with no body pits, that was laid more than two days earlier. The nest was marked and could be located on the slope of the dune amongst grass. This example had hatched by the time it was found, and a 'monitoring event' was added to show this.



Acknowledgements

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Authors: Brian Ross, Justin Perry, Nathan Waltham, Stewart Macdonald, Jim Mitchell

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