UTILITY OF SEA TURTLE PHOTO ID TECHNIQUES: THE EXAMPLE OF A MALE HAWKSBILL IN KUWAIT

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INTRODUCTION

Sea turtles are long-lived, slow to mature marine reptiles (Chaloupka & Musick, 1997) that undergo seasonal reproductive migrations that may span thousands of miles (Plotkin, 2003). The ability to re-identify an individual over time and in different locations improves our understanding of sea turtle life history, which in turn, informs management and conservation actions for their protection.

The application of flipper tags is a technique that has been used for many decades to bestow an identity on individual sea turtles in capture-mark-recapture (CMR) programmes. Analysis of CMR data has helped reveal many important facets of sea turtle biology and ecology (Balazs, 1999). In the last decade, satellite tracking has become increasingly used to reveal detailed insights into sea turtle migration and diving behaviour (Godley *et al*., 2008). However, sample sizes for these studies are often limited due to financial constraints of costly satellite transmitters and data (Godley *et al*., 2008).

Photo ID of sea turtles has been proposed as a cheap and reliable method for re-identifying individuals (Lloyd *et al*., 2012). The technique has been used for leatherback turtles (*Dermochelys coriacea*) for which the shape of the pink pineal spot acts as the distinguishing feature (Buonantony, 2008). The stable pattern of facial scales has been used for loggerhead turtles (*Caretta caretta*; Schofield *et al*., 2008), green (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*; Reisser *et al*., 2008).

METHODS

The Kuwait Turtle Conservation Project (KTCP) undertook fieldwork from 2008-2011 on Qaru Island (KTCP 2011). The project recorded hawksbill and green turtle nesting on the Islands of Um Al-Maradim and Qaru. KiwiSat 101 Satellite transmitters were attached to four green and four hawksbill turtles in order to ascertain foraging habitats away from nesting areas. All were adult females (Rees *et al*., In press; KTCP unpublished data). A catalogue of reef species (from corals to reef fish), mainly at Qaru, was also created as part of the project and included photo records of all species observed.

RESULTS

In July 2009, during the reef cataloguing work, an adult male hawksbill turtle was photographed swimming over the reef at Qaru. This individual was observed and photographed swimming over the reef at Qaru again in June 2010. In addition to a characteristic head scale pattern, this turtle had a clear 'paw' shaped set of scales on its hind left flipper which aided its identification (Figure 1a).

Supplementary results

A simple internet search for 'turtle' and 'Kuwait' revealed numerous files, photographs and PowerPoint presentations that matched these terms. One 'hit' from Flikr (Alsabah, 2011) revealed a photo of a male hawksbill turtle taken at Qaru on 14 October 2011 (Figure 1b). This was confirmed, from visual assessment, as the KTCP adult male, thus extending his association with the reef for a further year.

Another 'hit' linked to a PowerPoint presentation (Alsaffar & Al-Tamimi, 2006), which, on inspection, revealed a slide of a male hawksbill turtle in the section on Qaru. Examination of the animal's head scales and the scale pattern on its hind left flipper confirmed it to be the turtle identified by the KTCP (Figure 1c). The individual's association with the reef therefore pre-dated its first observation by the KTCP by at least three years.

The final discovery came from a book on coral reef habitats in Kuwait (Carpenter *et al*., 1997). Page 20 showed a dark image of a hawksbill turtle labelled 'a

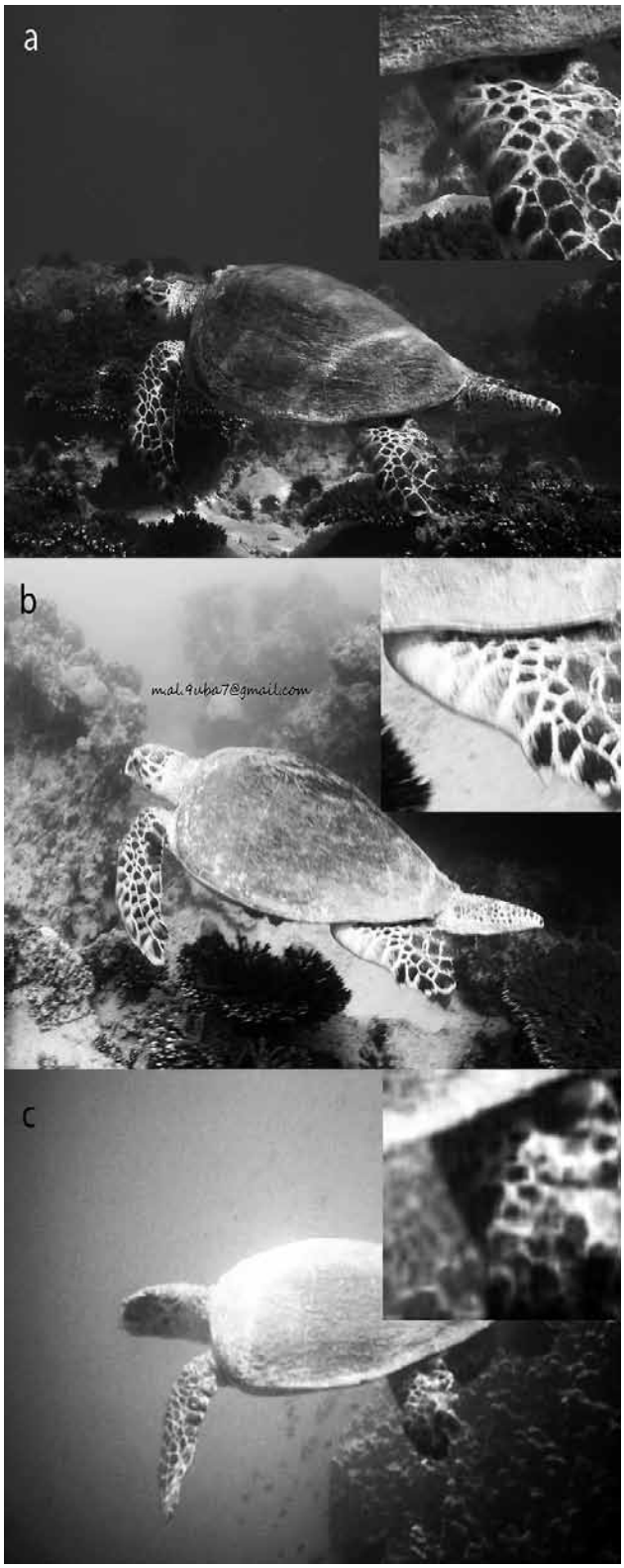

Figure 1. Adult male hawksbill turtle seen at Qaru Island, Kuwait.

a) July 2009. Photo: ALan F. Rees.
b) October 2011. Photo: Mohammad Alsabah.
c) ≤1997. Photo: Peter L. Harrison; in Carpenter et al. (1997).

marine turtle at Qaro reef'. This was the same photo used by Alsaffar & Al-Tamimi (2006). The book's publication date of 1997 extends the male's association with Qaru back a further nine years with photographic records of him in the area totalling 14 years.

DISCUSSION

These results confirm the utility of photo ID techniques for long-term sea turtle monitoring, where every photograph, taken for research or pleasure, can contribute to our understanding of their movements and residency. Further, it is poignant that only one adult male hawksbill turtle appears to have been photographed around Qaru Island in over a decade, which may indicate he is the sole male contributing to the Island's small breeding population. A genetic investigation of nesting hawksbills and their offspring, combined with genetic characterisation of this male, could support or refuse this hypothesis. If true, this individual is key to the current viability of the population and highlights the importance of protecting the habitat in which he has been found over the past 14 years.

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