Assessing populations of sea turtles in the Maldives using Photo-ID: First results of a citizen science project

Jillian A. Hudgins
jillian@oliveridleyproject.org

Introduction

The ability to identify individuals is often a starting point for ecological & conservation studies. Realistic estimates of population size & distribution are essential for creating effective management strategies for a species.

Photo-ID uses photographs of unique natural features/markings on an animal's body to aid in its recognition. Advantages include:
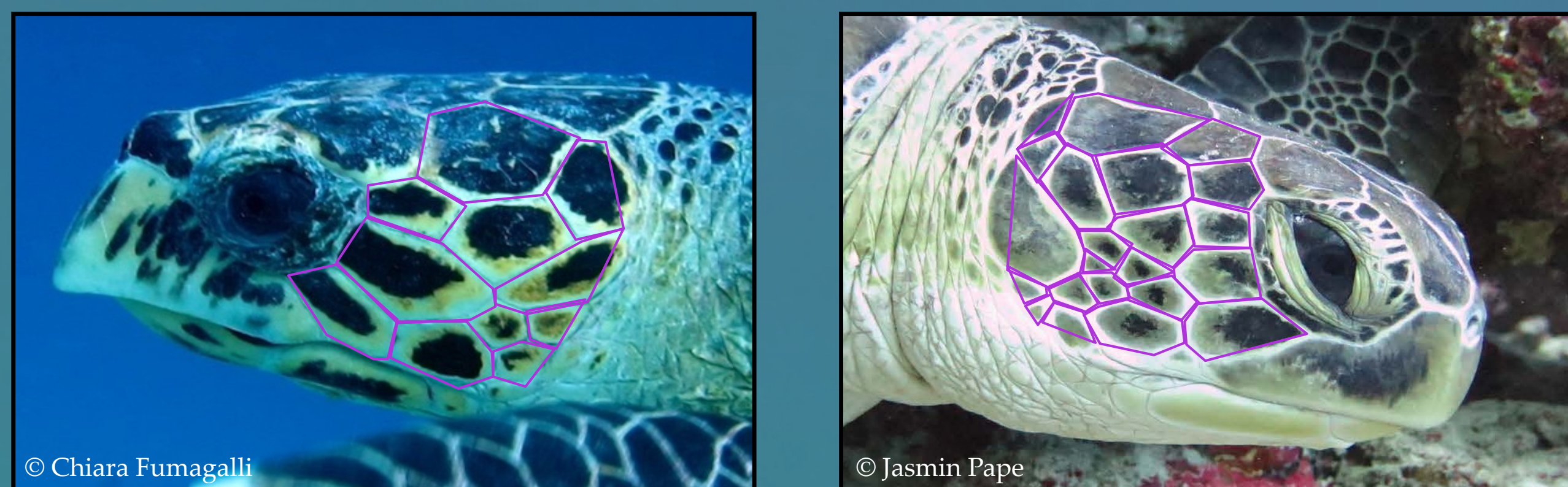- No physical capture or handling,
- Natural markings generally stable over time,
- No tag or marking that can fall off or hinder animals' movements,
- Behaviour is less likely affected (trap happiness/shyness), &
- Untrained people (citizen scientists) can contribute to research.

Citizen science is scientific research carried out, in part or in whole, by untrained members of the general public. Photo-ID projects are ideal for involving citizen scientists because:
- Little training & equipment is required,
- Large amount of data can be collected over a large area with minimal effort, &
- Archived photos can be contributed.

Methods

Clear photos showing both sides of a turtle's face & its carapace were collected from biologists, divers, & tourists. Carapace photos were used for secondary information.

Fig. 1. Area used for identification. Every turtle has a unique pattern of facial scutes. Left & right sides are asymmetrical.

At the beginning of the study, turtle profiles were compared using a SQL program developed by SeaMarc Pvt. Ltd., based on an adapted version of Jean *et al.* (2010), which gives individual scutes a 3-digit code based on its placement & shape. After the 2nd year of the study, turtles were identified by eye, only.
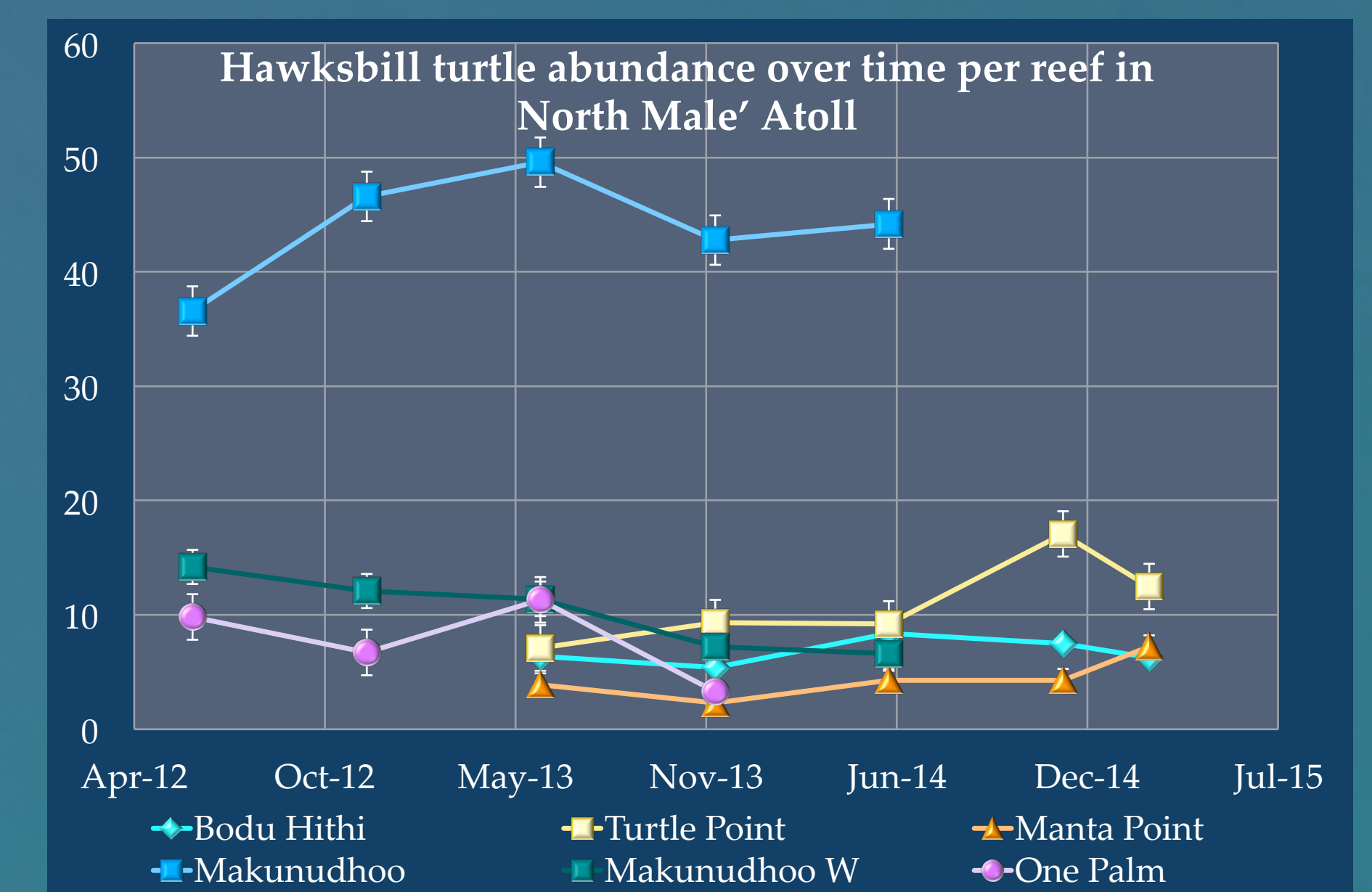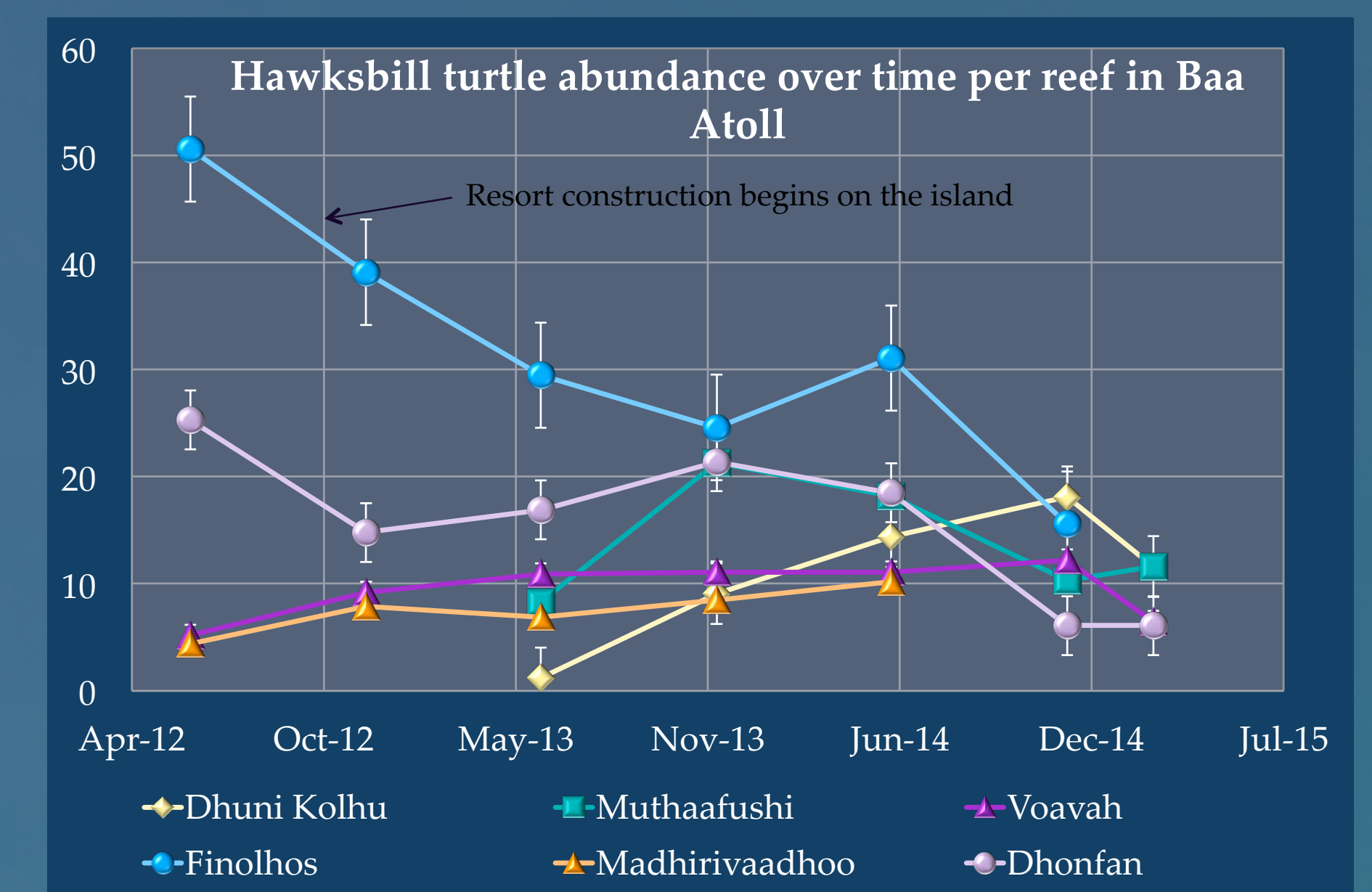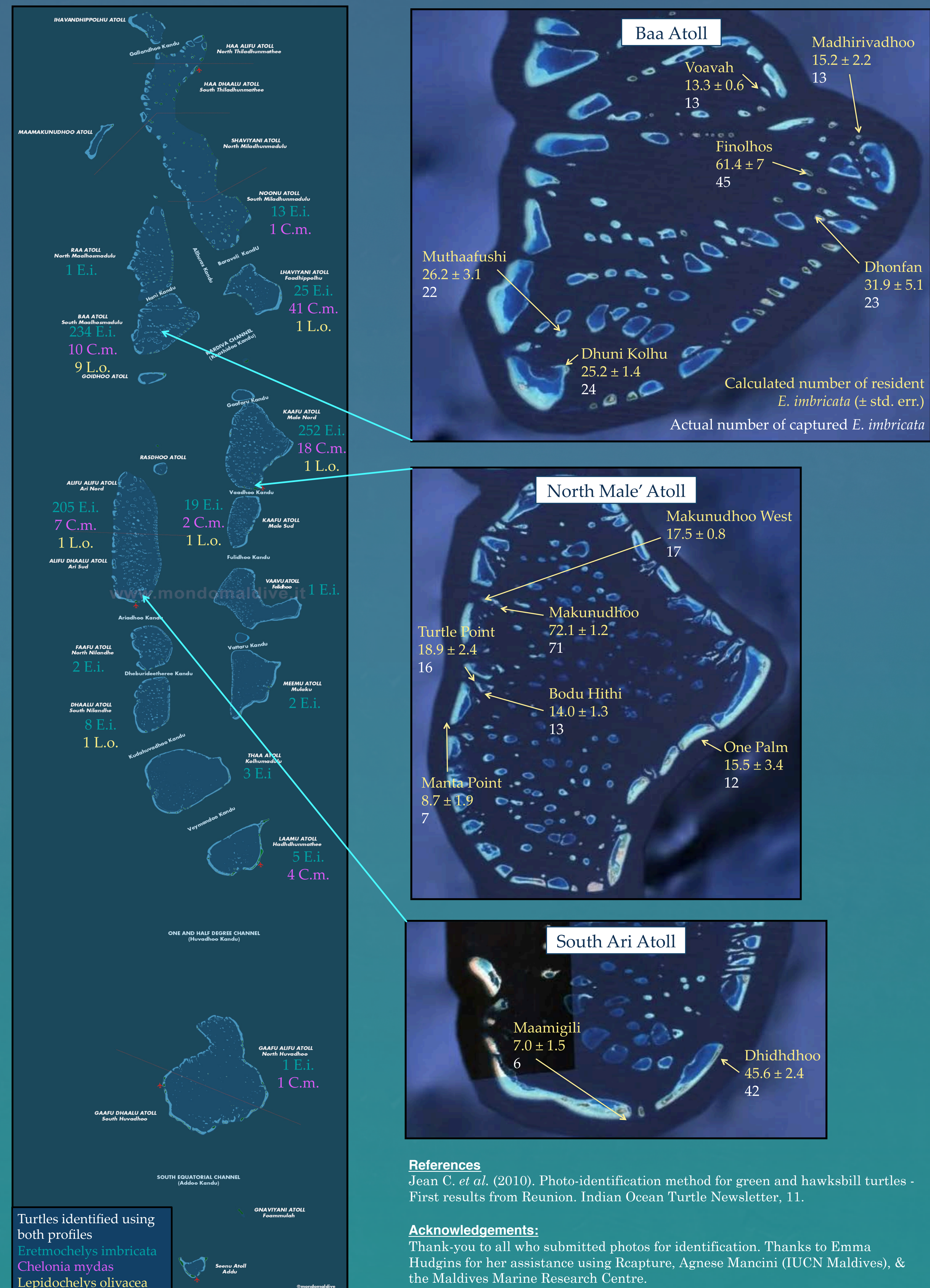

Fig. 2. Quality control of photos. All photos © Chiara Fumagalli

Photos were ranked on quality & given a score (1 to 5) in 3 categories (focus, angle, & contrast). Only photos with total score ≥12 and photos of both left & right profiles were used to create a capture history.

Capture histories for selected reefs were analyzed using an open population model in R using the package RCapture. Capture occasions were defined to be one month.

Study area

Turtles identified using both profiles
- Eretmochelys imbricata
- Chelonia mydas
- Lepidochelys olivacea

Baa Atoll

Calculated number of resident *E. imbricata* (± std. err.)

Actual number of captured *E. imbricata*

North Male' Atoll

South Ari Atoll

References
Jean C. *et al.* (2010). Photo-identification method for green and hawksbill turtles - First results from Reunion. Indian Ocean Turtle Newsletter, 11.

Hawksbill turtle abundance over time per reef in Baa Atoll

Hawksbill turtle abundance over time per reef in North Male' Atoll

Results

- **1263** *E. imbricata*, **176** *C. mydas*, **1** *C. caretta*, & **18** *L. olivacea* identified using both profiles,
- Photographs from **227** sites in **16** atolls,
- Average size 45-50 cm CCL (sub-adult),
- Males only 2% of *E. imbricata*, 3% of *C. mydas*,
- Extremely high foraging site fidelity for both species.

Conclusions

- A high number of juveniles indicates that population is recovering from exploitation.

- On reefs with high effort (≥1 Photo-ID trip/week), number of captured individuals was within error of model's prediction for total number of inhabitants.

- Model confirms that resort construction lead to a decrease in turtle abundance on a surrounding reef.

- The Maldives, with many tourist resorts & heavy dive tourism, is an ideal place to involve citizen scientists.

- A citizen science Photo-ID program could be used to monitor populations throughout the country with minimal time & resource investment.