

The use of photo identification for sea turtle population analysis in Lhaviyani Atoll, a Maldivian green turtle hotspot



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Introduction

Out of the seven extant sea turtle species, two are native to the Maldives. Both green sea turtles (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*) are known to nest and forage in the country. The status of the populations of both species is currently incompletely known because survey data is scarce or unavailable from certain atolls, but previous studies suggest a higher number of hawksbills than green turtles in the Maldives.

In the current study we used photo identification technique to estimate the number of sea turtles present in Lhaviyani atoll. We used survey data collected by resident marine biologists and citizen scientists alike to estimate population size of both turtle species and monitor sea turtle movement and habitat use.

Green Turtle Abundance

Between November 2016 and June 2018 a total of 147 green sea turtles were identified in Lhaviyani atoll in addition to 95 hawksbill turtles.



Fig. 1: Profile photo of a green sea turtle showing the scale pattern on the side of the head unique to each turtle, which is used for photo identification.

An especially high number of green turtles was found around the island of Kuredu in the North of the atoll, with a total of 130 individuals. Survival rate of individual turtles was very high (>95 %). Green Turtles were also very likely to be spotted again (recapture probability 0.71 ± 0.02). Additionally, new individuals are still discovered regularly, suggesting that carrying capacity of the reefs is not yet reached.

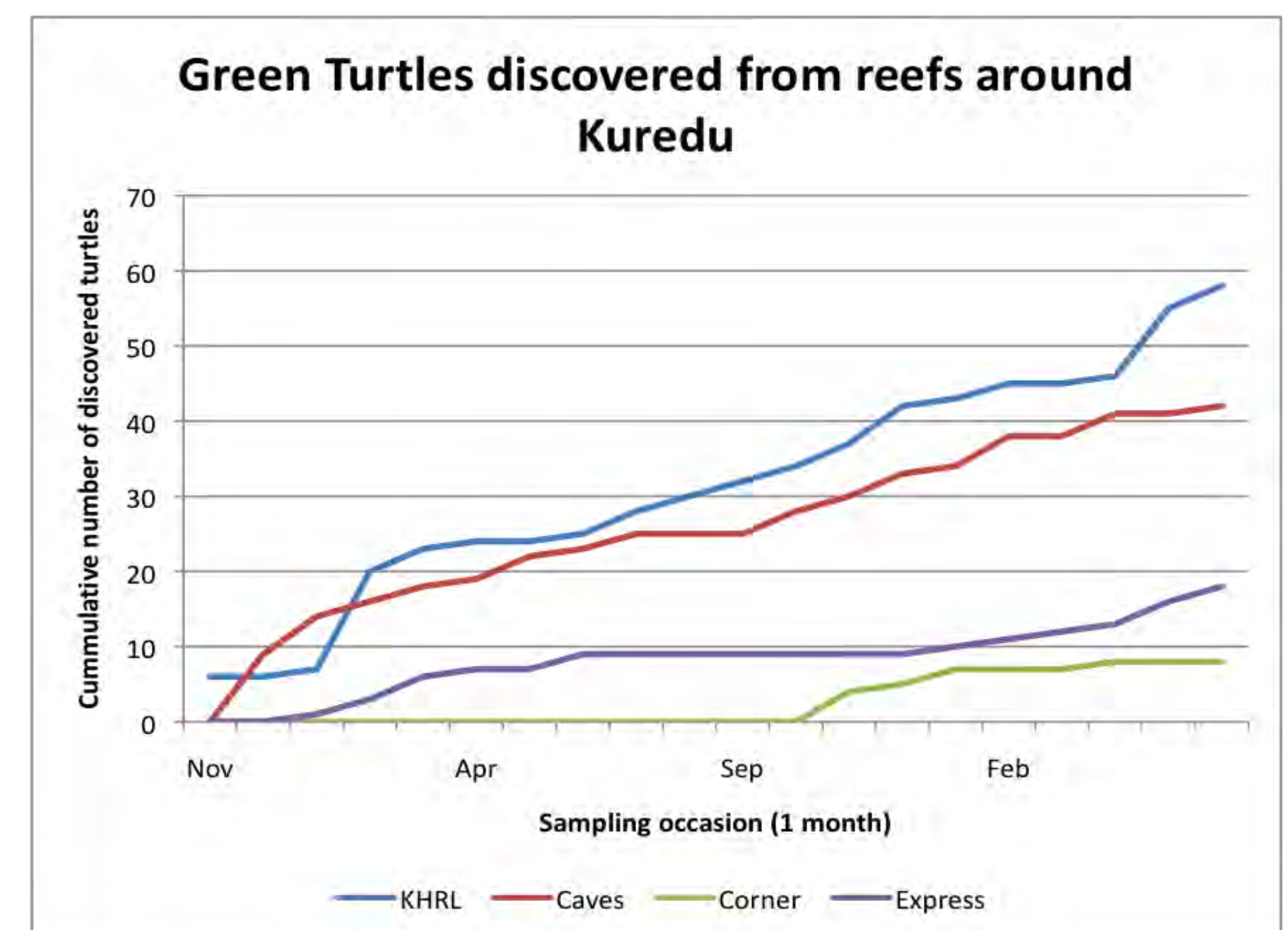


Fig. 2: Total number of green sea turtles discovered on four different reefs around the island of Kuredu.

Habitat use and movement

Both green turtles and hawksbills in Lhaviyani are very sedentary once they have settled on a suitable foraging ground. Sporadic photo identification data starting in May 2004, with regular sampling efforts from November 2016 onwards, allow us to document sea turtle behaviour and habitat use in Lhaviyani atoll.

The longest distance traveled by an identified turtle was 8 km along the eastern side of the atoll (Fig. 4, yellow).



Fig. 3: Movement of green sea turtles around northernmost part Lhaviyani atoll. (A) Kuredu House Reef and Lagoon, (B) Kuredu Caves, (C) Kuredu Corner, (D) Mashura Outreef, (E) Kanihura Outreef.

Turtles travel along continuous reefs (e.g. Fig. 3 & 4, light green) as well as between reefs which are not directly connected (e.g. Fig. 3 & 4, yellow).

Hawksbill turtles use the same reef for resting and foraging, whereas green turtles have specific feeding and resting areas.

Green turtles rest along the the northern and eastern part around Kuredu, but forage only on the southern side (Fig. 3, A-C).



Fig. 4: Movement of hawksbill turtles around northern Lhaviyani atoll. (A) Komandoo Southside, (B) Komandoo Northside, (C) Kuredu Caves, (D) Kuredu Corner, (E) Kuda Kandu, (F) Tinga Giri, (G) Kuredu Express.



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