

Report on habitat use by flatback turtles off the Mackay coast and their migration routes – 2014-2015 nesting season

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Executive summary

Marine turtles lay several clutches of eggs in a breeding season at intervals of around 14 days. After laying her first clutch a female will generally remain close to the nesting beach and the period between a turtle laying one clutch and her attempt at a subsequent clutch is known as the inter-nesting period.

We used GPS satellite tags to examine the movement patterns of female turtles nesting in the Mackay region to understand the extent to which flatback turtles used the area during their inter-nesting period. This report summarises data collected from November 2014 to July 2015.

In November 2014 four flatback turtles were caught after they completed a nesting cycle. They were each fitted with a satellite tag configured to transmit GPS location and depth.

All four turtles remained within the Mackay region to lay more clutches of eggs, thus providing data on habitat use during the inter-nesting period. To look at habitat use we examined the distribution and density of GPS locations for each turtle to determine core habitat use areas.

The size of the core habitat used by the four turtles during the inter-nesting period ranged between 90-150 km².

At the completion of the nesting season 3 of the 4 turtles migrated away from the region. One migrated to the north, one remained in Repulse Bay and the third female migrated to the southern Great Barrier Reef. All four turtles remained in the Great Barrier Reef World Heritage Area.

Introduction

The flatback turtle is a vulnerable species that breeds in the Mackay region, including Blacks Beach and Halliday Bay. Because we know little about the use of coastal habitats by flatback turtles during the nesting season we aimed to document the inter-nesting turtle behavior, map the migration routes and understand where the turtles lived outside of the nesting season. Therefore, this study deployed GPS linked satellite tags on breeding flatback turtles and examined the data for high-resolution movement, behaviour, and habitat use in the Mackay regions. Ultimately, this work will increase the understanding of flatback turtle use of marine habitats in the central and northern Queensland region of the Great Barrier Reef Marine Park.

Methods

Field trip

The capture of turtles and attachment of tags was conducted in partnership with Mackay and District Turtle Watch Association. One turtle was caught at Ball Bay, one at Halliday Bay, one at Eimeo Beach and one at Blacks Beach. Each of them was caught after they had completed laying eggs and returning to the water. They were each fitted with Mackay Regional Council supplied Wildlife computers MK10 Splash GPS tags with depth and temperature sensors. The tags were attached with a harness (Figure 1) and in accordance with research permits.



Figure 1. A female flatback turtle being fitted with a harness style satellite tag in the field

Data analysis

The satellite tags provide two types of location data; ARGOS PTT locations and Fast-loc GPS locations. ARGOS PTT locations are less accurate (~150 m for the best quality locations) compared to Fast-loc GPS locations (~50 m for the best quality locations) (Hazel 2009). Once the raw tracking data are downloaded from the ARGOS website we convert the raw locations to GPS data by using the Wildlife Computers software. Both ARGOS PTT and Fast-loc GPS Data were filtered in two ways. First, using the Wildlife Computers software, we omitted locations with a residual error >30 or with fewer than four satellites. Second, we used the techniques described in Shimada et al. (2012). We mapped the inter-nesting period and migration of each turtle in ArcGIS.

Results

Inter-nesting information

All of the four turtles tagged remained in the Mackay region for one inter-nesting period and thus laid at least two clutches of eggs. The four turtles used inter-nesting habitat that spanned from Blacks Beach north to the southern reaches of Repulse Bay. All inter-nesting habitat was within 25 km of the coast and none of the turtles used the waters within the Mackay Port Limits during the interesting period (Figure 2). The overall size of the core habitat used by the turtles ranged from 90-150 km².

Migration and foraging area information

Migration data were obtained for three of the four turtles (Figures 3 to 6, Table 1). Each of the turtles migrated between 70 and 1000 km (straight line distance). One migrated to the north, one remained in Repulse Bay and the third female migrated to the southern Great Barrier Reef. All four turtles remained in the Great Barrier Reef World Heritage Area.

Table 1. Foraging area destination details for the female flatback turtles tracked from their nesting beach at Mackay, November 2014.

GPS transmitter number	Turtle name	Migration distance (straight line km)	Total travelling distance (km)	Destination	Destination (Latitude)	Destination (Longitude)
120641	Matilda	70 km	1992 km	Repulse Bay	-20.5548	148.7919
54528	Mei-Kai	943 km	2161 km	Princess Charlotte Bay	-14.3261	143.9721
108471	Clancy	298 km	2315 km	Southern GBR	-22.7421	151.2855
54531	Livia		975 km	Did not complete migration		

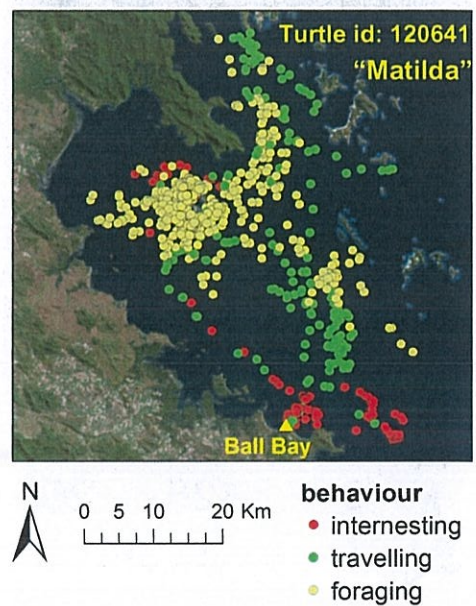
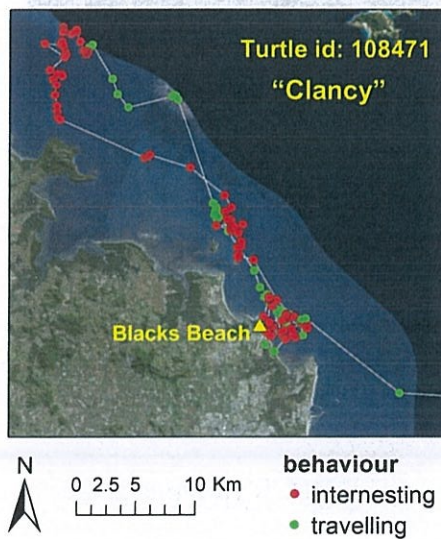
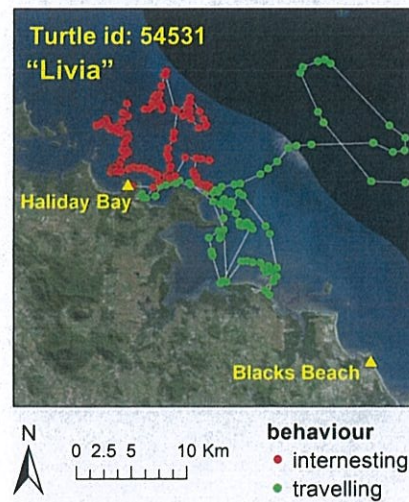
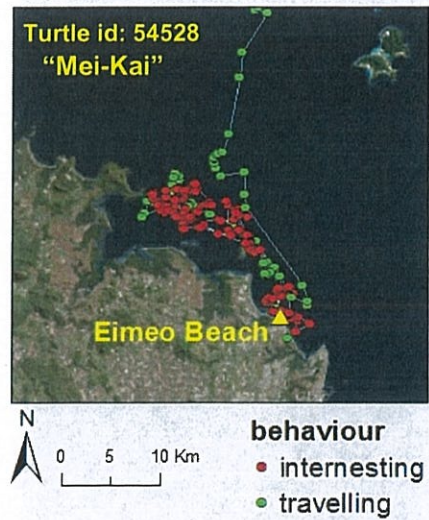


Figure 2. Habitat use of four adult female flatback turtles during their inter-nesting period November and December 2014

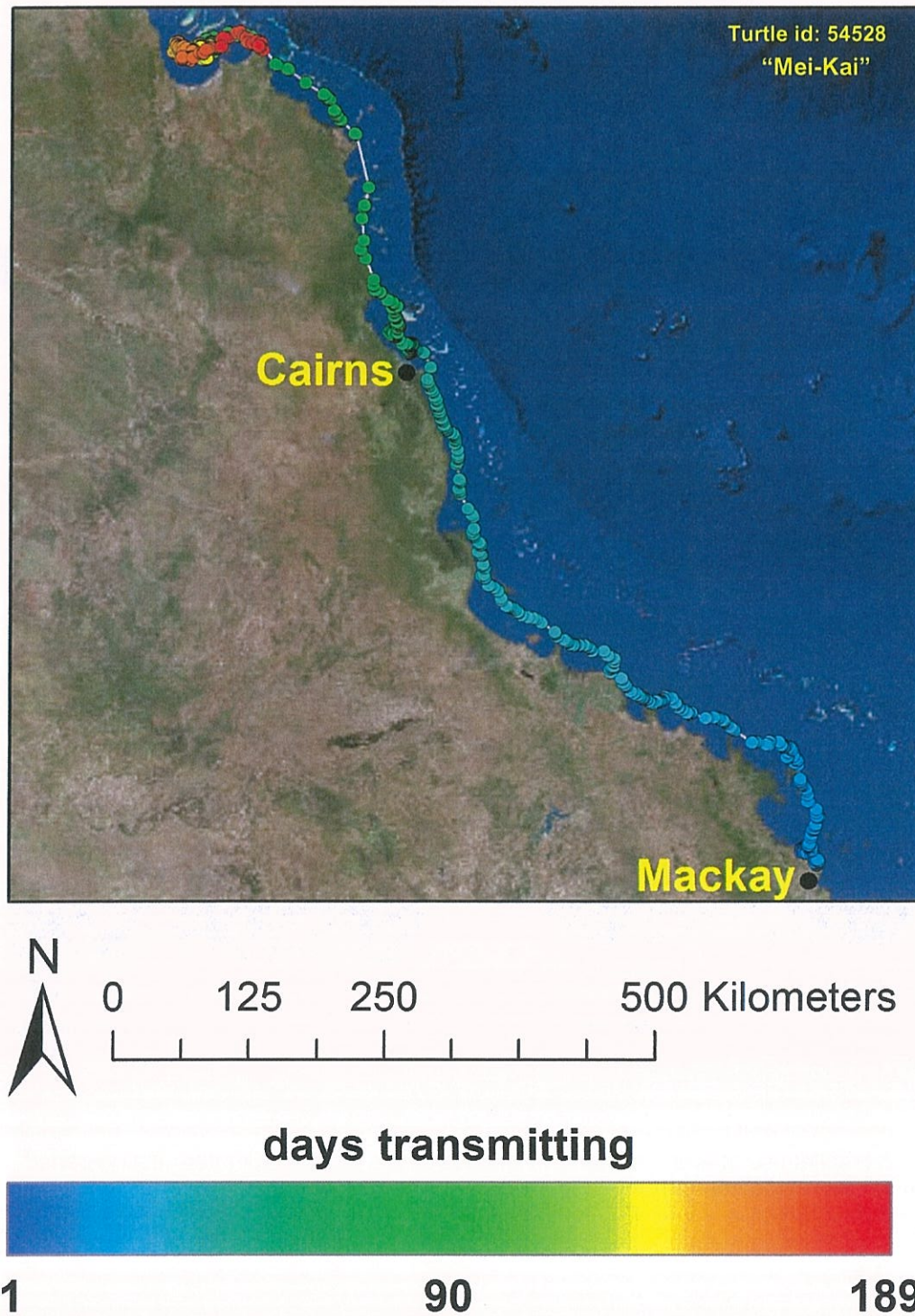


Figure 3. Migration and foraging area location for 54528, an adult female flatback turtle tagged after nesting in Eimeo Beach – 2014. Her migration from Eimeo Beach to Princess Charlotte Bay took nearly 3 months.

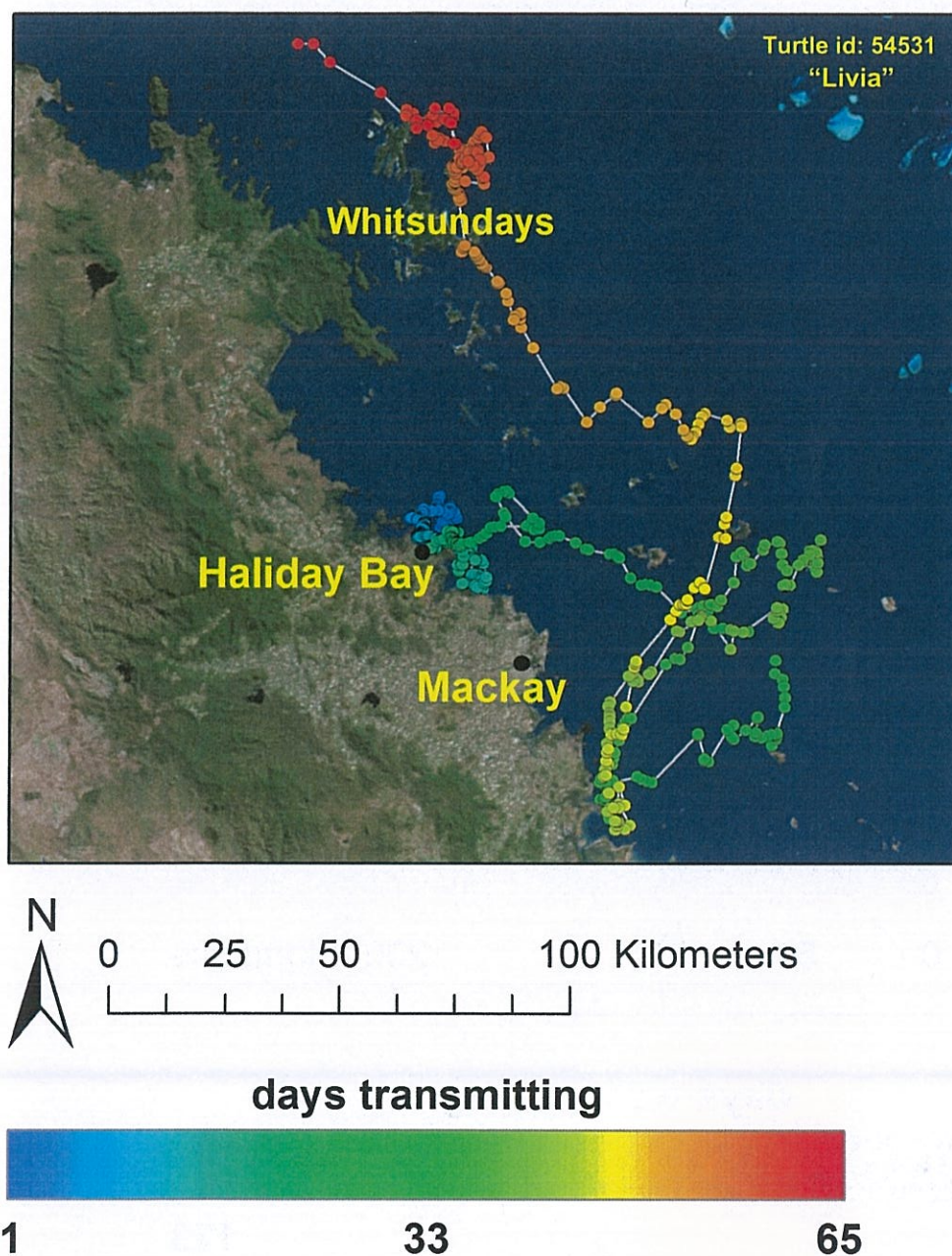


Figure 4. Migration route for 54531, an adult female flatback turtle tagged after nesting in Haliday Bay – 2014. This female spent a fortnight around the Hay Point area and then nearly a month in the Whitsunday Islands before departing north. Her transmitter failed after three months and we did not determine her final foraging habitat.

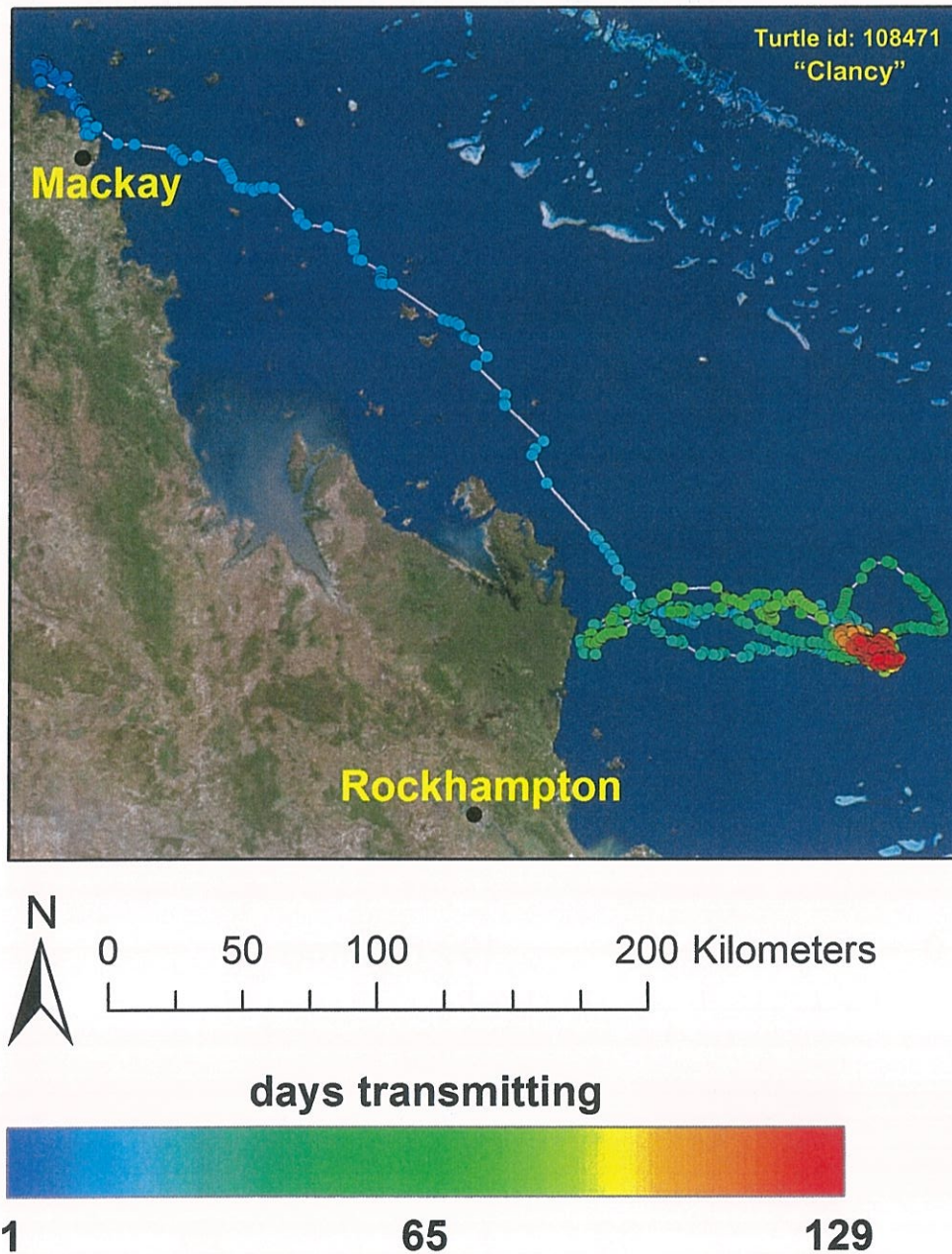


Figure 5. Migration and foraging area location for 108471, an adult female flatback turtle tagged after nesting in Blacks Beach – 2014. This turtle travelled south during 35 days until entering the Capricorn Channel, where she stayed for the remaining of the transmission, undertaking several trips in and out from the foraging ground (up to 100 km away from the foraging ground).

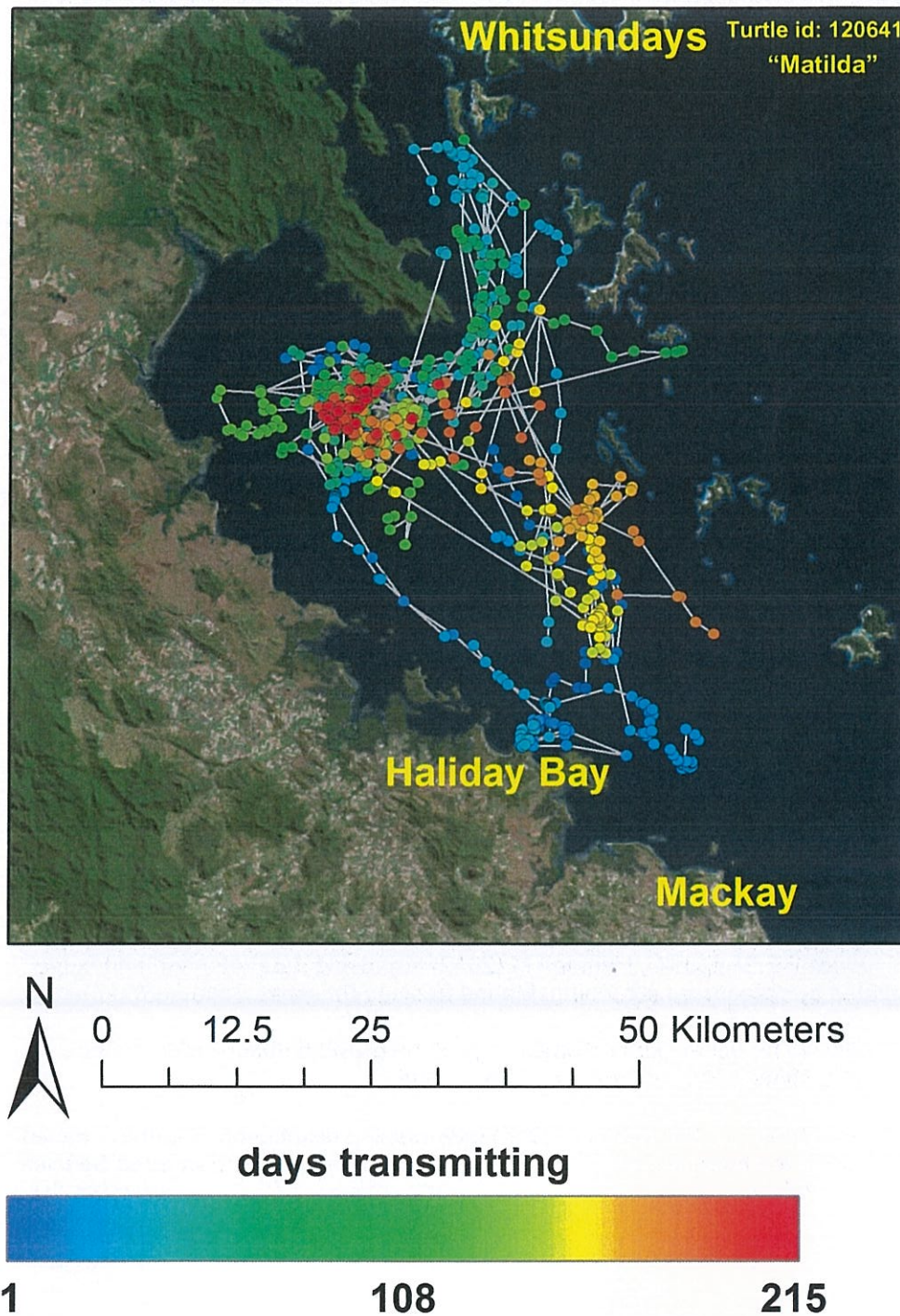


Figure 6. Migration and foraging area location for 120641, an adult female flatback turtle tagged after nesting in Ball Bay – 2014. This turtle stayed near the Mackay region, moving constantly between Repulse Bay and the Whitsunday's Region.

Discussion

We tracked four turtles during their inter-nesting period and all of them spent time within the waters of Mackay region. These areas are within the range reported by other researchers on flatback turtles (Whitlock et al. 2014). We confirmed the use of Mackay waters by inter-nesting flatback turtles.

Although none of the females used waters of the Mackay Port limits during their inter-nesting period, one turtle migrated through the Mackay Port's waters and the female who migrated north swam through, or near, the Port waters of Abbott Point, Townsville and Cairns. A portion of each turtle's migration and foraging areas was within the shipping channel of the GBR. The risk from shipping on migrating and foraging marine turtles in the GBR has not yet been investigated.

Acknowledgements

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