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GREEN TURTLE NESTING ACTIVITY AT JUANI ISLAND, TANZANIA, DURING THE 2012 PEAK NESTING SEASON

LINDSEY WEST, BONIVENTURE MCHOMVU, OMARI ABDULLAH

& SALUM MAPOY

Sea Sense, Dar es Salaam, Tanzania

lindsey@seasense.org

INTRODUCTION

Juani Island (Figure 1) is a small island (9km long and 3.5km wide) located in the south eastern corner of Mafia Island Marine Park (MIMP) off the coast of Tanzania. Gazetted in 1995, MIMP covers 822km^2 and more than 75% of the park is below the high water mark. The marine park supports a diverse range of tropical habitats including coral reefs, seagrass beds, mangroves, intertidal flats and a strip of lowland coastal forest. The area is recognised internationally as a critical site for biodiversity (MIMP General Management Plan, 2000). There are eight turtle nesting beaches on the eastern side of Juani Island that support the largest green turtle (*Chelonia mydas*) rookery in Tanzania (Sea Sense, unpublished data). More than half (60%) of all green turtle nests in MIMP are laid on Juani Island (West, 2010a) with an average of 124 ± 45 nests per year. The beaches range from 109m to 330m in length. There are also a number of small sandy inlets, but most are submerged at high tide. Nesting activity is concentrated on four beaches (West, 2011) and occurs year round with a noticeable peak in April and May (Muir, 2005). Hawksbill turtles (*Eretmochelys imbricata*) also nest in small numbers on the southern tip of the island (L. West, pers.obs).

METHODS

In 2001, a community based nest monitoring programme was established at Juani Island. The eight nesting beaches are monitored by a Community Conservation Officer, who received training in sea turtle biology and conservation from Sea Sense, a Tanzanian registered NGO. Early morning foot patrols are conducted on a daily basis throughout the year, and the number and species of nesting turtles are recorded based on track counts (West, 2010b).

Opportunistic flipper tagging has occurred since 2004, most often when a nesting turtle was encountered during early morning patrols. In 2012, the first saturation flipper tagging programme was undertaken during the peak nesting months of April and May. Four teams of two surveyors conducted night time foot patrols between 19:00 and 06:00 hours every night, from 3rd April to 3rd June 2012 (62 nights), on the four beaches where most nesting is concentrated. Each female turtle encountered was measured (curved carapace length and width) and examined for the presence of existing tags. If not already tagged, individually numbered titanium tags (TZ series) were applied between the first and second scale along the posterior edges of the front flippers. Tags were applied after oviposition was complete, to minimise disturbance. Any nest under threat from poaching, predation or tidal inundation was relocated to a safer area above the spring high water mark (Boulon, 1999). All other nests were left to incubate *in situ*. All nests are monitored until hatching and then excavated to determine clutch size and hatching success (Miller, 1999).

RESULTS

Sixty nesting attempts were recorded, 50 (83%) of which were successful. For the purposes of comparison, Table 1 shows the number of nesting events recorded through

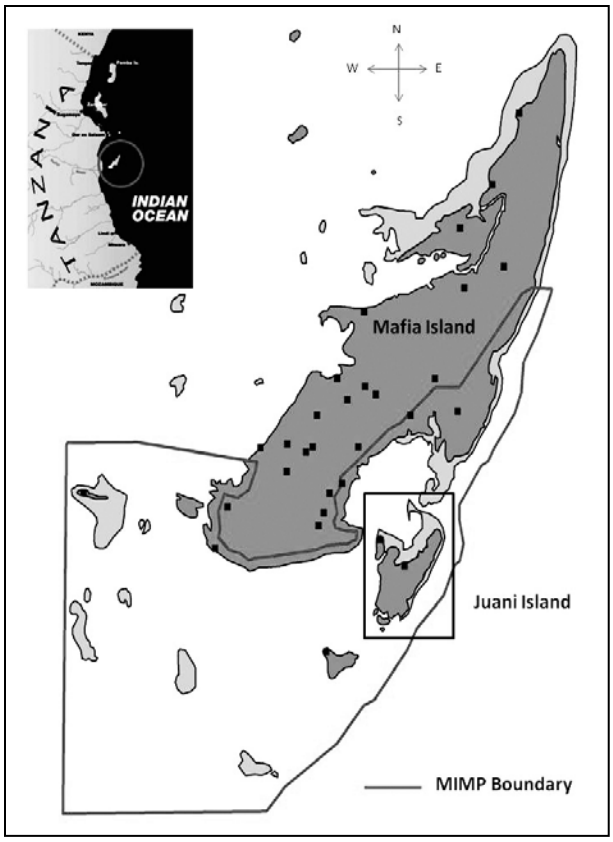

Figure 1. Mafia Island Marine Park and location of Juani Island, Tanzania.

track counts during previous years of monitoring at the same sites, with the same level of observation effort. Eighteen individual females nested during the survey period. Females were encountered during 46 (92%) of the nesting events. Six females that did not nest successfully were also encountered. CCL's ranged from 101–118cm with a mean±standard deviation of 107.2±4.7cm (n=18). CCW's ranged from 90–113cm with a mean±standard deviation of 99.7±4.8cm. Three of the turtles had been tagged in previous years. One was first tagged in 2006, and was observed again in 2009 then during this survey. The second female was tagged in 2006, and the third was tagged in 2009. Half of the nesting females encountered (n=9) nested at least three times during the survey period; two females nested at least five times. Inter-nesting intervals were calculated according to Alvarado & Murphy (1999) and ranged from 9 to 20 days (n=31) with a mean±standard deviation of 13.2±2.3 days. The observed clutch frequency (OCF) value (Johnson & Ehrhart, 1996) was calculated for each turtle encountered nesting at least once within the survey period as a mean±standard deviation of 2.5±1.2. Of the nine individuals nesting at least three times, five turtles used the same beach for each clutch. Three females used two different beaches and one individual used three different beaches. Fourteen nests (28%) were relocated. The mean clutch size was 134±14 eggs, with a hatch success of 71%.

CONCLUSION

Prior to the saturation flipper tagging programme in 2012, estimates of the number of green turtles nesting in Juani Island had been calculated using track counts from daily patrols and breeding frequencies quoted in published literature. While track counts are a very useful method of estimating nesting population size, detailed observation of nesting behaviour was essential to begin to build a more accurate and nuanced picture. The survey not only provided accurate information on nest numbers and the number of individual females, but also the first data on clutch frequencies and inter-nesting intervals for any turtle nesting population in Tanzania.

Due to high levels of natural inter-annual variability in green turtle nesting numbers (Broderick *et al.*, 2001), annual monitoring programmes are critical to detect trends in populations. It takes many years for sea turtles to mature and reproduce so populations are slow to recover from population losses. Hence it is critical to determine population trends at the earliest opportunity.

Funding for a repeat saturation tagging programme in 2013 has already been secured. Efforts will be made to secure additional funding for future years to build understanding of remigration intervals, which can provide crucial information on

Table 1. *Chelonia mydas* nesting activity at four key nesting beaches, Juani Island, 2004 to 2011.

	YEAR							
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
No. nests in peak season (Apr – May)	33	34	58	29	42	41	84	76
Total no. nests per year	70	75	120	54	143	141	173	141
No. nests in peak season as % of whole year	47	45	48	54	29	29	49	54

recruitment, longevity and survivorship within the population (Broderick *et al*., 2002).

There remains a paucity of data on post-nesting migratory patterns and the location of important foraging grounds used by green turtles with natal origins in Tanzania. To help acquire this information, satellite tags were attached to four nesting females at the end of the flipper tagging programme in 2012. Preliminary results indicate a marked difference in the migratory behaviour of the four individuals. Two of the turtles undertook short distance migrations to foraging grounds less than 120km from their nesting beaches. In contrast, the other two individuals proceeded north along the east African coastline to foraging grounds in Kenya and Somalia, a distance of up to 2,000km from the nesting beaches. Daily beach patrols, flipper tagging and satellite telemetry studies are contributing to a greater understanding of green turtle nesting populations in Tanzania. More than half of all recorded green turtle nests in Tanzania are laid at Juani Island (West, 2010a) so data from a continuous and focused monitoring programme can also be used to determine population sizes at other nesting sites in Tanzania where only track counts are available (Alvarado & Murphy, 1999).

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