



Marine Turtles Stranded on Land after the Samoa Tsunami

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1. INTRODUCTION

The tsunami waves that swept through parts of the Samoa Islands on 29 September 2009 brought a lot of marine life with them, portions of which were stranded on land when the waves subsided. In addition to the reef fishes of varying sizes, marine turtles, a few sharks and dolphins were also stranded. Three dolphins were reportedly stranded but rescued and released by villagers with two more that were left on land dead and were buried. This report focuses on marine turtles and attempts to give an account on the number and fate of marine turtles that were stranded on land after the tsunami waves.

The MPA work in both districts of Safata and Aleipata as well as general conservation effort seem to have contributed significantly to the high numbers of stranded turtles being released back to the sea. For example, the first turtle that was tagged and released was brought to the home of the MPA officer by a construction worker because he knew turtle conservation is part of the officer's tasks. The other four turtles tagged and released were held by Police Officers posted in one of the affected villages and communication with SPREP lead to these being brought in for tagging and then releasing. The other two turtles that were tagged and released were kept by a village in the Aleipata District MPA. The release of other turtles for which no information was recorded is believed to be linked to the successful campaign and positive response of the communities and individuals to conserve marine turtles.

2. METHODOLOGY

Most of the information was obtained from interviews with certain individuals (e.g. Pulenuu, fishermen) in villages most affected by the tsunami. The tagging, tissue sampling and measurements and recording of information on turtles that were brought to Apia or held by communities were conducted by DEC and SPREP representatives.

Turtle tagging was done using a Stockbrand tag applicator and titanium tags with the SPREP R-series. (Figure 1: Conducting measurements etc on one of the "saved" turtles).

For genetic analysis, a small turtle tissue was taken from each of the hind flippers of each turtle sampled using a sharp blade. Each tissue was transferred directly to a separate vial containing DMSO. These samples are being kept refrigerated until sent with other samples for analysis overseas to help in the identification of turtle stocks in the region. (Figure 2: Taking tissue samples from one of the "saved" turtles, for genetic analysis).

It was only possible to visit two offshore islands where turtle nesting occurs, Nuutele Island off Aleipata and Nuusafee Island, off Vaovai/Poutasi. DEC has been monitoring turtle nesting on Vini Beach for several years. Turtle nesting on Nuusafee has only been reported by the community but no monitoring has been conducted there to assess and confirm actual turtle nesting. For this report, visual inspections on the beaches were conducted and using past photographs for comparison, where available. It was not possible to visit Nuutele Beach on the northern side of Nuutele Island during this preliminary survey due to sea conditions. The whole island of Nuusafee was inspected.

3. RESULTS

3.1 Turtles

Number of turtles stranded on land and their fate: Table 1 summarizes data on reported and actual observations of turtles washed up by the tsunami and stranded on land. At least fifty one marine turtles were reportedly stranded on land of which seven were released by DEC/SPREP, at least 41 were reportedly released by communities, Government officials, resorts and individuals where they were found, one consumed and the fate of three reported is unknown. In addition, a few dead turtles were also reportedly buried at Malaela. The 41 reportedly released by communities, Government officials, resorts and individuals includes seven turtles that were reportedly taken to another village near town which were kept in a river but swept away/escaped after heavy rain causing the river to rise.

The seven marine turtles released by DEC/SPREP were tagged with titanium tags, tissue samples collected, photographs of external injuries taken and length measurements taken first before their releases. Table 2 lists information recorded for these turtles. Of these seven, one was brought in by a construction worker, four were brought from the Police post at Malaela after arrangement by SPREP and DEC, and two were tagged at Malaela after the village found them in the mangrove area and stocked them in a smaller pond. One of these two turtles was already tagged when checked. Records in the DEC turtle tagging database confirmed that this particular turtle (green) was tagged and released at Satitooa, Aleipata, in October 2008 (it was caught in a fishing net at that time). Five of the seven tagged turtles were released at Mulinuu/Sogi, Apia while two were released at Malaela. Figure 3 is the first turtle that was tagged and released while Figures 4 and 5 show turtles racing to the seas with one needing a “push” for the second lot of turtles tagged and released.

Dead turtles: There were no dead turtles resulting from the tsunami observed during the survey. However, a few dead turtles were reportedly buried at Malaela. It was not possible to obtain an estimate on the numbers of dead turtles buried.

Species composition of turtles stranded on land: All of the seven turtles tagged and released by DEC and SPREP were green turtles. The one turtle that was consumed, because one side of its carapace was badly damaged, was a hawksbill turtle. One of the turtles with an unknown fate was also a green. All of the turtles released at Tafitooala Safata by people from Fusi village were described as having carapace of the same colour and smoothness as the turtle that was consumed, a hawksbill. However further questioning seemed to indicate that they could have been green turtles given they had reddish carapaces with scutes not overlapping except one.

Turtle stranding by village affected: The highest numbers of stranded turtles reported were at Malaela, Aleipata (19+ turtles) followed by Tafitooala Safata (13 turtles). Four stranded turtles were reportedly released in Lalomanu, at least two were released at Coconut Beach Resort, Siumu, two released at Vaovai, Falealili and one at Salesatele.

Sizes of stranded turtles: Carapace measurements were only possible on eight turtles (7 greens tagged and released and 1 hawksbill that was consumed). These measurements are recorded in Table 2. Of the seven turtles (green) tagged and released, two (with curved carapace lengths of 91.5 cm and 101.5 cm) seem to have reached maturity stage for that species. The rest were sub-adults. The hawksbill turtle that was consumed has also reached maturity length (curved carapace length of 100.0 cm). One of the turtles (a green) with an unknown fate, stranded at Ulutogia, also seemed (from a photograph taken) to have reached maturity length. Of the 12 turtles released at Tafitooala, five were reported to be large, almost the size of the hawksbill that was consumed. The other seven were sub-adults. The turtles

reportedly released by communities etc seem to have been sub-adults. (Figure 6: Carrying the 101.5 cm female green turtle to be released to the sea).

Damages on individual stranded turtles: Of the seven turtles tagged and released, only one seemed to have a major crack on its carapace (Figure 7). This involved the large green caught by the village in the mangrove area. It was informed that the crack resulted from handling when moving the turtle from the mangrove area, where it was caught, to the small pond when the turtle fell on a rock. The green turtle saved by the construction worker from Falealili also had a crack in the centre of its carapace. Parts of the tips of its front flippers also showed peeling of the skin showing the white layer underneath the skin (Figure 8). The large hawksbill that was consumed had large cracks on the side of the carapace indicating that it was knocked around quite a bit (Figure 9). There were no signs of cuts or any major bruises on the rest of the seven turtles except mud covering their bodies (Figure 10). No information was obtained on the other turtles released by communities as well as the dead ones that were buried at Malaela.

Turtle gender: Gender was only noted for turtles that were tagged and having a CCL above 90.0 cm. Thus only two green turtles and the one hawksbill that was consumed fitted under this category. All of the three were females. Two of the green turtles that were above 70.0 cm in CCL also seemed to be female turtles.

3.2 Turtle nesting islands

Vini beach on Nuutele Island: Turtle nesting occurs on the north and south sides of Nuutele, where there are sandy beaches. It was only possible to visit Vini Beach, on the south-west side of the island, during this work. For the last couple of years, large rubbles have been accumulating on part of the beach making most of it unsuitable for turtle nesting. Figure 11 compares the beach profile at one point on Vini beach in 2003, 2005 and 2007 which clearly shows the rubble accumulation up to 2007. The inspection on 15 October, 2009 indicated that the tsunami waves seem to have “removed” the rubble layers on the beach (Figure 11c) leaving sand making it similar to Figure 9a.



Figure 11: Changes on the beach profile at Vini: a-2003; b-2005; c-2007

Nuusafee Island: The impact on Nuusafee however was different as it seems the wave hit it directly from the south-east. Blocks of limestone material along the shore were torn away and washed up onto the beach and the island. Figure 12 shows part of the island with blocks washed up on the beach on the south east side. Figure 13 shows a place nearby along the shore where a block was “torn” from by the tsunami waves. The site reported as a turtle nesting area on the south-west side of the island was covered with a few blocks and minimum erosion. With the exception of what appears to be a deposit of sand on the west tip of the island (Figure 14a) and small fraction on the south-east side (Figure 14b), the rest of the island seems unsuitable for turtle nesting due to:

- high rubble build-up on the sand making it impossible for any turtle to crawl across to any suitable area under the bushes or to dig nests there (Figure 15). Fortunately, some areas that would be suitable for turtle nesting only have a few blocks on it;
- deep coastal erosion making it impossible for any turtle to crawl up (Figure 16).

The sandy beach area on the west tip as mentioned above is not suitable for nesting if the sea reaches it during high tide. In addition, it might be too exposed to the sun, not having any vegetation providing shade over it.

3. DISCUSSION

The response of the communities and the general public at large in the releases of turtles that were stranded on land after the tsunami waves subsided is a reflection of the success of the campaigns to conserve turtles in Samoa. Only one turtle was reported/confirmed to have been consumed. This was also done because the turtle concerned was badly damaged.

Reports relayed to the team on the releases of turtles back to the sea by communities etc, turtles observed and reportedly buried, indicate that more than 51 turtles were stranded on land after the tsunami. The vast majority were released back to the sea with a few found dead. It is likely that there were other turtles that were swept back to the sea when the waves subsided especially if the waves went back more slowly at some places and where there were no barriers for them being swept back (refer to discussion below).

The highest numbers of stranded turtles reported were at Malaela, Aleipata (19+ turtles) followed by Tafitoala Safata (13 turtles). Both villages are in the MPA programme and this fact could have contributed to the high reporting at these sites. In addition, the areas in both villages where turtles were mostly found (alive) have inland waterways and surrounding vegetation, i.e. mangrove areas. Thus when the waves subsided turtles were “trapped” inside the mangrove areas.

The number of green turtles stranded on land is an indication of the importance of the green turtle foraging area around Aleipata. The stranding of a green turtle that was tagged and released at Satitua Aleipata in October 2008 further illustrates the value of this foraging area for green turtles and indicates the presence of a foraging green turtle population in the area. The stranding of 13 turtles at one site in Tafitoala Safata can also be an indication of a foraging area around that area. The age composition, sub-adults, of at least the turtles that were tagged and released, further illustrates the foraging areas.

Only two of the seven stranded turtles that were tagged and released had major external damages to their bodies. Thus physically, most of the observed turtles seemed to have experienced minimum damages. This can be attributed to the nature of the area they “landed” on and the way the waves “carried” them. It seems the waves “carried” the turtles above the barrier reefs thus avoiding damages from there. The damages to the carapace of the third turtle was reported to be due handling when the turtle was moved from the mangrove area where it was stranded to the pool where it was kept awaiting tagging and release. It was not possible to obtain information on the turtles that were buried whether they had external damages.

The villager who found and released the turtles at Tafitoala was not able to determine whether they were green or hawksbill turtles. Thus this seems to be another area in turtle

awareness campaigns, i.e. turtle species identification, especially on the two most common species in Samoa, greens and hawksbill.

The wave that swept along Vini Beach on the south side of Nuutele Island (off Aleipata) seems to have been at an angle to “sweep” away the layers of rubble that have been accumulating on part of this beach for the last couple of years. The accumulation of these rubbles made most of the beach unsuitable for turtle nesting. It now seems that the tsunami has cleared the rubble layers making turtle nesting there more suitable. However, it was not apparent whether the sand now on most of the beach is sand that was there already or new sand swept in by the waves. It would, nevertheless, be necessary to examine whether the sand is deep enough for turtles to nest. DEC has recorded less and less turtle nesting activities on Vini Beach for the last few years for which the rubble accumulation could have been a contributing factor. Thus on-going turtle nesting monitoring would be necessary.

While the turtle nesting beaches on the north side of Nuutele Island as well as that on the north side of Nuulua Island seemed to have been sheltered from the tsunami waves, it would be necessary to ascertain the impacts. This also applies to the turtle nesting beach on Namu’a Island as well as other known turtle nesting beaches at Aleipata.

The limestone blocks swept onto Nuusafee Island seem to have been “torn” off from the fringes surrounding the island itself, particularly the south-east end. Most parts of the south-east end of the island have blocks forming gently sloping profile from the edge of the vegetation and on the beach area. Fortunately, some areas which seem to be suitable for turtle nesting and affected would only require removal of a few blocks washed up on the beach to facilitate turtle nesting activities.

4. RECOMMENDATIONS

- Assess the extent of the turtle foraging areas around Aleipata and the impact of tsunami on it. If baseline information is not available, the survey would be important in establishing baseline information. There also seems to be another foraging area around the Safata area as indicated by the number of turtles stranded at one particular area after the tsunami. A major undertaking could include identification of major turtle foraging areas in Samoa. [Note: One of the three main objectives under the Theme “Research” in the regional Marine Turtle Action Plan is the identification of major turtle foraging grounds in the Pacific Islands region].
- Assess the impacts of the tsunami on the major turtle nesting beaches around affected areas to determine appropriate action to take where necessary to facilitate turtle nesting. This should include assessing the suitability of substrate as the top sand seen on one turtle nesting beach could be washed-in sand covering rubble.
- Conduct clean-up on beaches and areas where major nesting activities have been recorded/reported, and where necessary and possible. Some of these areas, e.g. one area on Nuusafee, merely involves removal of a few limestone blocks/rubble. In some areas, it is recommended not to remove the blocks, especially where heavy erosion is apparent, as removal may facilitate further erosion.
- Continue turtle nesting monitoring on the major nesting beaches, especially around the Aleipata area including the offshore Islands.

- Conduct further turtle conservation awareness campaigns including species identification using simple external characteristics such as carapace colour and scales placement on the carapace, which communities can easily recognize at first glance.
- Consider establishing a turtle monitors network in communities involved in the MPA as part of the turtle conservation programme highlighted in the MPA Management Plans under Priority Working Goal, Special Biodiversity.

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Table 1: Marine turtles reported stranded on land after Tsunami, September 2009

	Fate	Date	Place	#	Village total	Species
Release observed	Tagged/Released	1-Oct	Aleipata, Malaela	4		Greens
	Tagged/Released	15-Oct	Aleipata, Malaela	2	6	Green
	Tagged/Released	30-Sep	Falealili, ??	1	1	Green
TOTAL				7		
Consumed confirmed	Consumed	29-Oct	Safata Tafitoala, consumed in Fusi	1	1	Hawksbill female
TOTAL				1		
Reported	Released	??	Aleipata, Lalomanu	4	4	unknown
	Released	6-Oct	Aleipata, Malaela	1		unknown
	Released	15-Oct	Aleipata, Malaela	10+		
	Escaped from river at Lailii where they were kept when river flooded	15-Oct	Aleipata, Malaela/Lailii	7		
	Released	Before 1-Oct	Aleipata, Malaela	1	19+	unknown
	Released	??	Aleipata, Salesatele	1	1	unknown
	Released	17-Oct	Falealili, Vaovai	2	2	unknown
	Released	29-Oct	Safata, Tafitoala	8		7 green?, 1 hawksbill?
	Released	29-Oct	Safata, Tafitoala	5	13	All green?
	Released	30-Sep	Siumu, Maninoa	2+	2+	unknown
TOTAL				41+		
Reported but unknown fate	Unknown? Released?	30-Sep	Aleipata, Ulutogia	1	1	Green
	Unknown	30-Sep	Aleipata, ??	1		unknown
	Unknown	6-Oct	Aleipata, Lotofaga,?	1?		unknown
TOTAL				3		

Table 2: Information on Tsunami-stranded turtles that were tagged and released by DEC and SPREP.
(Tissue samples for genetic analysis were collected from all these turtles).

Date	Place Obtained	Species/ Sex	Measurements (cm)	Tags	Info/Observation	Release Date/Place
15 Oct 09	Malaela, Aleipata	Green female	CCL _{Min} : na CCL _{Max} : 101.5 CCW: 90.5	Already tagged: Left: R39447 Right: R39448	<ul style="list-style-type: none"> Tagged and released by DEC on 30 Oct 2008 at Satitoo; Upper left side carapace cracked (from handling when moving from mangrove by village) No bleeding from cracks and turtle seemed to be well and strong when released 	15 Oct 2009 Malaela beach (infront of affected village)
15 Oct 09	Malaela, Aleipata	Green female?	CCL _{Min} : 72 CCL _{Max} : 75.2 CCW: 65.2	New tags: Left: R47080 Right: R47079	<ul style="list-style-type: none"> No cuts, well and strong when released 	15 Oct 2009 Malaela beach (infront of affected village)
1 Oct 09	Malaela, Aleipata	Green	CCL _{Min} : 67.5 CCL _{Max} : nm CCW: 59.0	New tags: Left: R47089 Right: R47090	<ul style="list-style-type: none"> Turtle brought in from Malaela 	1 Oct 2009 Mulinuu, Apia from boat slipway
1 Oct 09	Malaela, Aleipata	Green	CCL _{Min} : 57.0 CCL _{Max} : nm CCW: 53.0	New tags: Left: R47095 Right: R47096	<ul style="list-style-type: none"> Turtle brought in from Malaela 	1 Oct 2009 Mulinuu, Apia from boat slipway
1 Oct 09	Malaela, Aleipata	Green female	CCL _{Min} : 91.5 CCL _{Max} : nm CCW: 82.0	New tags: Left: R47093 Right: R47094	<ul style="list-style-type: none"> Turtle brought in from Malaela Seemed weak while tagging but strong when released 	1 Oct 2009 Mulinuu, Apia from boat slipway
1 Oct 09	Malaela, Aleipata	Green female?	CCL _{Min} : 70.0 CCL _{Max} : nm CCW: 65.5	New tags: Left: R47091 Right: R47092	<ul style="list-style-type: none"> Turtle brought in from Malaela 	1 Oct 2009 Mulinuu, Apia from boat slipway
29 Sep 09	Falealili	Green	CCL _{Min} : 56.0 CCL _{Max} : 56.4 CCW: 50.0	New tags: Left: R47098 Right: R47097	<ul style="list-style-type: none"> Turtle brought in from Falealili 	29 Sep 2009 Sogi, Apia

Figures



Figure 1: Taking measurement and tagging on one of the stranded but “saved” turtles at night at Vaitele.



Figure 2: Taking tissue samples at Malaela.



Figure 3: Release of the first tsunami stranded/saved/tagged turtle at Sogi, Apia.



Figure 4: Three of the saved/tagged turtles racing to the sea upon release at night at Mulinuu, Apia.



Figure 5: One of the tagged turtles needing “a push” to sea when release at Mulinuu, Apia.



Figure 6: One of the bigger saved/tagged turtles being carried to the sea for release at Malaela.



Figure 7: Cracks on the carapace of this turtle believed to be resulting from handling on land, released at Malaela.



Figure 8: Crack on the carapace and peeling on the front flippers on the first turtle that was tagged and released at Mulinuu, rescued from Falealili.



Figure 9a: Carapace of the hawkbill turtle that was consumed.



Figure 9b: Badly damaged left side of the carapace of the turtle that was consumed.



Figure 10: Some of the rescued/tagged turtles of varying sizes covered with dry soil.



Figure 11: Changes on the beach profile at Mni: a-2003; b-2005; c-2007



Figure 12: Limestone blocks “thrown” up on the beach on the south-eastern side of Nuusafee Island.



Figure 13: Limestone blocks “torn” from the fringes of the coast and “thrown” up on the beach and island at Nuusafee Island.



Figure 14: Sandy beach on the western tip of Nuusafee.



Figure 14b: A small portion at the southern-east end of Nuusafee Island that still seems to be suitable for turtle nesting.



Figure 15: High rubble build-up on the sand on the south-east end of Nuusafee making it unsuitable for turtle nesting.



Figure 16: High coastal erosion on the southern end of Nuusafee make this portion of the island unsuitable for turtle nesting.