

*Department of Marine & Wildlife Resources (DMWR)
American Samoa Government
Pago Pago, American Samoa 96799*

“Investigations into the Status of Marine Turtles in American Samoa: Assessment of Threat to Nesting Activities and Habitat in Swains Island”

NOAA/NMFS Unallied Management Grant:
Award No. NA08NMF4540506

FINAL REPORT
(01 October 2008 to 30 September 2009)

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February 3, 2010

With
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OVERVIEW:

NA08NMF4540506 is the fourth in a series of Unallied Management grants awarded to DMWR (Wildlife Division) in support of research and conservation of marine turtles in American Samoa. The grant was specifically for work on Swains Island.

The principal objectives of the project were to: 1) assess threat of the island's (Swains) feral pig population to nesting habitat and possible turtle nests; 2) propose options for mitigation of threats from feral pigs by evaluating viability of fencing (to restrict movements and access to beaches) and eradication (through trapping or hunting); and 3) establish monthly beach monitoring program to determine seasonality, spatial patterns, and frequency/intensity of nesting.

Swains Island is a small flat coral atoll approximately 326 ha. in area located about 320 km NNW of Tutuila. Historical (Tuato'o-Bartley et. al., 1993) and oral reports (W. Jennings, pers. comm.) of tracks indicating nesting on the beaches suggest the importance of the island for turtle conservation in American Samoa. Although green and hawksbill turtles have been recorded from the island, the species, timing, and intensity of nesting remains to be confirmed. The island falls under a single family ownership and recently (2007) the family approached DMWR-Wildlife, over their concerns for the impact that feral pigs have on the habitat and wildlife on the island.

1. THREAT ASSESSMENT: *Assess threat of the island's feral pig population to nesting habitat and possible nests*

METHODS

Mapping and substrate classification (sand, coral rubble and rock) of the beach was conducted by walking the beach strip between the high tide line and the vegetation line. Using a hand held Trimble GeoExplorer3, GPS points or locations were recorded approximately every 100 meters and every location where the substrate composition would change while walking the high tide line and the vegetation line. All data was collected under WGS 1984 datum Lat. Long. Maps were created using ARCGIS 9.3.

We planned to conduct 1) visual examination and documentation of types and extent of damage to beaches and beach vegetation by feral pigs around the island and 2) estimation of numbers of feral pigs on the island over a two week field visit. However, due to logistical problems with transportation to island (see following section: COMMENTS), the entire survey was completed in only 3 days (May 7-9, 2009).

Approximately 30m inland perpendicular to the vegetation line was surveyed by walking and visually searched for evidence of feral pig activity and turtle nesting. The area between the high tide line and vegetation line was mapped and simultaneously surveyed for feral pig and turtle nesting activity.

Information on turtle nesting and pig activity was subsequently layered on to the substrate map to project a "nesting vulnerability map." Such a map will be useful in identifying critical sites for mitigation not only from feral pig threat but also for any other proposed activities or projects in the future.

ACCOMPLISHMENTS/RESULTS

Substrate Classification Map

A total of 148,623.4 sq. m. of beach area was covered by the survey. The area from the high tide line to the vegetation line was classified into: sand, coral rubble, and rock, wherein the substrate is composed of more the 70% of the area; coral rubble/sand, coral rubble/rock, sand/rock, 50% of each substrate; sand/rock, sand/coral rubble and coral rubble/sand where 60% is composed of the first substrate and 40% is composed of the second substrate (Figure 1.). Of the total area surveyed, 29.9% is sand; 32.6% coral rubble; 3.6% rock; 1% sand/rock; 12.5% coral rubble/sand (50/50); 1% coral rubble/rock (50/50); 13.6% coral rubble/sand (60/40); 5.8% sand/coral rubble (60/40)

Highest nesting activity area is located at the south west of the island (Figure 2), where the substrate is coral rubble and sand. The substrate of the north side of the

island where nesting and pig interaction was recorded is mainly sand and there was also a record of nesting in the coral rubble/sand (60/40). The south east nesting area of the island where pits were recorded is a sand beach (>70% sand). Turtle tracks were also observed at the area in front of the village/entrance to the village at the northwest portion of the island.

The data shows that sand (northeast) and coral rubble (southwest) beaches were the preference for nesting in Swains Island, however the substrate of the locations where the nests and pits were found is more than 70% sand and these locations were under the beach vegetation.

Turtle Nesting and Pig Activity

A total of 56 locations of pits/possible nests, turtle tracks, and evidence of pig activity (tracks and wallows) were recorded using a GPS unit (Garmin 76csx) within the approximately 30m inland strip from the beach vegetation line (Table 1; Figure 2). Recorded turtle tracks, pits/possible nests did not appear to be from an active nesting season based on visual inspection of the tracks on the beach which were already barely visible, the old pits/possible nests were already covered with vegetation litter and no freshly dug or dislodged substrate beside or adjacent to it. The last fresh set of tracks sighted by the residents was in March 2009. A preponderance of turtle activity indicators were in the south west sector of the island dominated by coral rubble. Pig activity, on the other hand, was largely evident in the NE to E sectors of the island.

Assessment of Threat

As documented in the study, there appeared to be minimal overlap between high turtle activity areas and spheres of pig activity (Figure 2). Locations of pig tracks, wallows and pits with pig tracks in the NE sector of the island clearly show that there are interactions between feral pigs and the nesting beach, albeit limited outside the nesting season. Although no evidence of consumption of hatchlings or eggs by the pigs was found, data show that the feral pig population is a potential threat to the turtle nesting beaches of the island.

In addition, human activity may impact and pose as a possible threat to the nesting area as exhibited by the denuded patch where the village is located, north of the high turtle activity area of the SW portion of the island. On the other hand, the advantage of proximity of high turtle activity area to human habitation is for facilitating monitoring and if needed, nest protection in the event that an active nest is identified.

The assessed threats to potential turtle nests or nesting areas based on currently available information are encapsulated in Figure 2. The map provides a template for evaluating vulnerability of the areas to future activities (human and non-human). In

combination with data on near shore presence of turtles (such as that presented on Figure 3), we will be able to generate a comprehensive vulnerability as well as assessing impacts of any disasters that may befall the island and its surroundings

COMMENTS

Logistical problems specific to the vessel charter resulted in temporally short field work. Instead of a planned 2 week trip by the project biologist and one staff, we were only able to spend 3 days on island. The problem was primarily due to an unexpected increase in vessel charter cost. Despite advanced intensive negotiations, with intercession of the DMWR Director, no fixed rate was given to DMWR by the Port Authority until 2 days before the targeted departure date. Fuel and oil of the vessel were purchased by DMWR on top of the boat fee that was charged which exceeded the budgeted amount for vessel charter.

To compensate for the shortened field schedule, we increased the number of survey participants so most planned activities (mapping and beach searches) could be completed. A total of 8 volunteers participated in the field work: 1 GIS specialist, 4 independent volunteers, a 3-man team from the Environmental Protection Agency (specifically to provide technical assistance on the feral pig surveys), and 2 DMWR Enforcement/Conservation officers joined in support of the core Wildlife Division team. Karen Frutchey of JIMAR/NOAA-PIRO was also participated and lent technical guidance.

Coral reef monitoring and large scale fish survey teams of the Fisheries Division of DMWR shared charter costs; they also provided near shore sighting data on turtles recorded from dive surveys (Figure 3).

- 2. MITIGATION OF THREATS:** *Propose options for mitigation of threats from feral pigs by evaluating viability of fencing to restrict movements and access to beaches and eradication through trapping or hunting.*

METHODS

The original plan was to document movements and behavior of feral pigs by mapping out pig trails. We also intended to obtain an estimate of numbers of pigs in part to assess the magnitude of the problem. Using information from these activities, a cost analysis of control and/or eradication methods was to be generated.

Due to the shortened field schedule the original planned activities could not be conducted, instead the area between the high tide line, plus 30m inland from the vegetation line was visually surveyed, to document pig movements near known and potential nesting areas. Four pig traps were also set up in areas where pig activity has been sighted before. Interviews were also conducted with the 4 people living on the island and the Jennings family.

ACCOMPLISHMENTS/RESULTS

We were unable to complete a comparative cost control analysis and recommendations due to lack of sufficient data on pig numbers and movements. Although we set four snare traps over two days, no feral pigs were caught. Information gathered from interviews of the 4 island residents suggest that there are approximately 6 sows on the island, making hunting/trapping appear to be a more viable method to control and/or eradicate the feral pig population. However, the logistics of effective trapping and hunting need to be worked out. Based on the mapped indicators of pig activity (see Figure 2) and a visual reconnaissance of the island, we deem fencing of beaches to keep out feral pigs to be a very costly option.

COMMENTS

We will continue to study options for feral pig control, eradication, or threat mitigation using the combination of mapped pig and turtle activity data and landscape features (e.g., topography, trails, vegetation) that the Wildlife Division plan to map during future visits for other biological work.

The Jennings family members have different views with regards to the feral pig population. There are those who would like to maintain a small population of pigs as a source of protein for the residents on the island. Others prefer to completely eradicate the population. A consensus would be needed before proceeding with any of control or eradication measures.

3. **BEACH MONITORING:** *Establish a regular monthly beach monitoring program to determine seasonality, spatial patterns and frequency/intensity of nesting.*

METHODS:

Recruit and train resident beach monitors who shall conduct daily beach walks at least 5 days per week for turtle tracks sighting or evening walks for sighting nesting individuals. Monitors were to be provided with a low intensity flashlight with red filter for evening walks. They will be asked to record spatially-explicit notes of observations beach map data sheets.

ACCOMPLISHMENTS

One resident was trained with handling and identification of turtles, equipment and supplies for nesting beach monitoring was also provided. Anecdotal information was collected via interview of the 4 residents.

However, we were unable to institute a regular beach monitoring program using local residents due to as-yet unresolved differences between DMWR and Jennings

clan on how to manage the monitoring project (see COMMENTS below).

OTHER OBSERVATIONS/NOTES

The past few months before the arrival of the research team, two residents (husband and wife, Alatina and Moana) took interest in observing the nesting activities of turtles, and they would occasionally monitor the beach during full moon or “when the moon is bright”. They knew of and can differentiate two species (green and hawksbill) of turtles that nest on the island. When the team arrive, the couple was in possession of a green turtle hatchling that they kept as a pet, out of the 10 eggs that they collected during a nesting episode. They had made a sand box with dimensions approximately 2 ½ X 2 ½ X 1 ½ feet where they relocated the 10 eggs. Upon the arrival of the research team the 9 other hatchlings were already released as according to the couple they were all strong and healthy except for one which they tried to rehabilitate. The green turtle hatchling was weak, slightly emaciated and also had an abnormal carapace with 7 vertebral scutes.

Residents were advised about federal and territorial regulations about turtles. In effect they were in violation and could have been subjected to fine or imprisonment. However, the isolation and lack of information for these people were mitigating factors and it was not really to the benefit of turtle conservation to impose punitive measures in this case, especially since their actions were solely based on their curiosity about and interest of caring for turtles. DMWR enforcement officers have given them guidance on how best to deal with similar situations in the future.

COMMENTS

The beach monitoring activity was not implemented due to continuing negotiations with the Jennings family. Almost all of the people that were born and used to live on Swains Island are based in Tutuila Island at present and are all members of a community organization of Swains islanders. The Jennings family has been coordinating community members and is planning to relocate back to Swains Island. The proposed regular shifting of people to live on the island every 4 months has not been established and implemented, and with the family wanting to course beach monitoring funds to go through the community organization, this caused the breakdown of the negotiations between the interested beach monitors the Jennings family regarding the projects beach monitoring plan. A renegotiation with the owners of the island is needed to implement future turtle project activities.

4. OTHER ACTIVITIES:

Genetic Sampling

Tissue samples were collected from the captive green turtle hatchling and from 3 old

nests by K. Frutchey in the presence of permitted wildlife division staff. Samples were shipped to Dr. Peter Dutton at the NOAA-NMFS/SWFSC LaJolla Laboratory for analysis.

Large Scale Fish Survey and Coral Reef Monitoring: Documentation of in-water turtle presence

Incidental turtle sightings were recorded by the DMWR fisheries division that conducted coral reef monitoring and large scale fish survey (Figure 3). The large scale fish survey completed 3 transects around the island, and sighted a total of 3 green turtles. The coral reef monitoring conducted 5 dive surveys covering 100m transects and recorded a juvenile leatherback turtle. The nearshore sightings were concentrated in the northwest point of the island.

5. FINAL RESOLUTION/RECOMMENDATIONS:

There are three items that should be pursued as priorities:

- a) Monitoring during active nesting season is needed. Ideally, a year round beach monitoring system is recommended. Signing of a memorandum of understanding/agreement between DMWR, the Jennings Family and/or the Swains Island community organization may be necessary to foster the program.
- b) Cost and viability analysis of pig control or eradication measures should be completed. Options should be discussed with the Jennings family in consideration of expressed desire to provide a sustainable protein source for island residents.
- c) Presence of other threats to the nesting beach habitat, nesting turtles and hatchlings such as feral cats needs to be verified in the field.

The Wildlife Division turtle program should continue to coordinate with the Fisheries Division for incidental collection of nearshore turtle data. These incidental reports, collected over years, may suggest marine patches that may be preferentially frequented by turtles.

All information collected in this report will be provided to the Jennings Family to assist in arriving at a consensus on the direction to take in addressing the feral pig population threat to the nesting beaches.

Table 1. GPS position/locations of nesting turtle pits, tracks and evidence of feral pig interaction with the nesting beaches at Swains Island

ID	Lat_Deg	Lat_D_min	Long_Deg	Long_D_min	Lat_DD	Long_DD	Pits
01	11	3.544000	171	5.273	-11.059067	-171.087883	no tracks
02	11	3.553000	171	5.271	-11.059217	-171.087850	no tracks
03	11	3.579000	171	5.249	-11.059650	-171.087483	with turtle tracks
04	11	3.620000	171	5.214	-11.060333	-171.086900	with turtle tracks
05	11	3.627000	171	5.211	-11.060450	-171.086850	with turtle tracks
06	11	3.655000	171	5.192	-11.060917	-171.086533	with turtle tracks
07	11	3.657000	171	5.187	-11.060950	-171.086450	with turtle tracks
08	11	3.666000	171	5.181	-11.061100	-171.086350	with turtle tracks
09	11	3.673000	171	5.173	-11.061217	-171.086217	with turtle tracks
10	11	3.682000	171	5.164	-11.061367	-171.086067	no tracks
11	11	3.687000	171	5.16	-11.061450	-171.086000	no tracks
12	11	3.694000	171	5.152	-11.061567	-171.085867	no tracks
13	11	3.704000	171	5.141	-11.061733	-171.085683	no tracks
14	11	3.709000	171	5.132	-11.061817	-171.085533	no tracks
15	11	3.729000	171	5.117	-11.062150	-171.085283	no tracks
16	11	3.738000	171	5.109	-11.062300	-171.085150	with turtle tracks
17	11	3.755000	171	5.099	-11.062583	-171.084983	with turtle tracks
18	11	3.755000	171	5.089	-11.062583	-171.084817	no tracks
19	11	3.765000	171	5.082	-11.062750	-171.084700	very old pit
20	11	3.785000	171	5.055	-11.063083	-171.084250	no tracks
21	11	3.792000	171	5.05	-11.063200	-171.084167	no tracks
22	11	3.801000	171	5.034	-11.063350	-171.083900	with turtle tracks
23	11	3.820000	171	5.014	-11.063667	-171.083567	no tracks
24	11	3.839000	171	4.991	-11.063983	-171.083183	with turtle tracks
25	11	3.841000	171	4.973	-11.064017	-171.082883	no tracks
26	11	3.860000	171	4.959	-11.064333	-171.082650	no tracks
27	11	3.866000	171	4.948	-11.064433	-171.082467	no tracks
28	11	3.879000	171	4.929	-11.064650	-171.082150	no tracks
29	11	3.881000	171	4.917	-11.064683	-171.081950	no tracks
30	11	3.885000	171	4.913	-11.064750	-171.081883	no tracks
31	11	3.895000	171	4.882	-11.064917	-171.081367	no tracks
32	11	3.905000	171	4.853	-11.065083	-171.080883	no tracks
33	11	3.642000	171	4.348	-11.060700	-171.072467	no tracks
34	11	3.501000	171	4.12	-11.058350	-171.068667	no tracks
35	11	2.908000	171	4.536	-11.048467	-171.075600	no tracks
36	11	2.900000	171	4.545	-11.048333	-171.075750	no tracks
37	11	2.901000	171	4.548	-11.048350	-171.075800	with Pig Tracks
38	11	2.903000	171	4.576	-11.048383	-171.076267	no tracks
39	11	2.907000	171	4.587	-11.048450	-171.076450	with Pig Tracks
40	11	2.904000	171	4.609	-11.048400	-171.076817	no tracks

Table 1. Continued

ID	Lat_Deg	Lat_D_min	Long_Deg	Long_D_min	Lat_DD	Long_DD	Pits
41	11	2.927000	171	4.752	-11.048783	-171.079200	no tracks
42	11	3.047000	171	5.251	-11.050783	-171.087517	with Pig Tracks
43	11	3.047000	171	5.251	-11.050783	-171.087517	Turtle Tracks Only
44	11	2.838000	171	4.291	-11.047300	-171.071517	with Pig Tracks
45	11	2.905000	171	4.524	-11.048417	-171.075400	Pig Tracks
46	11	2.908000	171	4.521	-11.048467	-171.075350	Pig Tracks
47	11	2.901000	171	4.514	-11.048350	-171.075233	Pig Tracks
48	11	2.852000	171	4.308	-11.047533	-171.071800	Pig Tracks
49	11	2.911000	171	4.526	-11.048517	-171.075433	Pig Tracks
50	11	2.843000	171	4.302	-11.047383	-171.071700	Pig Tracks
51	11	2.840000	171	4.295	-11.047333	-171.071583	Pig Tracks
52	11	2.908000	171	4.477	-11.048467	-171.074617	Pig Tracks
53	11	2.841000	171	4.287	-11.047350	-171.071450	Pig Tracks
54	11	2.907000	171	4.478	-11.048450	-171.074633	wallow
55	11	2.840000	171	4.285	-11.047333	-171.071417	wallow
56	11	3.125000	171	4.133	-11.052083	-171.068883	wallow

Table 2. *Swains Island Nesting Beach area substrate classification.*

FID	sector	prcnt_Rubb	prcnt_Sand	prcnt_Rock	width	Substrate
0	18-19	50	50	0	10	Equal Rubble/Sand
1	19-20	90	10	0	10	Rubble
2	20-21	50	50	0	5	Equal Rubble/Sand
3	21-22	100	0	0	7	Rubble
4	22-23	60	40	0	5	Mostly Rubble
5	23-24	60	40	0	3	Mostly Rubble
6	24-25	100	0	0	2	Rubble
7	25-26	100	0	0	4	Rubble
8	26-27	80	20	0	5	Rubble
9	27-28	100	0	0	2	Rubble
10	28-29	100	0	0	10	Rubble
11	29-30	90	10	0	3	Rubble
12	30-31	30	70	0	4	Sand
13	31-32	60	40	0	4	Mostly Rubble
14	32-33	90	10	0	3	Rubble
15	33-34	70	30	0	8	Rubble
16	34-35	40	60	0	10	Mostly Sand
17	35-36	50	50	0	10	Equal Rubble/Sand
18	36-37	40	60	0	8	Mostly Sand
19	37-38	70	30	0	3	Rubble
20	38-39	50	50	0	8	Equal Rubble/Sand
21	39-40	20	80	0	3	Sand
22	40-41	10	90	0	6	Sand
23	41-42	5	95	0	15	Sand
24	42-43	20	80	0	15	Sand
25	43-44	5	95	0	6	Sand
26	44-45	5	85	10	5	Sand
27	45-46	2	88	10	5	Sand
28	46-47	1	94	5	6	Sand
29	47-48	2	78	20	6	Sand
30	48-49	5	15	80	5	Rock
31	49-50	5	55	40	8	Sand/Rock
32	50-51	5	90	5	10	Sand
33	51-52	60	30	10	5	Mostly Rubble
34	52-53	10	20	70	8	Rock
35	53-54	5	90	5	6	Sand
36	54-55	5	75	20	6	Sand
37	55-56	3	95	2	4	Sand
38	56-57	10	0	90	5	Rock

Table 2. Continued

39	57-58	70	10	20	5	Rubble
40	58-59	5	85	10	7	Sand
41	59-60	50	0	50	3	Equal Rubble/Rock
42	60-61	50	0	50	6	Equal Rubble/Rock
43	61-62	45	50	5	8	Mostly Sand
44	62-63	20	80	0	6	Sand
45	63-64	40	55	5	8	Mostly Sand
46	64-65	80	15	5	10	Rubble
47	65-66	50	48	2	20	Equal Rubble/Sand
48	66-67	20	75	5	20	Sand
49	67-68	60	35	5	15	Mostly Rubble
50	68-69	60	40	0	10	Mostly Rubble
51	69-70	40	60	0	10	Mostly Sand
52	70-71	50	50	0	10	Equal Rubble/Sand
53	71-72	60	40	0	15	Mostly Rubble
54	72-73	30	70	0	15	Sand
55	73-74	70	30	0	20	Rubble
56	74-75	80	20	0	25	Rubble
57	75-76	90	10	0	10	Rubble
58	76-77	60	40	0	15	Mostly Rubble
59	77-78	50	50	0	25	Equal Rubble/Sand
60	78-79	100	0	0	40	Rubble
61	17-18	100	0	0	10	Rubble

Figure 1

Swains Nesting Beach Composition 07 - 09 May, 2009

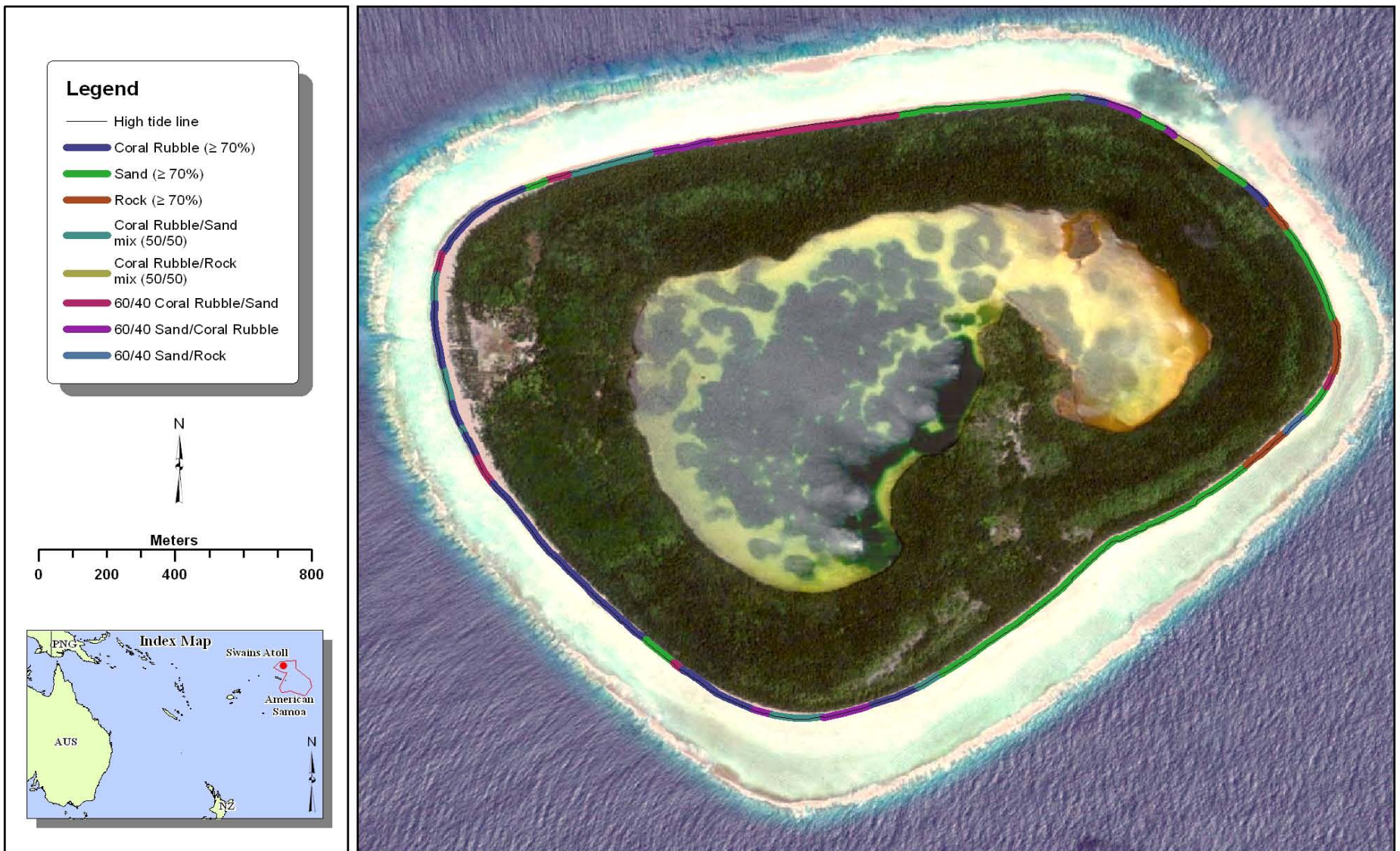


Figure 2

Swains Atoll Sea Turtle Nesting Sites, Pig Interaction and Beach Composition 07 - 09 May, 2009

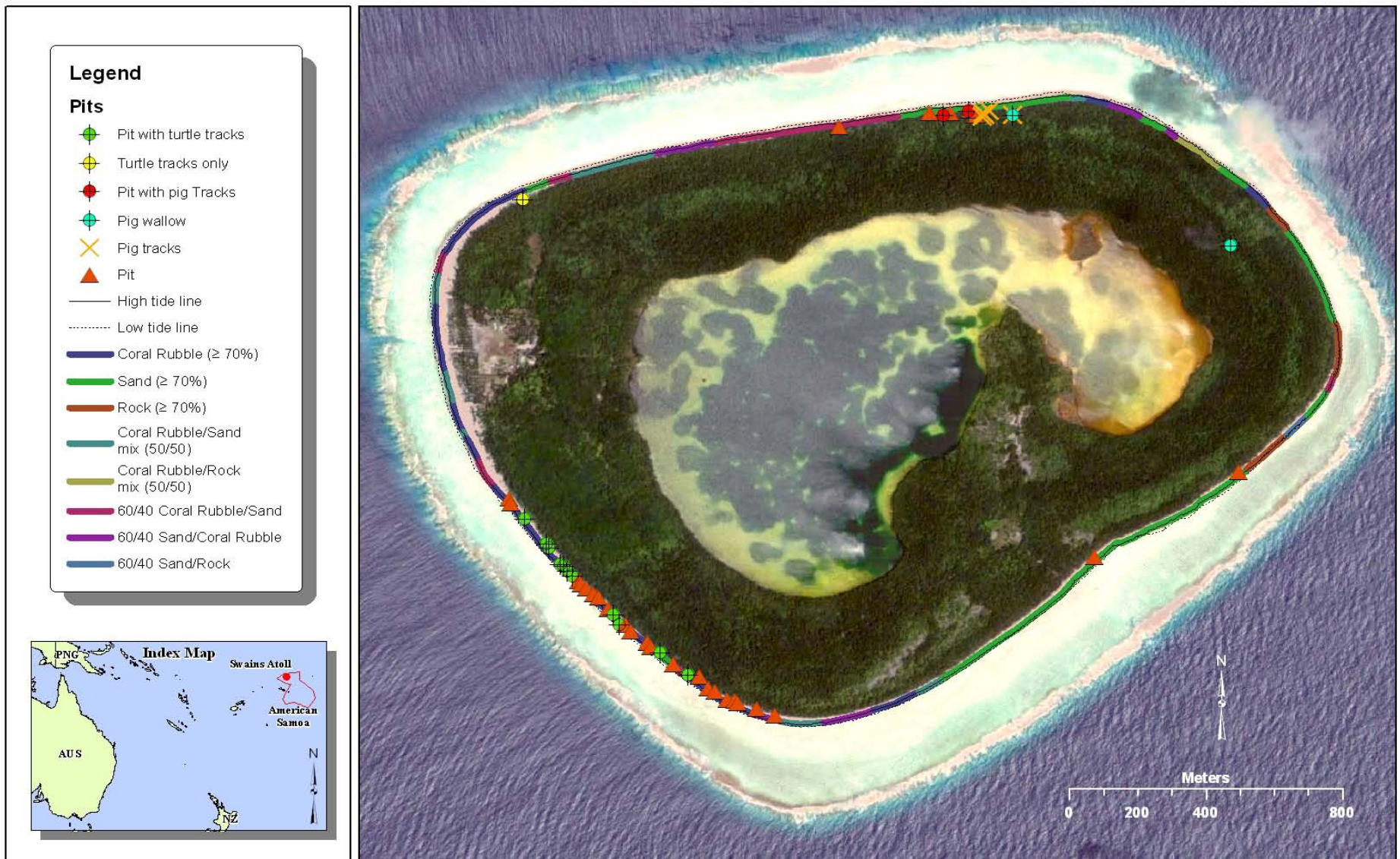
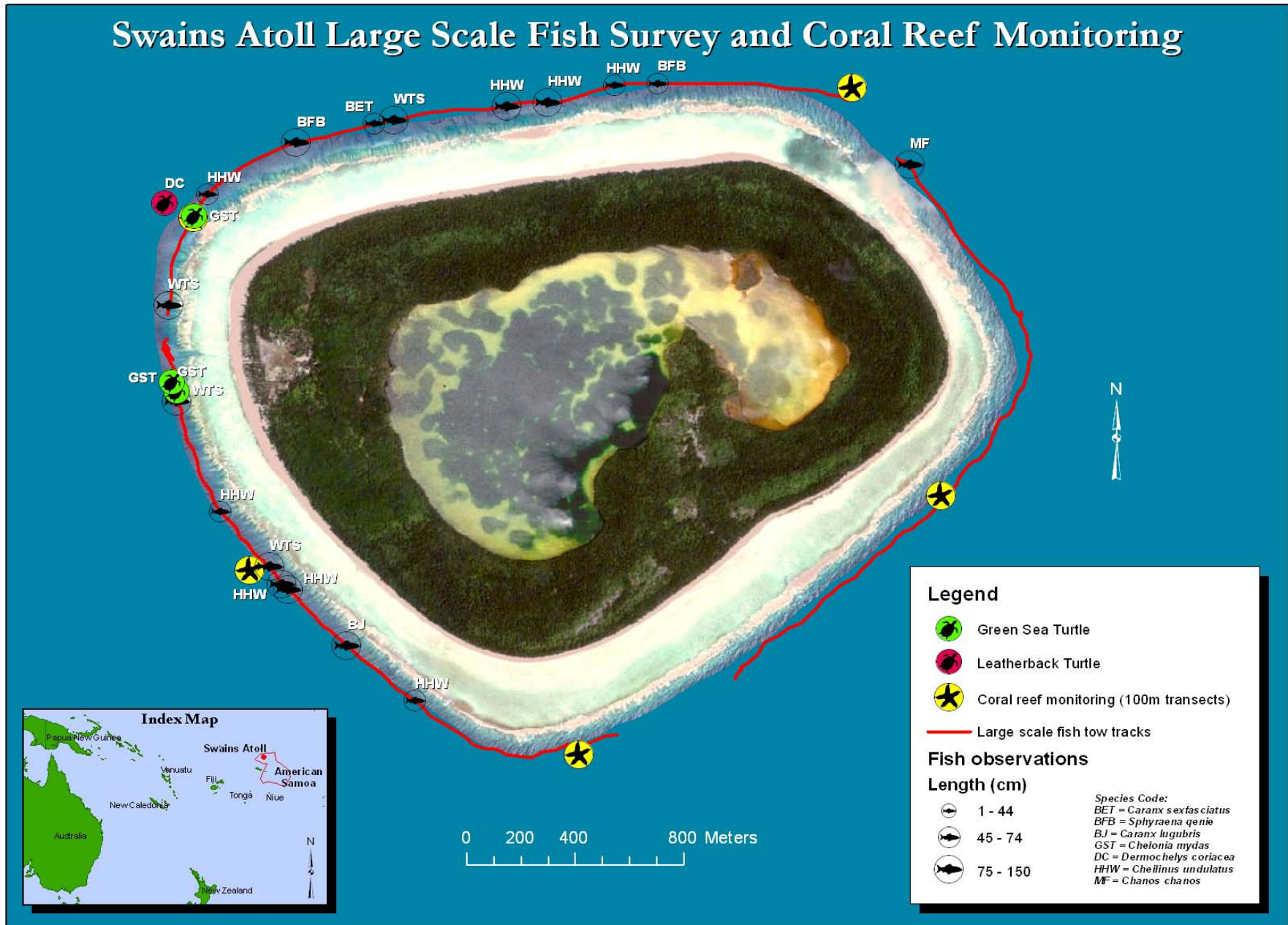


Figure 3



*Department of Marine & Wildlife Resources (DMWR)
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“Investigations into the Status of Marine Turtles in American Samoa,
with Remediation of Identified Threats and Impediments
to Conservation and Recovery of Species”

NOAA/NMFS Unallied Management Grant:
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FINAL REPORT
(01 October 2004 to 30 September 2008)

Prepared by:
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Katerine Schletz Sali, (Previous) Wildlife Biologist
Ruth Utzurum, Consulting Biologist
29 December 2008

OVERVIEW:

The objectives of Award No. NA04NMF4540126 were to: 1) expand satellite tagging and continue with flipper tagging to enhance information on movements (local and migratory); 2) continue opportunistic genetic sampling for determination of population association (i.e., genetic stock); 3) determine patterns of occurrence and relative numbers of turtles frequenting near-shore areas around Tutuila through in-water surveys; 4) institute remediation of threats to successful nesting and hatching at nesting sites; and 5) implement an aggressive community outreach program to enhance village-based conservation activities.

Implementation of day to day project activities were handled by Kate Schletz Sali from the award of the grant until third quarter of 2006 followed by minimal implementation as a replacement biologist was sought. Alden Tagarino was hired in late June 2007 and assumed responsibility for day-to-day implementation of marine turtle projects. A 2-month (July to August 2007) field biologist, D. Monie (an MS student at UC at Santa Barbara) was also recruited to assist primarily in resumption of beach mapping, in-water surveys, and tagging activities.

Accomplishments throughout the grant are presented herein in four main sections: 1) Local Movements and Distribution; 2) Regional Movement and Phylogeography; 3) Nesting and Nesting Beach Habitat; and 4) Information and Outreach. Each Section is further divided in Methods, Accomplishments, Outcome/Evaluation, and Final Resolution. A fifth section (OTHER ACTIVITIES) reports on other activities conducted (both research/conservation and grant management) during the period.

1. LOCAL MOVEMENTS AND DISTRIBUTION

Information on the local patterns of distribution and movement of turtles occurring in Territorial waters is key to conservation and management of the species. The patterns provide guidance on critical in-water habitat that may need protection and management of human activities (such as fishing, recreational activities) to minimize impact on resident populations.

Determination of local movements and distribution were conducted through mark-recapture (flipper tagging), systematic in-water surveys, and opportunistic incidental sighting records. Methods employed and results of the activities are detailed in succeeding sections.

A) Flipper Tagging

METHODS

Live turtles were obtained from recoveries from the community through DMWR's Conservation/Enforcement Section as well as from in-water captures. All live, previously untagged turtles were tagged on both right and left front flippers with self-piercing, self-locking titanium tags (40 x 11 x 10 mm) made by Stockbrands Co., Mt. Hawthorn, Australia and provided to DMWR by the Secretariat of the South Pacific Regional Environment Programme (SPREP). Tags and applicator were washed in soapy water and rinsed with 70% Isopropyl alcohol prior to tagging. The application site was also disinfected with 70% Isopropyl alcohol prior to tagging. Tags were applied using stainless steel tag applicators (Stockbrands Co., Mt. Hawthorn, Australia). The tag application site was located proximal of and adjacent to the proximal-most large scale on the posterior edge of the front flipper, as described in Balazs (1999). Tags on recaptured animals were inspected for any signs of infection or tissue damage that may be alleviated through tag removal/replacement; missing tags were replaced.

Data collected for all turtles included species, sex (if known), curved carapace length (CCL), curved carapace width (CCW), general condition based on external examination, activity at the time turtle was found, location found, and location released.

In-Water Capture

METHODS: Capture methods attempted followed recommendations described in Ehrhart and Ogren (1999) paraphrased as follows: The primary method attempted involved sighting turtles from shore/in-water, swimming out to the turtles using snorkel gear, catching them by hand, and transporting them to shore by hand and use of an inner tube attached to a plywood platform. Any turtles captured are placed on their backs inside the tube with their heads resting upon the tube. The alternative method attempted consisted of sighting turtles from a boat (Whaler), following a turtle until it slows or stops, and diving into the water to capture it. Biologists diving into the water are equipped only with snorkeling gear. Any turtles successfully captured are held at the nuchal and posterior marginal scutes and guided to the surface where they are lifted onto the boat for tagging.

Efforts to procure turtles for flipper tagging, tissue sampling, and possibly satellite tagging were made on 3 separate days in 2006: 2/17 Gataivai, 2/24 Fagaalu, 3/13 Gataivai, Fagaalu, Fagaitua. On day 1, no boat was used. Although five turtles were sighted on that day, efforts to capture them proved futile. The DMWR Whaler was used on Day 2. Only 2 green turtles (possibly the same individual) were seen and quickly swam away when the boat approached them. No turtles were seen on Day 2 at Gataivai. Day three yielded 3 hawksbill sightings. Although 1 was seen at the surface, it quickly dove to a depth not attainable by free divers. The other 2 hawksbills were also sighted at unreachable depths. Unsuccessful capture attempts were due in part to staff inexperience and in part to the method used. It is apparent that a combination of trying new methods (i.e., “rodeo” capture, use of SCUBA divers – with 2-person teams and night diving, and tangle net) and continued practice with the hand capture method outlined above is necessary to achieve capture success.

ACCOMPLISHMENTS

- 1) A total of 35 turtles were flipper tagged during the grant period, 19 hawksbill and 16 green turtles (Table 1). All of the turtles tagged were either hand captured (11 individuals), results of fishery interaction (4 individuals) and/or from strandings reported by the public (50 individuals). All turtles were recovered by either DMWR Enforcement Officers or Wildlife Biologist.
- 2) K. Schletz Saili met with A. Trevor (SPREP) to obtain a copy of the regional Turtle Research and Monitoring Database (TREDS), learn how to navigate it, learn data entry format, and discuss data ownership and access agreements for all database users. Anne Trevor and Christian Slaven visited DMWR on October 11-13, 2006 and trained 2 Wildlife staff (A. Tualalelei and V. Vaivai) in the use of TREDS. Modifications to the basic data base set up were made during the training to include input of additional observations DMWR collects/records on turtles. Update of the database has been pending after the end of contract of the previous biologist, as efforts have been focused in resumption of the turtle project activities focusing on in-water surveys by the new biologist.

B) In-water Surveys

METHODS

Two swimmers (using snorkel gear) keeping approximately 10 meters distance between them conducted a continuous search for 1 hour as they swam parallel to the shore starting at 15 meters from the shore and moving farther out in 15-meter increments (shorter for sites with low visibility) for subsequent passes as time allowed. Species, approximate size, and general location were recorded for any turtles sighted.

14 potential bays/lagoons were visited at least once to confirm suitability as survey sites and, if suitable, conduct surveys. “Suitability” was determined by on-site assessment of several factors including safety (absence of dangerous waves or currents), visibility (>1 meter visibility and absence of regular turbidity), and accessibility (sites which require long hikes or access from a boat were eliminated due to logistical constraints). Two of

these sites were each formally visited twice and later eliminated as potential survey sites based on the regular presence of rough waves (Tula) or turbidity (Lion's Park). An additional site identified based on the "suitability" criteria during the resumption of project activities was added to the 10 previously identified survey areas.

ACCOMPLISHMENTS

A total of 11 in-water snorkel survey sites (Airport beach lagoon, Malota, Amanave, Fagaalu, Gataivai/Utulei, Vatia, Masefau, Onenoa, Alofau, A'asu, and Coconut Point) have been established for regular monitoring of turtle population near shore and reef flats around Tutuila Island.

2 sites in Ofu (Toaga and in front of Ofu Village) and 1 site in Olosega (in front of the Village) have also been identified for regular and long term monitoring

78 in-water surveys were completed in Tutuila and 9 exploratory snorkel surveys were conducted in the Manu'a Islands specifically Ofu and Olosega during the grant period. Raw data of in water sightings are presented in Table 2.

C) Incidental Sightings

METHODS

Two types of incidental sightings data were collected and will continue to be collected: *Type A* – Structured data from systematic dive and snorkel surveys (site specific, repeated) around Tutuila Island as components of the Community-Based Fisheries Management Program, Marine Protected Areas Program and Key Reef Species Monitoring Program.

Type B – Unstructured data consisting of incidental sighting reports from non-systematic in-water activities (dives, snorkeling, etc) conducted by employees of DMWR, the National Park of American Samoa, other government agencies

Data collected are recorded on an incidental in-water turtle sighting form developed by K. Schletz Saili under Unallied Management Grant: Award No. NA03NMF4540355.

ACCOMPLISHMENTS

- 1) *Type A* data from DMWR Fisheries Biologists: A total of 24 sightings were reported during dives and snorkel surveys unrelated to turtle surveys, including 9 hawksbills and 9 greens. Six others were unidentified.
- 2) *Type B* data from sightings by other government agency employees and interested villagers: A total of 43 sightings were reported including 15 greens, 18 hawksbills, and 10 unidentified turtles.

OUTCOME/EVALUATION: LOCAL MOVEMENTS and DISTRIBUTION

Current data are insufficient to establish the relative population of turtles that frequent near shore and reef flats around Tutuila Island. Data from flipper tagging, in-water snorkel surveys, and incidental sightings are also preliminary given the short temporal span of the activities. The data, however, strongly suggest that American Samoa waters may support a population of year-round resident sea turtles, particularly juveniles and sub-adults, with high site fidelity (also see section on satellite tagging).

The low number of recaptures as recapture activities are yet to be implemented by use of a tangle net and the relatively brief time interval (1-2 days) between tagging and recaptures do not as yet provide sufficient data to determine local movement. The data collection can be improved through institution of better in-water capture techniques conducted at greater frequencies. A quarterly tangle net capture method is recommended to acquire a robust data set.

Systematic collection of incidental turtle sightings data from DMWR fisheries biologists during dives and snorkel surveys unrelated to turtle surveys served to widen the areal coverage of information collected. While the systematic snorkel-based surveys covered near shore reef flats and bays, the dives included areas near the reef edge. Additionally, analysis of the data will require reconstruction of dive information (which are on record with the Fisheries division) to capture negative information, i.e., records of dives (sites and times) when no turtles were sighted. No NOAA support staff were in any way involved in this activity and release of raw data to other agencies other than DMWR is prohibited until a formal request for permission to use the data is approved.

FINAL RESOLUTION

Flipper tagging activities are programmed to be continued under NOAA Grant Award No. NA06NMF4540217. Additionally, George Balazs was contacted and agreed to train select DMWR in the use of tangle nets pending the acquisition of a tangle net for in-water captures to increase the numbers of turtles for the mark-recapture study. In-water snorkel survey activities are also continuing under this grant.

Collection of *Type A* incidental sighting data by the Fisheries staff will continue. Both positive (with sightings) and negative (no sightings) dive data will be recorded.

Tagging data will be submitted annually to Anne Trevor (SPREP) for archival in the regional Turtle Research and Monitoring Database.

We anticipate being able to generate a robust set of data on abundance, distribution, and movement of marine turtles frequenting local waters with the continuation of NOAA Grant Award No. NA06NMF4540217.

2. REGIONAL MOVEMENTS AND PHYLOGEOGRAPHY

Documentation of large scale movements and information on phylogeographic relationships among populations of turtles are essential for the conservation and management of species (such as turtles) that are migratory. The transboundary and geopolitical issues inherent in the protection and management of migratory species require knowledge of connectivity

among seemingly geographically-separated populations. Previous satellite tracking of green turtles from Rose Atoll and flipper tagging data from the region have shown the potential for shared populations among American Samoa, Fiji, and other South Pacific countries (Craig et al 2004).

With the series of Unallied Management grants awarded to DMWR-Wildlife, we have developed a program for determining regional connectivity through satellite tracking, regional coordinated flipper tagging, and genetic analysis. The regional flipper tagging program is coordinated with through SPREP while the genetic studies are conducted in collaboration with the NOAA Southwest Marine Fisheries at La Jolla.

A) Satellite Tagging

METHODS

Prepare previously labeled transmitter by removing the magnet and placing masking tape over the screw heads (saltwater switch). Thoroughly clean the carapace at the site that the satellite tag and fiberglass cloth will cover. Clean carapace using scrub brush and fresh water. Dry thoroughly with a towel. Sand working area with course sandpaper and dust. Wipe again with freshwater and dry. Prepare elastomer by adding catalyst and mixing. Pour elastomer onto bottom of satellite tag and place it on the second vertebral scute. After the elastomer has cured, cut away excess and resand the areas that the elastomer contacted the carapace. Place a towel over the turtle's head to protect its eyes during the next step. Wearing latex gloves, mix resin and catalyst for 60 seconds. Brush resin onto transmitter and carapace, place pre-cut fiberglass cloths onto transmitter, and soak cloths with more resin using a paintbrush. Allow to dry until only slightly tacky. Repeat the mixing of resin and placing of more pre-cut fiberglass cloth for 2 additional coats. Remove tape from saltwater switch contact heads using a small knife. Label the turtle carapace by lightly sanding a code (e.g., "M1") and painting it with white appliance paint. Wait about 1 hour before releasing turtle at its original capture site.

Mapping data from ARGOS (dive data and positions), the position data are uploaded to Maptool of seaturtle.org. Many data pts are inaccurate, it is at the discretion of the biologist to select which points should be retained. Generally, all pts of accuracy 1, 2, or 3 should be kept which are accurate within 1 kilometer. Since often the only accuracy points available are A and B (unknown accuracies), some of these can be used if they look reasonable.

Reasonable:

- Other pts are near the pts in question and a realistic path is followed.
- Great distances have not been traveled in unrealistic time periods.
- Note (many pts show up on land. This is probably because the turtles are in fact in water, but the slight inaccuracy puts them on land. These pts should either be kept as is or modified (you'll have to use a program other than maptool) to show up in water.

ACCOMPLISHMENTS

- 1) Satellite tags/transmitters and satellite tagging supplies were purchased in addition to the 7 transmitters purchased under Unallied Management Grant: Award No. NA03NMF4540355. Supplies purchased under this grant included 5 transmitters from Telonics, Inc. and miscellaneous items including elastomer, fiberglass cloth, and marine resin. Satellite tracking service associated with the 5 transmitters was contracted (paid for) through Argos, Inc.
- 2) 7 satellite tags were deployed during the grant period: 1 sub-adult green, 3 sub-adult hawksbill and 3 nesting female hawksbills (Table 1.) To date, two of these seven are still being actively monitored: 1) a recently satellite tagged post nesting hawksbill turtle with ID#60062 from Amalau Valley (Tutuila); and 2) a sub-adult hawksbill turtle ID #60070 from Fagaalu.

B) Tissue Sampling

METHODS

Sterile forceps and tweezers were used to cut away an area ca. 3 mm² and 1 mm thick from the surface layer of skin proximal to the first large scale on the dorsal side of the rear flipper. Alternatively, one sample was collected using a sterile razor blade and tweezers to cut away the small piece of tissue (ca. 2 mm³) displaced by the flipper tag at the tag's locking site on the ventral surface of one front flipper. Samples were placed in a screw-top vial of saturated sodium chloride solution, sealed with parafilm, and stored in a refrigerator at approximately 10.5 °C until they could be shipped to Dr. Peter Dutton at the NOAA-NMFS/SWFSC LaJolla Laboratory for analysis. Sampling methods used were based on personal communication with B. Bowen and reference to Fitzimmons et al. (1999).

ACCOMPLISHMENTS

- 1) 55 tissue samples were collected from 36 hawksbills, 17 greens and 2 olive ridley sea turtles during the grant period (Table 1.) Samples were taken from both live and dead turtles recovered by DMWR enforcement officers and/or wildlife biologist.
- 2) Tissue samples and data on the collections were reviewed and reconciled for submission to NOAA/SWFSC (La Jolla) at close of grant. Data on the collections were entered into the prescribed NOAA genetic samples archive entry spreadsheet.

OUTCOME/EVALUATION: REGIONAL MOVEMENTS and PHYLOGEOGRAPHY

Mapping of the positions transmitted showed that the 1 green and 3 hawksbill turtles, all sub-adults (43-51cm CCL) stay near shore and did not migrate away from Tutuila (Figure 1). Furthermore, the tracking data strongly suggest high site fidelity.

Adult post-nesting females, on the other hand, did show large-scale movements. Interestingly, directions of the movements of the two tagged post-nesting hawksbills showed two migration patterns: 1) a generally southern pattern with a more limited

East-West range within the Samoa waters (Figure 2); and 2) a southwesterly movement towards Cook Islands (Figure 3). Both differ from the generally northward movement shown by a post-nesting hawksbill tagged and released from Samoa (Samoa MNRE, pers. comm.).

Although the sample size from the tagging activities precludes conclusive determination of migration patterns, the movements seen so far provide a very informative indication of age-related differences of adult nesting females and subadults in behavior as well as the potentially geographically broad connections among turtle populations in the South Pacific.

Molecular data from the tissues collected, when analyzed against a broader set of samples from elsewhere in the region will contribute towards our understanding of the nature and extent of these geographic relationships.

FINAL RESOLUTION

Both satellite tagging and tissue sampling are continuing under NOAA Grant Award No. NA06NMF4540126. Deployment of the remaining three (3) A 1010, two (2) A 110 Telonics satellite tags will resume as opportunity arises.

3. NESTING AND NESTING BEACH HABITAT

In the American Samoa islands, beach habitats are generally limited with a significant proportion fronting villages and infrastructure (e.g., roads). Although historical data on nesting sites have been recorded (Tuatoo-Bartley et al, 1993), there is scant detail on the nature of the available beach habitats and an evaluation of their suitability for nesting.

The main thrusts of the nesting and nesting beach habitat component of this grant were to map and characterize as many of the accessible beach habitats on Tutuila, determine features that are associated with confirmed nesting, and identify any predispositions towards increased risk to nesting and hatching. This component constitutes a continuation of a mapping project initiated under NA03NMF4540355.

A) Beach Mapping

METHODS

On-site surveys using a Trimble GeoExplorer3 GPS unit to record beach features that potentially contribute to the selection and success of a nesting beach were conducted. The major features recorded were high tide line, vegetation, streetlights, streams/culverts, and roads. Additional data recorded included beach slope and aspect, sand composition, and the presence of additional threats such as “at large” dogs. All mapping data collected were uploaded using Pathfinder Office and maps were created ARC GIS 9 using ArcMap

ACCOMPLISHMENTS

Forty seven beaches were initially identified as *potential* nesting beaches based on DMWR data (e.g., reports of nesting or in-water sightings). On-site surveys on all 47 beaches were conducted. Of these beaches, 3 were assigned a status of NO nesting potential, 15 LOW potential, 14 HIGH potential, 9 IDENTIFIED, and 6 CONFIRMED. A total of 15 maps were produced for all active nesting beaches (beaches of the status IDENTIFIED or CONFIRMED)

Preliminary surveys of beach habitats in Manu'a were conducted. 5 beaches have been identified for mapping, Ofu Village beach, Toaga, Mafafa, Asaga and Olosega Village beach. Additionally, mapping data were collected on five potential nesting beaches. The mapping of the 5 beaches were initiated in (August 2007).

Figure 4 summarizes information on beach habitats as they relate to turtle nesting. Maps of five beach habitats confirmed used for nesting within the past five years are presented in a series of figures: Malota (Figure 5), Sailele (Figure 6), Amalau (Figure 7) O'a (Figure 8), Tula (Figure 9), Amanave (Figure 10)

B) Recorded Nesting/Hatching

METHODS

The following protocol for beach monitoring was established and followed per suggestions from K. Frutche (NOAA-PIRO): 1) *AM beach walk*: walk along beach in early morning (05:00-08:00) walking close to tide line. Look for crawls, pits, and turtle egg shells. If a crawl is seen, follow it to determine whether a nest was made or it was a non nesting emergence. 2) *PM monitoring*: target beaches where crawls have already been reported. Return 10-15 days after a crawl is reported. Starting around 19:00 until dawn, periodically check the beach for nesting turtles or hatchlings. Do this by walking along the beach as described for AM monitoring. Use only ambient light or a red-filtered headlamp. If a track is seen, follow it being careful not to disturb the turtle. Observe from behind. If the turtle nests, use only red-filtered light to count eggs. Once turtle begins to cover eggs, measure and flipper tag the turtle. Shortly after she begins to move towards the water, place pre-fabricated restraining pen over her and wait until dawn for satellite tagging (see above methods for satellite tagging). If hatchlings are observed, count without disturbing or touching them and attempt to determine nest location. Three days later, return to dig up nest and count egg shells to determine hatch success.

ACCOMPLISHMENTS

- 1) A total of 62 AM beach walks were conducted covering Malota, Seetaga, Sailele, Masausi, Onenoa, Tula, Alao, Utumea, and Amalau. Only one crawl was seen during these AM beach walks. It was a somewhat old crawl seen at Onenoa on 11/11/05.
- 2) 10 overnight monitoring at Malota nesting beach and five overnight monitoring at Amalau nesting beach were also done. Only 1 night yielded any sign of turtles at Malota; it was the night that a post-nesting hawksbill was captured for satellite

tagging (see satellite tagging above). Five possible nests were recorded at the confirmed hawksbill turtle nesting beach in Amalau.

- 3) Seven opportunistic morning beach walks were conducted in Ofu and Olosega in search for turtle tracks but none were recorded.
- 4) Three post-nesting females (from Amalau, Malota, and Tula) were recorded during the grant period; additionally, nesting at three other beaches (Amanave, O'a, Sailele) were inferred from presence of hatchlings (Table 2).

OUTCOME/EVALUATION

Direct confirmation of nesting activity has increased since the institution of the Unallied Management grant-supported turtle program at DMWR. Improved coordination and increased understanding of conservation issues between and among Wildlife staff and Conservation/Enforcement officers were instrumental in improved documentation of these events (nesting, crawls, hatchling recoveries).

It is recognized that increased beach monitoring is needed. These requires manpower and man-hours that may be beyond the fiscal scope of the grant or Department. DMWR-Wildlife turtle program will endeavor to develop and train community volunteers to undertake part of the monitoring. Among potential participants are members of the AMERICORPS.

FINAL RESOLUTION

Nesting beach activities are CONTINUING under NOAA Grant Award No. NA06NMF4540217. Evaluation, mapping, and monitoring of nesting activity in the remote Island of Swains is scheduled for FY2009 under NOAA Grant Award No.NA08NMF4540506.

A compilation of completed beach habitat maps will be submitted in print and digital form before the close of FY2009.

C) Mitigation and Threat Remediation

With this a step towards threat remediation at nesting sites was planned through a pilot village project involving establishment of vegetation barriers and reduction of light pollution. The vegetation barrier was intended to reduce mortalities (of both adult nesters and hatchlings) in areas where the nesting habitat is proximal to roads/vehicular traffic.

METHODS

A village confirmed as a nesting beach site was selected and approached for institution of a vegetation barrier and light reduction. The village of Tula was identified based on the proximity of confirmed nesting areas to the road, repeated records of either post-nesting females or hatchlings straying into traffic, and preponderance of street/environmental lights that may contribute to disorientation of the turtles following emergence (Figure 9).

Negotiations were done through traditional channels. The ASCC-Land Grant program contributed to the effort by propagating seedlings for planting. K. Schletz Saili discussed with the local power company, ASPA, on way for reducing light pollution. The initial plan was to replace existing street light fixtures with environmentally (less polluting) rated units on a trial basis (paid for by the grant). ASPA suggested installation of light shields as an alternative.

ACCOMPLISHMENTS

1) Initial work on nesting beach barriers in Tula Village in 2006 involved planting of native species of coastal plants (*Terminalia catapa*, *Thespesia populnea*, *Zafora sp*) and mostly three non native species of *Crotons sp.* of the 1500+ seedlings propagated by the Land Grant Program of the American Samoa Community College. This effort was largely unsuccessful in part due to a poor choice in species of plants (i.e., not suitable for a beach substrate) and spacing between plants. Resumption of negotiation with village leaders on revised plans took place in July 2007 upon cultivation of starter plants that were coastal species.

2) 500 native coastal species, 300 *Scaevola sp.* and 200 *Zafora sp.* seedlings were propagated by the Land Grant Program of the American Samoa Community College for the second attempt at establishing beach vegetation barriers. Approximately 300 seedlings were planted in Tula Village (May 21, 2008) with participation from the Village Officials and students of Matatula Elementary School.

3) Two road revetment projects, in Aoa and in the road section damaged by hurricane Heta in 2004 in Ta'u Island (both potential nesting beaches), were reviewed in response to a public notice issued by the Army Corps of Engineers. The review consisted of searching archived data to determine whether nesting activity had been reported on the beach, analyzing beach mapping data (collected under NOAA Award No NA03NMF4540355), and re-visiting the site to make an overall assessment of the beach's nesting habitat potential and identify alternative, low-impact construction options. Recommendations, including relocation of construction activities farther inland, to minimize impacts on the beach were submitted to the Army Corps of Engineers.

OUTCOME/EVALUATION

We were unable to push through with the light reduction initiative due to problems in engaging ASPA through the implementation process. We will continue to pursue the issue through ASPA as well as through villages starting with voluntary light reduction (e.g., selective turning off of 30-50% of street or external lights) during potential nesting periods (e.g., as indicated presence of crawls and/or possible nests).

We also have to do a better job at following up on the vegetation barrier program following planting and seek to replace dead seedling as soon as possible.

FINAL RESOLUTION

The program will resume discussions with ASPA regarding light reduction at nesting sites. The issue of voluntary light reduction will be brought to the attention of the village councils. Improvement and expansion of the vegetation barrier program will be pursued.

4. INFORMATION AND OUTREACH

The information and outreach component of DMWR's marine turtle program includes an array of presentation and media releases for both targeted and general audiences. Following is a listing of ACCOMPLISHMENTS and ACTIVITIES.

A) Presentations

DMWR Wildlife Division biologists collaborated with the DMWR Education Dept. to conduct an educational talk on sea turtle conservation for fourth grade students in Vatia in 2005. Seventh and eighth grade students at Matatula Elementary School in Tula on March 3rd, 2006.

After resumption of information and outreach activities in 2007, 3 educational campaigns on sea turtle biology and conservation were conducted in November 9 and 16, 2007 at the DMWR conference room participated by Manumalo Baptist School and Siliaga Primary School. The third information and education campaign was conducted at Matatula Elementary School in May 21, 2008 (6th-8th grade students)

B) Media

4 TV interviews discussing turtle conservation needs, DMWR research activities, and YOST (Year of the Sea Turtle) announcements. Additionally, a TV panel discussion was held on KVZK on February 7th 2005 (DMWR Wildlife, Education, and Enforcement). A radio interview and associated PSA were aired on Showers of Blessings 104FM. Additionally, articles appeared in 2 newspapers on 11/5/05 (Samoa News) and 11/13/05 (Samoa Post) about sea turtle conservation, the latter article written by K.S. Saili.

In July 2007, staff from the Wildlife Division (A. Tualualelei and A. Tagarino) held interviews with Malama News (TV) and Samoa News (print media) on local marine turtle conservation efforts and to remind the public of federal and local regulations protecting the species. These were followed by a TV (Malama News) reminder of protective regulations by DMWR Director Tulafono in August following a series of recoveries of dead turtles from the Pago Pago Harbor.

Media releases were conducted via print media (Samoa News and Samoa Tribune) in October 31, 2007 and January 12, 2008 TV (Malama News and KVZK) October 30, 2007 and January 14, 2008 the express purpose of reiterating conservation and regulations in effect following a series of recoveries of hatchlings from the village of Amanave and Sailele. Media release by Radio interview regarding the hatchlings found and released in the Village of Sailele was conducted by 93.1 KHJ on January 11, 2008.

In July 2008, Volunteer April Tadlock and Wildlife Biologist Alden Tagarino of the Wildlife Division held interviews with Malama News (TV) and Samoa News (print media) on local marine turtle conservation efforts and to remind the public of federal and local regulations protecting the species, following a series of recoveries of dead turtles where plastics were

found in the intestines during necropsy of two turtles. Articles on sea turtles including reminders of federal laws on turtles were printed by Samoa News in August (satellite tagged turtle) and September (recovered captive hawksbill).

FILMOGRAPHY

- 1) Approximately 1 hour of video footage was collected during satellite tag attachment and release of a post-nesting hawksbill ("Ms. Malota") subject to USFWS/NMFS permit regulations. Permission to obtain this video footage is expressed in DMWR's USFWS Permit No. TE-094808-0 granted on 5/4/05, which states that "video may be used for training and educational purposes" and "authorization from NMFS and the PIFWO is required prior to its use for *commercial* purposes." The permit also states that a copy of the video should be provided to NMFS and PIFWO for review. (It is understood that the copy of the "video" in question is the final product, not the raw footage.) The development of an educational video using this footage is in its initial stages and will be provided to the appropriate agencies for review prior to airing on local television stations.
- 2) Approximately 5 hours of video footage of hatchlings and nesting green sea turtles was obtained subject to USFWS permit regulations. Permission to obtain this video footage is expressed in DMWR's USFWS Permit No. TE-094808-0 granted on 5/4/05, which states that "video may be used for training and educational purposes" and "authorization from NMFS and the PIFWO is required prior to its use for *commercial* purposes." The permit also states that a copy of the video should be provided to NMFS and PIFWO for review. (It is understood that the "video" in question is the final product, not the raw footage.) The development of an educational video using this footage is in its initial stages and will be provided to the appropriate agencies upon completion.

SEA TURTLE HOTLINE: this program started in July 2007 and paved the way of a 24hr 7days a week wildlife emergency response program that includes response to marine mammal strandings terrestrial wildlife emergencies and avian influenza.

C) Interdepartmental Collaboration:

The American Samoa Sea Turtle Recovery Team (STRT), consisting of active members from DMWR, the National Park of American Samoa, Fagatele Bay National Marine Sanctuary, Dept. of Commerce, and NMFS (M. Sagapolu), was revived at the request of K.S. Saili (DMWR-Wildlife). Six formal meetings were held to plan a territorial campaign plan for the Year of the Sea Turtle (YOST), with special focus on the official launch on March 1st, 2006.

YEAR OF THE SEA TURTLE: The American Samoa Sea Turtle Recovery Team launched the YOST on March 1st, 2006 at Lion's Park. The launching ceremony coincided with the ceremonial ribbon cutting/opening of a wetlands platform (funded by DOC). Special guest speakers included the Lieutenant Governor, DOC Director, DMWR Director (Ufagafa Ray Tulafono). Other activities included performances from the Tafuna Swing Choir and Drama Club, a visit from the Turtle Mascot (yet to be named), announcement and prize-giving of YOST poster contest winners, and reading of a YOST Territorial proclamation (attached).

Special guests included all village mayors from identified nesting beaches and science club members from Matatula Elementary School, Matafao Elementary School, Tafuna Polytechnical High School, and Alataua Elementary School. Schools had been chosen based on proximity to identified nesting or foraging areas.

5) OTHER ACTIVITIES

Necropsies

METHODS

The protocol applied for necropsies follow those detailed in Work, 2000. Following is an abbreviated list of steps followed: Thaw frozen carcass by moving to room temperature approximately 24 hrs prior to necropsy. Measure curved carapace length and width and make external assessment (look for injuries, growths, etc.). Cut plastron off using a scalpel or filet knife. Cut digestive organs out by first tying off the esophagus near the throat and the rectum, then cutting just outside the ties. Carefully remove digestive organs. Look for reproductive organs to determine sex. Assess appearance of other organs such as lungs and liver, if possible. Slice open esophagus, stomach, and intestine to identify undigested food and/or foreign materials. Collect tissue sample using methods above. Best tissue to collect is muscle. Cut out humerus by cutting at shoulder and elbow joints, removing most muscle and skin, and placing in ziplock bag for freezing. Cut head just behind the scale (see manual for confirmation). Assess appearance of brain. Tissues can be collected and saved in formalin, if desired. Dispose of carcass and tissues by burying.

ACCOMPLISHMENTS:

- 1) One necropsy of a green sea turtle originally recovered from Lion's Park on March 31st, 2005 and frozen in the DMWR lab freezer was conducted by S. Fa'aumu, K.S. Saili, K. Frutchev (NOAA), and M. Snover (NOAA) on March 15th. The necropsy was done in part as a training exercise while NOAA staff were visiting on island. Although the carcass was too deteriorated to determine sex, a tissue sample was collected and stomach contents were collected. Initial assessment of stomach contents suggest that the turtle had been eating mangrove seeds. No potential cause of death was determined. The humerus was collected in anticipation of future collaboration with M. Snover to determine age by analyzing bone growth rings. The carcass was buried at a predetermined location near Vatia.
- 2) Seven dead turtles recovered from July – September 2007 were necropsied (3 greens and 4 hawksbills). Tissue samples from internal organs were preserved in formalin for histopathology. Aberrations were recorded in two of the necropsies: 1) a segment of fishing line and a fishing hook were found in the intestines of a hawksbill; and 2) pieces of plastic and aluminum were recovered from a green turtle. No other unusual findings were noted.
- 3) One dead hawksbill turtle was necropsied in January 2008 was. Tissue samples from internal organs were preserved in formalin for histopathology. Aberrations were recorded in the necropsies: 1) a fishing hook was found in the intestines of the hawksbill; and 2) pieces of plastic and aluminum were also recovered. No other unusual findings were noted.

- 4) Eight dead turtles were recovered and necropsied (1 green and 7 hawksbills) from April – September 2008 . Tissue samples from internal organs were preserved in formalin for histopathology (NOTE: We intend to send the samples to Dr. T. Work in Honolulu). Aberrations were recorded in four of the necropsies: 1) a segment of fishing line was found in the intestines of a hawksbill; 2) intestines filled with water and fishing line wrapped around the neck; 3) pieces of hard plastics and plastic grocery bags were recovered from one of the hawksbills and a green turtle that had a deformed carapace.

OUTCOME/EVALUATION & FINAL RESOLUTION: NECROPSIES

The information being recovered from necropsies are proving to be very important in documenting potential impacts of fishing interactions and pollution to the turtle populations. For this reason, we will continue to conduct these necropsies and will coordinate with Dr. Thierry Work (USGS-NWHC, Honolulu) to have tissues processed for histological examination when warranted.

On-island Visitation from NOAA staff

- 1) In January, 2005, Karen Frutchey, International Turtle Conservation and Management Liaison, visited DMWR to follow up on grant activities completed or in progress.
- 2) In January, 2005, Dan Namur, Grants Officer, visited DMWR to follow up on grant conditions including compliance with reporting requirements.
- 3) On March 13th-16th, 2006, Karen Frutchey, International Turtle Conservation and Management Liaison, and Melissa Snover visited DMWR to follow-up on grant activities completed or in-progress. K. Frutchey and M. Snover were able to accompany DMWR biologists on in-water capture attempts at 3 sites: Fagaalu, Gataivai, Fagaitua, and accompany us during 3 nights at Malota waiting for nesting hawksbills.
- 4) There have also been two on-island consultations with Scott Bloom and one with Stephanie Bennett for grant/fiscal issues in 2006.

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Table 1: Flipper Tagging, Satellite Tagging and Tissue Sampling activities of DMWR between October 1st, 2004 and September 30th, 2008.

(*Condition: 1=no injury, 2=injured, 3=dead)

Date Retrieved	Species	Location Found	Condition*	Lt Front Tag	Rt Front Tag	CCL cm	CCW cm	Tissue Sample#	Satellite Tag#	Activity
10/15/2004	ERIM	Lions Park	1	R20310	R20311	60	57	NA	NA	Caught by fishermen
10/20/2004	ERIM	Afao	1	R20314	R20315	37	34	NA	NA	Caught by fishermen
10/20/2004	ERIM	Amalau	1	R20312	R20313	89	76	NA	NA	Nesting
10/24/2004	ERIM	Laulii	1	R20317	R20316	53	44	NA	NA	Stranding
3/15/2005	ERIM	Pago Harbor	3	none	None	47	41	NA	NA	Stranding
3/19/2005	CHMY	Amouli	1	R20326	R20325	85	79	NA	NA	Stranding
4/10/2005	CHMY	Pago Harbor	2	R20327	R20328	56	47	NA	NA	Stranding
5/5/2005	CHMY	Aoa Stream	1	R20332	R20333	56	46	NA	NA	Stranding
5/5/2005	CHMY	Aoa Stream	1	R20334	R20335	47	46	NA	NA	Stranding
5/5/2005	CHMY	Aoa Stream	1	R20330	R20331	47	42	NA	NA	Stranding
8/16/2005	CHMY	Utulei	2	R20318	R20336	46	44	TUT-002	NA	Hand Capture
9/1/2005	ERIM	Utulei	3	none	none	43	36	TUT-003	NA	Stranding
10/3/2005	ERIM	Fogagogo	2	R20338	R20339	41	36	TUT-004	NA	Stranding
10/22/2005	ERIM	Utumea	1	none	none	ND	ND	NA	NA	Crawling on rd.
10/24/2005	ERIM	Laulii	1	R20317	R20316	53	44	NA	NA	Stranding
11/30/2005	CHMY	Utulei	2	R20341	R20340	46	44	TUT-005	NA	Stranding
12/6/2005	ERIM	Tula	1	none	none	4 avg.	4 avg.	TUT-006	NA	On beach, 6 hatchlings
2/28/2006	ERIM	Malota	1	R20457	R20456	81	71	TUT-007	60060	Nesting
3/2/2006	ERIM	Utulei	3	none	none	44	38	TUT-008	NA	Stranding
3/9/2006	ERIM	Pago Harbor	3	none	none	38	36	TUT-009	NA	Stranding
3/15/2006	CHMY	Lions Park	3	none	none	56.8	50.7	TUT-010	NA	Stranding
3/17/2006	CHMY	Pago Harbor	3	none	none	54	44	TUT-011	NA	Not recorded
3/31/2006	CHMY	Utulei	3	R20341	none	ND	ND	NA	NA	Not recorded
4/5/2006	ERIM	Pago Harbor	3	none	none	38	35	TUT-012	NA	Stranding
4/12/2006	ERIM	Pago Harbor	1	R20459	R20416	39	34	TUT-013	NA	Hand Captured
4/26/2006	ERIM	Amouli	1	R20347	R20345	49	44	TUT-014	60067	Gillnet fishery

Table 2: cont'd

Date Retrieved	Species	Location Found	Condition*	Lt Front Tag	Rt Front Tag	CCL cm	CCW cm	Tissue Sample#	Satellite Tag#	Activity
6/2/2006	ERIM	Fagaitua	1	R20464	R20466	52		TUT-015	60069	Hand Captured
6/2/2006	CHMY	Pago Harbor	1	R20467	R20469	46		TUT-016	60068	Hand Captured
6/7/2006	ERIM	Aua	3	none	none	38	34	TUT-017	NA	Stranding
6/13/2006	LEOL	Pago Harbor	3	none	none	50	51.8	TUT-027	NA	Stranding
6/16/2006	CHMY	Pago Harbor	1	R20470	R20482	54	50	TUT-018	NA	Hand Captured
6/16/2006	ERIM	Fagaalu	1	R20319	R20321	43	38	TUT-019	60070	Hand Captured
6/22/2006	CHMY	Fagaalu	1	R20485	R20484	64	59	TUT-020	NA	Hand Captured
6/22/2006	CHMY	Fagaalu	1	R20486	R20489	50	45	TUT-021	NA	Hand Captured
6/22/2006	CHMY	Fagaalu	1	R20492	R20490	49	44	TUT-022	NA	Hand Captured
6/22/2006	CHMY	Fagaalu	1	R20493	R20494	51	48	TUT-023	NA	Hand Captured
8/8/2006	CHMY	Utulei	1	R20496	R20495	46	42	TUT-024	NA	Stranding
8/27/2006	ERIM	Pago Harbor	1	none	none	41	36	TUT-025	NA	Stranding
11/29/2006	ERIM	Avaio	1	R20497	R20499	33	29	TUT-026	NA	Stranding
4/23/2007	ERIM	Fagatogo	3	none	none	40	37	TUT-028	NA	Stranding
7/12/2007	ERIM	Lions Park	1	R20478	R20479	41	36	TUT-029	NA	Stranding
7/21/2007	CHMY	Fagaalu	2	R20470	R20482	53.7	50.4	TUT-030	NA	Stranding
7/30/2007	ERIM	Pago Harbor	3	none	none	35.8	32.6	TUT-031	NA	Stranding
7/31/2007	CHMY	Airport Beach	3	none	none	46.3	43.1	TUT-032	NA	Stranding
7/31/2007	LEOL	Pago Harbor	3	none	none	51	54.6	TUT-033	NA	Stranding
8/22/2007	CHMY	Utulei	3	none	none	56.5	50.6	TUT-036	NA	Stranding
8/25/2007	ERIM	Pago Harbor	3	none	none	65.5	59	TUT-034	NA	Stranding
8/27/2007	ERIM	Pago Harbor	3	none	none	45.6	40.4	TUT-035	NA	Stranding
8/28/2007	ERIM	Lions Park	3	none	none	40.5	34.5	TUT-037	NA	Stranding
12/17/2007	ERIM	Amanave	1	none	none	4.2	2.9	TUT-038	NA	Hatchling
12/28/2007	ERIM	Utulei	3	none	none	52	47	TUT-042	NA	Stranding
1/10/2008	ERIM	Fagasa	3	R20500	R20503	45	36.5	TUT-039	NA	Stranding
1/11/2008	ERIM	Sailele	1	none	none	4.1	2.8	TUT-040	NA	Hatchling

Table 1: cont'd

Date Retrieved	Species	Location Found	Condition*	Lt Front Tag	Rt Front Tag	CCL cm	CCW cm	Tissue Sample#	Satellite Tag#	Activity
2/1/2008	ERIM	Amalau	1	R20703	R20704	81	70	TUT-041	60061	Nesting
3/12/2008	ERIM	Pago Harbor	3	none	none	38.5	33	TUT-043	NA	Stranding
3/22/2008	ERIM	Utulei	3	none	none	59	52	TUT-044	NA	Stranding
7/1/2008	ERIM	Aua	3	none	none	41	38	TUT-045	NA	Stranding
7/3/2008	CHMY	Utulei	3	none	none	48.5	45	TUT-046	NA	Stranding
7/4/2008	CHMY	Utulei	3	none	none	47.5	45	TUT-047	NA	Stranding
7/8/2008	ERIM	Pago Harbor	3	none	none	59	42	TUT-063	NA	Stranding
7/18/2008	ERIM	Pago Harbor	3	none	none	43	37	TUT-050	NA	Stranding
7/20/2008	ERIM	Pago Harbor		none	none	41	37	TUT-051	NA	Stranding
7/22/2008	CHMY	Kiribati Waters	3	none	none	31	29.7	TUT-052	NA	Purse seine
8/21/2008	ERIM	Alao	1	R20505	R20504	33	29.5	TUT-053	NA	Stranding
8/26/2008	ERIM	Tula	1	R20701	R20705	84	75	TUT-054	60062	Nesting
9/24/2008	ERIM	Pago Harbor	2	R20508	R20525	60.2	52	TUT-055	NA	Stranding
9/24/2008	ERIM	Pago Harbor	1	R20706	R20700	46	42	TUT-056	NA	Stranding
9/26/2008	ERIM	Afono	1	none	none	16.5	15.5	TUT-057	NA	Hand Captured

Table 2. Recorded Nesting on Tutuila during grant period.

SITE	DATE	SPECIES	Nesting female?	Hatchling/s found?	# Hatched eggs	# Unhatched eggs	# Released hatchling/s	NOTES
Malota	2/28/2006	ERIM	yes	no	NA	NA	NA	Satellite tagged and Flipper tagged
Amanave	10/28/2007	ERIM	no	yes	167	25	142	Hatchlings found by villagers
Amanave	11/12/2007	ERIM	no	yes	187	7	100+	Hatchlings found by villagers
Amanave	11/28/2007	ERIM	no	yes	156	18	100+	Hatchlings found by villagers
Sailele	1/10/2008	ERIM	no	yes	NA	NA	75	Hatchlings found by villagers Nest was not located
O'a	January 08	ERIM	no	yes	NA	NA	NA	16.5cm CCL confiscated (25 Sept 08) from villager in Afono
Amalau	2/1/2008	ERIM	yes	no	NA	NA	NA	Satellite tagged and Flipper tagged
Tula	8/28/2008	ERIM	yes	no	NA	NA	NA	Satellite tagged and Flipper tagged

Table 3. In-water sightings

(*Size Class: Juvenile: 10 – 70 cm, Adult: >70 cm)

Table 3.								
Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
2/16/2004	60	Gataivai	Y	Yes	7:55:00 AM	Coming In	Green	Juvenile
12/23/2004	60	Gataivai	Y	Yes	8:30:00 AM	Coming In	Hawksbill	Juvenile
12/25/2004	60	Gataivai	Y	Yes	8:15:00 AM	Coming In	Hawksbill	Juvenile
12/30/2004	60	Gataivai	Y	Yes	8:45:00 AM	High	Unknown	Unknown
1/2/2005	20	Amanave West	N	No				
1/3/2005	20	Amanave East	N	No				
1/5/2005	20	Poloa	N	No				
1/5/2005	30	Nua & Seetaga	N	No				
1/5/2005	60	Gataivai	Y	Yes	12:30:00 PM	High	Green	Juvenile
1/5/2005	60	Gataivai	Y	Yes	12:30:00 PM	High	Green	Juvenile
1/6/2005	60	Gataivai	Y	Yes	12:30:00 PM	High	Green	Juvenile
1/19/2005	60	Gataivai	Y	Yes	12:30:00 PM	High	Green	Adult
1/19/2005	60	Vatia	Y	No	9:45:00 AM	Low	Hawksbill	Juvenile
1/22/2005	60	Fagaalu	Y	Yes	12:45:00 PM	Coming In	Hawksbill	Juvenile
1/22/2005	60	Fagaalu	Y	Yes	1:00:00 PM	Coming In	Green	Juvenile
2/8/2005	NA	MASEFAU	N	No	8:50:00 AM	High		NA
2/26/2005	60	ALOFAU	Y	Yes	1:10:00 PM	High	Hawksbill	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
3/1/2005	60	ALOFAU	Y	Yes	1:50:00 PM	High	Hawksbill	Juvenile
3/4/2005	60	GATAIVAI	Y	Yes	2:20:00 PM	High	Hawksbill	Juvenile
3/5/2005	60	GATAIVAI	Y	Yes	2:40:00 PM	High	Hawksbill	Adult
3/8/2005	60	GATAIVAI	Y	Yes	2:00:00 PM	High	Hawksbill	Juvenile
3/8/2005	60	GATAIVAI	Y	Yes	2:00:00 PM	High	Green	Juvenile
3/8/2005	60	FAGAALU	Y	Yes	2:00:00 PM	High	Hawksbill	Juvenile
3/8/2005	60	FAGAALU	Y	Yes	2:15:00 PM	High	Unknown	Juvenile
3/8/2005	60	AMANAVE	N	No	3:30:00 PM	Going Out		NA
3/15/2005	60	ONENOA	N	No	7:30:00 AM	Coming In		NA
3/15/2005	60	AIRPORT BEACH	Y	No	4:15:00 PM	High	Unknown	Juvenile
3/16/2005	30	VATIA	Y	No	1:10:00 PM	Coming In	Hawksbill	Juvenile
3/18/2005	30	Amanave	N	No	3:30:00 PM			NA
3/31/2005	30	Vatia	N	No				NA
4/11/2005	NA	Malota	N	No	4:30:00 PM			NA
4/11/2005	60	Coconut Point	Y	Yes	1:32:00 PM	High	Green	Juvenile
4/11/2005	60	Coconut Point	Y	Yes	2:10:00 PM	High	Green	Juvenile
4/11/2005	72	Masefau	Y	Yes	9:30:00 AM	Incoming High	Hawksbill	Juvenile
4/12/2005	50	Malota	Y	No	3:30:00 PM	Incoming High	Hawksbill	Juvenile
4/12/2005	60	Airport Beach	Y	No	3:30:00 PM	Incoming High	Hawksbill	Juvenile
4/12/2005	64	Amanave	N	No	10:39:00 AM	Incoming High to High	NA	NA
4/12/2005	72	Masefau	Y	Yes	9:27:00 AM	Incoming High	Green	Juvenile
4/15/2005	62	Fagaalu	Y	Yes	4:40:00 PM	Low	Green	Juvenile
4/20/2005	62	Fagaalu	Y	Yes	4:40:00 PM	Low	Green	Juvenile
4/21/2005	62	Fagaalu	Y	Yes	4:40:00 PM	Low	Green	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
4/21/2005	62	Fagaalu	Y	Yes	4:40:00 PM	Low	Green	Juvenile
4/22/2005	62	Fagaalu	Y	Yes	3:46:00 PM	Low	Green	Juvenile
4/23/2005	67	Gataivai	Y	Yes	11:00:00 AM	High	Green	Juvenile
4/23/2005	67	Gataivai	Y	Yes	11:00:00 AM	High	Green	Juvenile
4/24/2005	67	Gataivai	Y	Yes	10:30:00 AM	High	Green	Juvenile
4/26/2005	67	Gataivai	Y	Yes	10:45:00 AM	High	Green	Juvenile
4/26/2005	67	Gataivai	Y	Yes	11:00:00 AM	High	Green	Juvenile
4/28/2005	20	Aasu	N	No	4:47:00 PM	Incoming High	NA	NA
4/29/2005	65	Alofau	Y	Yes	12:32:00 PM	Low	Unknown	Juvenile
5/4/2005	60	Olenoa	N	No	9:45:00 AM	Outgoing High	NA	NA
5/11/2005	65	Alofau	Y	Yes	11:45:00 AM	Low	Hawksbill	Juvenile
5/12/2005	65	Alofau	Y	Yes	12:24:00 PM	Low	Hawksbill	Juvenile
5/12/2005	65	Alofau	Y	Yes	12:30:00 PM	Low	Hawksbill	Juvenile
6/13/2005	50	Vatia	Y	No	11:05:00 AM	Outgoing HighTide	Green	Juvenile
6/13/2005	60	Airport Beach Tutuila	Y	Yes	12:45:00 PM	Incoming High Tide	Hawksbill	Juvenile
6/13/2005	60	Airport Beach Tutuila	Y	Yes	1:00:00 PM	Incoming High Tide	Hawksbill	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
6/13/2005	60	Airport Beach Tutuila	Y	Yes	1:15:00 PM	Incoming High Tide	Hawksbill	Juvenile
6/13/2005	60	Amanave	N	No	8:45:00 AM	Incoming High Tide	NA	NA
6/13/2005	60	Vatia	Y	No	9:00:00 AM	Incoming High Tide	Unknown	Juvenile
6/15/2005	50	Masefau	N	No	8:30:00 AM	Incoming High Tide	NA	NA
6/22/2005	45	Coconut Pt.	N	No	9:15:00 AM	Incoming High Tide	NA	NA
7/28/2005	45	Maloata	N	No	8:30:00 AM	Outgoing High	NA	NA
7/28/2005	70	Gataivai	Y	Yes	10:15:00 AM	High Tide	Green	Juvenile
7/28/2005	70	Gataivai	Y	Yes	10:45:00 AM	High Tide	Green	Juvenile
7/28/2005	60	Alofau	Y	No	2:10:00 PM	Outgoing High	Hawksbill	Adult
7/28/2005	30	Onoea	N	No	12:20:00 PM	High Tide	NA	NA
7/29/2005	60	Fagaalu	Y	Yes	10:28:00 AM	High	Hawksbill	Juvenile
7/29/2005	60	Fagaalu	Y	Yes	10:48:00 AM	High	Hawksbill	Juvenile
7/29/2005	60	Fagaalu	Y	Yes	10:45:00 AM	High	Green	Juvenile
7/29/2005	60	Fagaalu	Y	Yes	10:31:00 AM	High	Green	Juvenile
7/29/2005	60	Fagaalu	Y	Yes	10:32:00 AM	High	Green	Juvenile
8/3/2005	60	Amanave	N	No	10:39:00 AM	High	NA	NA
8/4/2005	40	Malota	N	No		High	NA	NA
8/5/2005	60	Coconut Pt.	Y	No	4:15:00 PM	High	Hawksbill	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
8/5/2005	60	Airport Beach	Y	No	5:10:00 PM	High	Hawksbill	Juvenile
8/6/2005	60	Gataivai/Utulei	Y	Yes	11:05:00 AM	High	Hawksbill	Juvenile
8/6/2005	60	Gataivai/Utulei	Y	Yes	10:10:00 AM	High	Hawksbill	Juvenile
8/8/2005	60	Vatia	N	No		High	NA	NA
8/8/2005	60	Masefau	N	No		outgoing high	NA	NA
8/8/2005	60	Alofau	N	No		outgoing high	NA	NA
8/25/2005	30	Onoea	N	No		high	NA	NA
10/4/2005	60	Gataivai/Utulei	N	No		outgoing high	NA	NA
10/7/2005	60	Amanave	N	No		High	NA	NA
10/21/2005	60	Malota	N	No		High	NA	NA
10/25/2005	60	Airport Beach	Y	No	1:10:00 PM	High	Hawksbill	Juvenile
10/25/2005	60	Coconut Pt.	Y	Yes	2:07:00 PM	High	Hawksbill	Juvenile
10/27/2005	60	Coconut Pt.	Y	Yes	2:25:00 PM	High	Unidentified	Juvenile
10/27/2005	60	Masefau	Y	No	11:55:00 AM	High	Hawksbill	Juvenile
10/27/2005	40	Vatia	N	No		outgoing high	NA	NA
10/27/2005	60	Alofau	Y	Yes	1:51:00 PM	outgoing high	Hawksbill	Juvenile
10/27/2005	30	Onoea	N	No		High	NA	NA
10/27/2005	60	Alofau	Y	Yes	1:30:00 PM	outgoing high	Green	Juvenile
10/27/2005	60	Alofau	Y	Yes	1:41:00 PM	outgoing high	Hawksbill	sub-adult
10/28/2005	60	Alofau	Y	Yes	1:47:00 PM	outgoing high	Hawksbill	Juvenile
10/31/2005	60	Fagaalu	Y	No	2:50:00 PM	outgoing high	Hawksbill	Juvenile
10/31/2005	60	Coconut Pt.	Y	No	11:00:00 AM	High	Unidentified	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
11/16/2005	60	Amanave	N	No		High	NA	NA
11/16/2005	60	Malota	N	No		incoming high	NA	NA
11/19/2005	60	Airport Beach	N	No		High	NA	NA
11/23/2005	60	Vatia	N	No		High	NA	NA
11/25/2005	60	Masausi	Y	No	1:10:00 PM	incoming high	Unidentified	Juvenile
11/26/2005	60	Alofau	Y	Yes	3:18:00 PM	High	Hawksbill	Juvenile
11/27/2005	60	Onoea	N	No		incoming high	NA	NA
11/27/2005	60	Alofau	Y	Yes	3:20:00 PM	High	Hawksbill	Juvenile
12/1/2005	60	Alofau	Y	Yes	3:24:00 PM	High	Hawksbill	Juvenile
12/2/2005	60	Utulei	N	No		High	NA	NA
12/8/2005	60	A'asu	N	No		High	NA	NA
12/10/2005	60	Airport Beach Lagoon	Y	No	12:35:00 PM	outgoing high	Hawksbill	Juvenile
12/14/2005	60	Coconut Point	N	No		High	NA	NA
12/22/2005	60	Alofau	Y	Yes	12:59:00 PM	High	Hawksbill	Juvenile
12/28/2005	60	Alofau	Y	Yes	12:51:00 PM	High	Hawksbill	Juvenile
1/10/2006	60	Alofau	Y	Yes	12:48:00 PM	High	Hawksbill	Juvenile
1/15/2006	60	Alofau	Y	Yes	12:47:00 PM	High	Hawksbill	Juvenile
1/19/2006	60	Alofau	Y	Yes	12:43:00 PM	High	Hawksbill	Juvenile
1/28/2006	60	Alofau	Y	Yes	12:40:00 PM	High	Hawksbill	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
2/12/2006	60	Alofau	Y	Yes	12:59:00 PM	High	Hawksbill	Juvenile
2/16/2006	60	Alofau	Y	Yes	1:12:00 PM	High	Hawksbill	Juvenile
2/16/2006	60	Alofau	Y	Yes	12:34:00 PM	High	Hawksbill	Juvenile
2/17/2006	60	Alofau	Y	Yes	12:22:00 PM	High	Hawksbill	Juvenile
2/17/2006	45	Onoea	N	No		incoming high	NA	NA
2/17/2006	60	Alofau	Y	Yes	12:57:00 PM	High	Hawksbill	Juvenile
2/17/2006	60	Masefau	N	No		High	NA	NA
2/17/2006	15	Vatia	N	No		High	NA	NA
2/24/2006	45	Malota	N	No		High	NA	NA
2/24/2006	5	Amanave	N	No		High	NA	NA
2/24/2006	NA	PAGO HARBOR	Y	No	12:00:00 PM	High	Green	Adult
2/24/2006	NA	Gataivai	Y	No	7:30:00 AM	ND	Unknown	Juvenile
2/24/2006	NA	Fogagogo	Y	No	6:30:00 PM	ND	Green	Juvenile
2/24/2006	NA	Utulei	Y	No	5:00:00 PM	Low	Unknown	Juvenile
3/7/2006	NA	Airport Lagoon	Y	No		ND	Green	Juvenile
3/8/2006	NA	Alofau	Y	No		ND	Hawksbill	Juvenile
3/13/2006	NA	Fagaalu	Y	Yes	2:15:00 PM	High	Unknown	
3/13/2006	NA	Fagaalu	Y	Yes	2:15:00 PM	High	Unknown	
3/13/2006	NA	Fagaalu	Y	No	2:15:00 PM	High	Hawksbill	Juvenile
3/14/2006	NA	Fagaalu	Y	Yes	2:15:00 PM	High	Unknown	
3/15/2006	NA	Pago Harbor	Y	No			Hawksbill	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
3/28/2006	NA	Nuuuli	Y	Yes			Green	Juvenile
3/29/2006	NA	Nuuuli	Y	Yes			Green	Juvenile
3/30/2006	NA	Utulei	Y	Yes			Green	Adult
3/31/2006	NA	Utulei	Y	Yes			Green	Juvenile
1/31/2007	NA	Vatia	Y	No			Unknown	Juvenile
5/8/2007	NA	Nuuuli or Fagaalu	Y	No		Low	Green	Adult
5/10/2007	NA	Gataivai	Y	No	9:30:00 AM		Green	Juvenile
7/6/2007	NA	Gataivai	Y	No	2:36:00 PM	High	Unknown	Juvenile
7/6/2007	NA	Fagaalu	Y	No	5:36:00 PM	High	Green	Juvenile
7/10/2007	NA	Utulei	Y	Yes	10:00:00 AM	Low	Unknown	Juvenile
7/11/2007	NA	Utulei	Y	Yes	10:00:00 AM	Low	Unknown	Juvenile
7/13/2007	NA	Utulei	Y	Yes	10:00:00 AM	Low	Unknown	Juvenile
7/18/2007	NA	Utulei	Y	Yes	10:00:00 AM	Low	Unknown	Juvenile
7/19/2007	NA	Gataivai	Y	No	10:45:00 AM	Low	Hawksbill	Juvenile
7/29/2007	NA	Nuuuli	Y	No	1:40:00 PM		Green	Juvenile
7/29/2007	NA	Aoa	Y	No	2:30:00 PM		Green	Juvenile
8/2/2007	NA	Aoa	Y	No	10:30:00 AM		Unknown	Juvenile
8/2/2007	NA	Fagasa	Y	No	11:30:00 AM		Green	Juvenile
8/2/2007	NA	Tafeu	Y	Yes			Unknown	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
8/2/2007	NA	Pago Pago Harbor	Y	No	2:00:00 PM		Hawksbill	Juvenile
8/2/2007	NA	Fagaalu	Y	No	12:35:00 PM		Green	Juvenile
8/2/2007	NA	Amaua	Y	No	10:51:00 AM		Hawksbill	Juvenile
8/3/2007	NA	Amaua	Y	No	12:53:00 PM		Hawksbill	Juvenile
8/3/2007	NA	Amaua	Y	No			Hawksbill	Juvenile
8/3/2007	NA	Amaua	Y	No	1:01:00 PM		Hawksbill	Juvenile
8/3/2007	NA	Alofau	Y	No			Hawksbill	Juvenile
8/3/2007	NA	Airport Lagoon	Y	No	5:00:00 PM		Hawksbill	Juvenile
8/8/2007	NA	Aua PT	Y	No	1:15:00 PM	Going Out	Green	Juvenile
8/9/2007	NA	Mataae Pt	Y	No	12:30:00 PM	Going Out	Green	Juvenile
8/9/2007	NA	Pago Harbor	Y	No			Unknown	Adult
8/10/2007	NA	Utulei	Y	No	8:20:00 AM	Coming In	Green	Juvenile
8/11/2007	NA	Fagamalo	Y	No	11:53:00 AM	Low	Green	Juvenile
8/11/2007	NA	Leone	Y	No	10:30:00 AM		Green	Juvenile
8/11/2007	NA	Fagaalu	Y	No	8:39:00 AM		Green	Juvenile
8/11/2007	NA	Nuuuli	Y	No	10:30:00 AM		Hawksbill	Juvenile
8/11/2007	NA	Masefau	Y	No	8:30:00 AM		Unknown	Adult
8/11/2007	NA	Masefau	Y	Yes			Unknown	
8/13/2007	NA	Masefau	Y	Yes			Unknown	

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
8/15/2007	NA	Masefau	Y	Yes			Unknown	
8/16/2007	NA	Masefau	Y	Yes			Unknown	
8/16/2007	NA	Masefau	Y	Yes			Unknown	
8/16/2007	NA	Masefau	Y	No	2:30:00 PM		Unknown	Adult
8/16/2007	NA	Rose Atoll	Y	No	10:30:00 AM	High	Green	Adult
8/16/2007	NA	Alofau	Y	Yes	12:30:00 PM	Coming In	Hawksbill	Juvenile
8/16/2007	NA	Alofau	Y	No	9:45:00 AM	Low	Hawksbill	Adult
8/16/2007	NA	Alofau	Y	Yes	12:30:00 PM	Coming In	Hawksbill	Adult
8/16/2007	NA	Vatia	Y	No	2:30:00 PM	Low	Hawksbill	Juvenile
8/26/2007	NA	Alofau	Y	No	9:30:00 AM	High	Hawksbill	Juvenile
8/26/2007	NA	Gataivai	Y	Yes	9:25:00 AM	High	Green	Juvenile
8/27/2007	NA	Gataivai	Y	Yes	9:25:00 AM	High	Green	Juvenile
8/27/2007	NA	Aoa	Y	Yes	4:00:00 PM	Coming In	Green	Juvenile
8/27/2007	NA	Aoa	Y	Yes	4:00:00 PM	Coming In	Green	Juvenile
8/27/2007	NA	Fagaalu Bay	Y	Yes		Low	Green	Juvenile
8/28/2007	NA	Fagaalu Bay	Y	Yes		Low	Green	Juvenile
8/29/2007	NA	Fagaalu Bay	Y	Yes		Low	Green	Adult
8/29/2007	NA	Gataivai	Y	No	5:00:00 PM		Green	Adult
8/29/2007	NA	FAGATOGO	Y	No			Green	Adult
8/29/2007	NA	GATAIVAI	Y	No	8:30:00 AM	Low	Green	Juvenile
8/29/2007	NA	FAGATOGO DMWR	Y	No	9:20:00 AM		Unknown	Juvenile
8/30/2007	NA	AUA	Y	Yes	2:40:00 PM	Low	Unknown	
8/30/2007	NA	AUA	Y	Yes	2:40:00 PM	Low	Unknown	

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
8/31/2007	NA	COCONUT PT	Y	Yes	3:00:00 PM	Coming In	Green	Adult
9/13/2007	NA	COCONUT PT	Y	Yes	5:30:00 PM	Coming In	Green	Adult
9/13/2007	NA	AIRPORT BEACH LAGOON	Y	No	9:45:00 PM	Coming In	Hawksbill	Juvenile
9/13/2007	NA	GATAIVAI	Y	No	7:15:00 AM	Low	Green	Juvenile
9/17/2007	NA	SLIDING ROCK	Y	No	4:00:00 PM	Going Out	Unknown	Adult
9/18/2007	NA	SLIDING ROCK	Y	No			Unknown	U
9/19/2007	NA	GATAIVAI	Y	No	7:50:00 AM	High	Unknown	Juvenile
9/20/2007	NA	FAGATELE BAY	Y	No	9:50:00 AM		Unknown	Juvenile
10/25/2007	NA	FAGAALU	Y	No	11:26:00 AM		Green	Juvenile
10/26/2007	NA	FAGATOGO	Y	No	12:00:00 PM		Hawksbill	Juvenile
10/26/2007	NA	PAGO HARBOR	Y	No	12:30:00 PM	High	Hawksbill	Juvenile
10/31/2007	NA	FOGAGOGO	Y	No	5:30:00 PM	High	Green	Juvenile
10/31/2007	NA	AUA	Y	No	11:30:00 AM		Green	Adult
11/27/2007	NA	VAL COVE	Y	No	5:00:00 PM		Unknown	Adult
11/27/2007	NA	FAGAITUA BAY	Y	No	10:00:00 AM		Hawksbill	Juvenile
11/27/2007	NA	FOGAGOGO	Y	No	6:00:00 PM	High	Unknown	Juvenile
11/27/2007	NA	SWAINS ISLAND	Y	No			Hawksbill	Juvenile
11/27/2007	NA	AUA	Y	No	11:00:00 AM	High	Hawksbill	Juvenile
11/28/2007	NA	NIULOVA PT	Y	No	12:30:00 PM	Going Out	Green	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
12/12/2007	NA	Gataivai	Y	Yes	10:50:00 AM	High	Green	Adult
12/19/2007	NA	Gataivai	Y	Yes	9:30:00 AM	High	Green	Juvenile
12/20/2007	NA	Gataivai	Y	Yes	10:30:00 AM	High	Unknown	Juvenile
12/26/2007	NA	Gataivai	Y	Yes	10:30:00 AM	High	Hawksbill	Juvenile
12/26/2007	NA	Gataivai	Y	Yes	10:30:00 AM	High	Unknown	Juvenile
12/27/2007	NA	FAGAALU	Y	Yes	4:00:00 PM		Green	Juvenile
12/27/2007	NA	FAGAALU	Y	Yes	4:00:00 PM		Green	Juvenile
12/28/2007	NA	FAGAALU	Y	Yes	4:00:00 PM		Green	Juvenile
12/28/2007	NA	Gataivai	Y	No			Unknown	
1/7/2008	NA	Fagaalu	Y	No			Green	Juvenile
1/9/2008	NA	Fagaalu	Y	No			Green	Adult
2/12/2008	NA	FAGAITUA	Y	No			Hawksbill	Juvenile
2/13/2008	NA	FAGAALU	Y	No	9:30:00 AM		Green	Juvenile
2/14/2008	NA	FAGAITUA	Y	Yes	3:00:00 PM		Hawksbill	Juvenile
2/14/2008	NA	FAGAITUA	Y	No	3:00:00 PM		Hawksbill	Juvenile
2/26/2008	NA	FAGAITUA	Y	Yes	3:00:00 PM		Hawksbill	Adult
2/26/2008	NA	FAGATOGO	Y	No	9:00:00 AM	Going Out	Hawksbill	Juvenile
2/27/2008	NA	MU PT ASILI	Y	No	11:30:00 AM	Low	Green	Juvenile
2/27/2008	NA	UTULEI BEACH PARK	Y	No	10:20:00 AM	High	Hawksbill	Juvenile
2/27/2008	NA	Fagaitua	Y	Yes	10:00:00		Hawksbill	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
					AM			
2/27/2008	NA	Fagaitua	Y	No	11:30:00 AM	Ebb Tide	Hawksbill	Juvenile
2/27/2008	NA	Alega	Y	No	11:30:00 AM	Ebb Tide	Hawksbill	Juvenile
2/28/2008	NA	Airport Beah	Y	Yes	3:00:00 PM	Incoming High	Unknown	Juvenile
4/9/2008	NA	Airport Beach	Y	Yes	3:00:00 PM	Inoming High	Green	Juvenile
4/10/2008	NA	Fagaalu	Y	Yes		Low	Green	Juvenile
4/28/2008	NA	Ofu Beach	Y	No	5:00:00 PM	Outgoing High	Unknown	Adult
4/28/2008	50	Ofu Airport Beach	N	No	3:30:00 PM	Incoming High	NA	NA
4/29/2008	NA	Ofu Beach	N	No	5:00:00 PM	ND	NA	NA
4/29/2008	64	Mafafa, Ofu	N	No	3:52:00 PM	Incoming High tide	NA	NA
4/30/2008	70	Olosega Beach	Y	Yes	10:00:00 AM	Low tide	Green	Juvenile
4/30/2008	70	Olosega Beach	Y	Yes	10:00:00 AM	Low tide	Green	Juvenile
4/30/2008	70	Olosega Beach	Y	Yes	10:00:00 AM	Low tide	Green	Juvenile
4/30/2008	70	Olosega Beach	Y	Yes	10:00:00 AM	Low tide	Green	Adult
5/8/2008	45	Sili, Olosega	N	No	3:45:00 PM	Incoming High tide	NA	NA
6/21/2008	70	Olosega Beach	Y	Yes	10:00:00 AM	Low tide	Green	Adult
6/23/2008	NA	Ofu Beach	N	No	5:00:00 PM	ND	NA	NA
6/23/2008	79	National Park 1, southwest of Pita's place	N	No	3:42:00 PM	Incoming High, still low	NA	NA
6/25/2008	47	Olosega Beach	Y	Yes	8:35:00 AM	High tide, going out	Unknown	Juvenile

Table 3.

Field2	Survey Duration (minutes)	Site	Turtles Seen	More Than One Seen	Time	Tide	Species	Size
6/25/2008	59	Ofu Beach	Y	Yes	6:00:00 PM	incoming High tide	Unknown	Juvenile
6/25/2008	59	Ofu Beach	Y	Yes	6:00:00 PM	Incoming High tide	Green	Adult
6/25/2008	47	Olosega Beach	Y	Yes	8:33:00 AM	High tide, going out	Unknown	Juvenile
6/25/2008	47	Olosega Beach	Y	Yes	9:05:00 AM	High tide, going out	Green	Juvenile
6/25/2008	40	National Park 2, northeast of Pita's place	N	No	11:05:00 AM	Outgoing High tide	NA	NA
6/25/2008	35	Ofu Bridge, Asagatai	N	No	10:10:00 AM	Outgoing High tide	NA	NA
6/25/2008	59	Ofu Beach	Y	Yes	6:00:00 PM	Incoming High tide	Green	Adult
6/25/2008	NA	Fagaalu	Y	No	12:20:00 PM	Low	Hawksbill	Juvenile
6/25/2008	NA	Sliding Rock	Y	No	5:00:00 PM	ND	UNK	Juvenile
6/25/2008	NA	Fagaalu	Y	Yes	9:30:00 AM	Outgoing High	UNK	Juveniles
6/25/2008	NA	Fagaalu	Y	Yes	9:30:00 AM	Outgoing High	UNK	Juveniles
6/27/2008	NA	Fagaalu	Y	Yes	9:30:00 AM	Outgoing High	UNK	Juveniles
6/27/2008	NA	Fagaalu	Y	Yes	9:30:00 AM	Outgoing High	UNK	Juveniles
6/30/2008	NA	Amaouli-matautele point	Y	No	10:00:00 AM		Hawksbill	Juvenile
6/30/2008	NA	Airport Beach, Tutuila	Y	No	5:45:00 PM	Incoming High	Hawksbill	Juvenile

Figure 1. Recorded positions and movement of Sat Tag ID #'s: #60067, #60068, #60069 and #60070

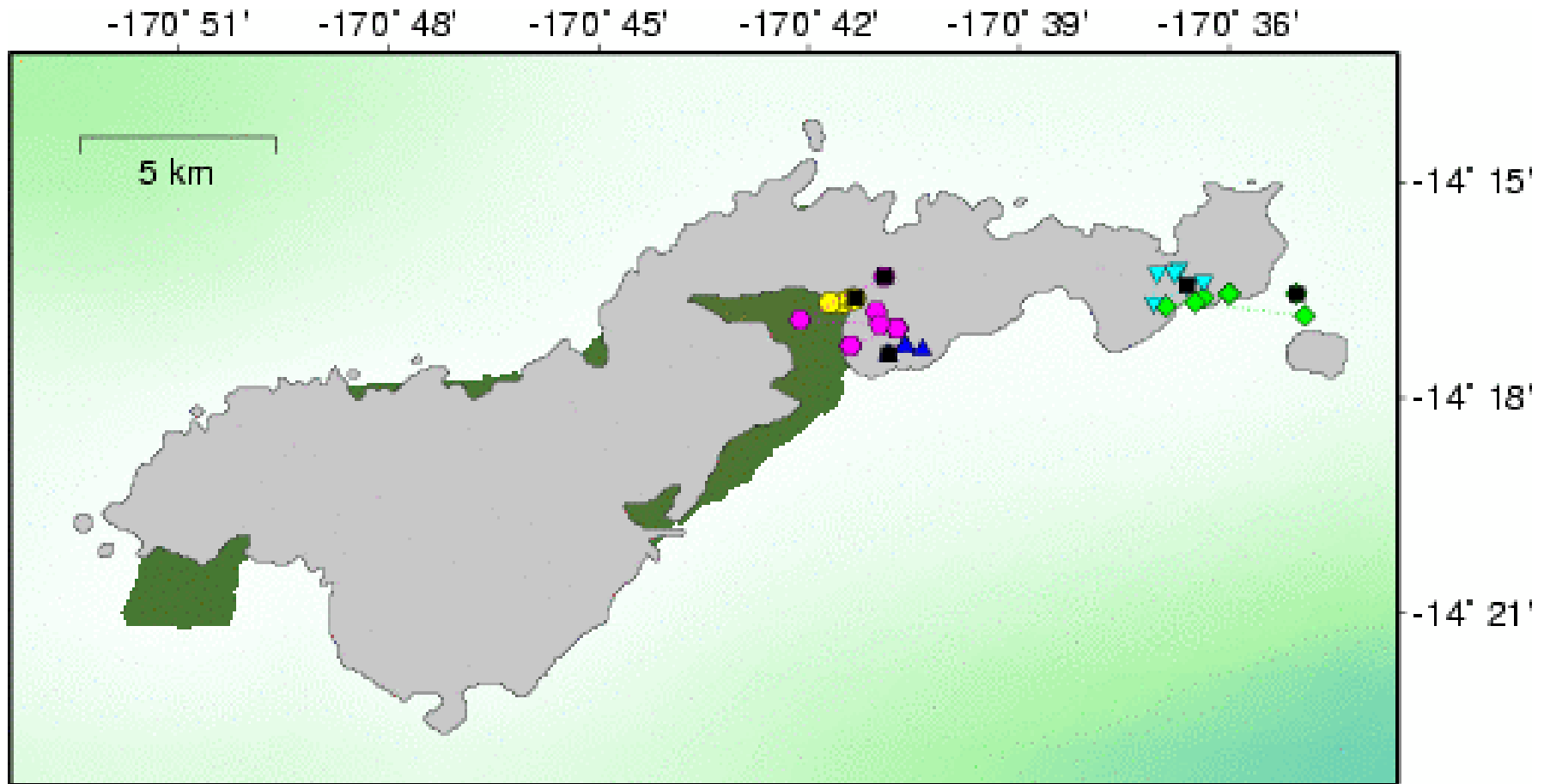


Figure 2. Migration of "Ms Malota" (Satellite Tag ID # 60060)

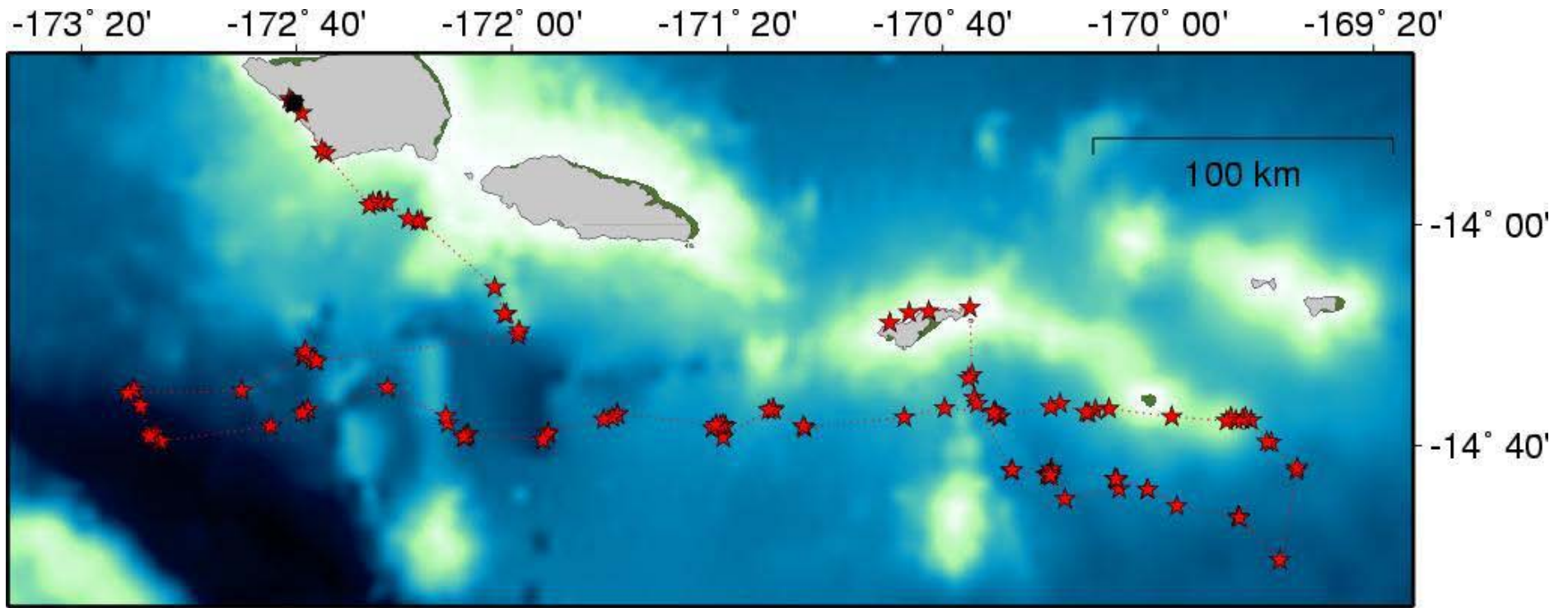


Figure 3. Migration of "Ms Amalau" (Satellite Tag ID # 60061)

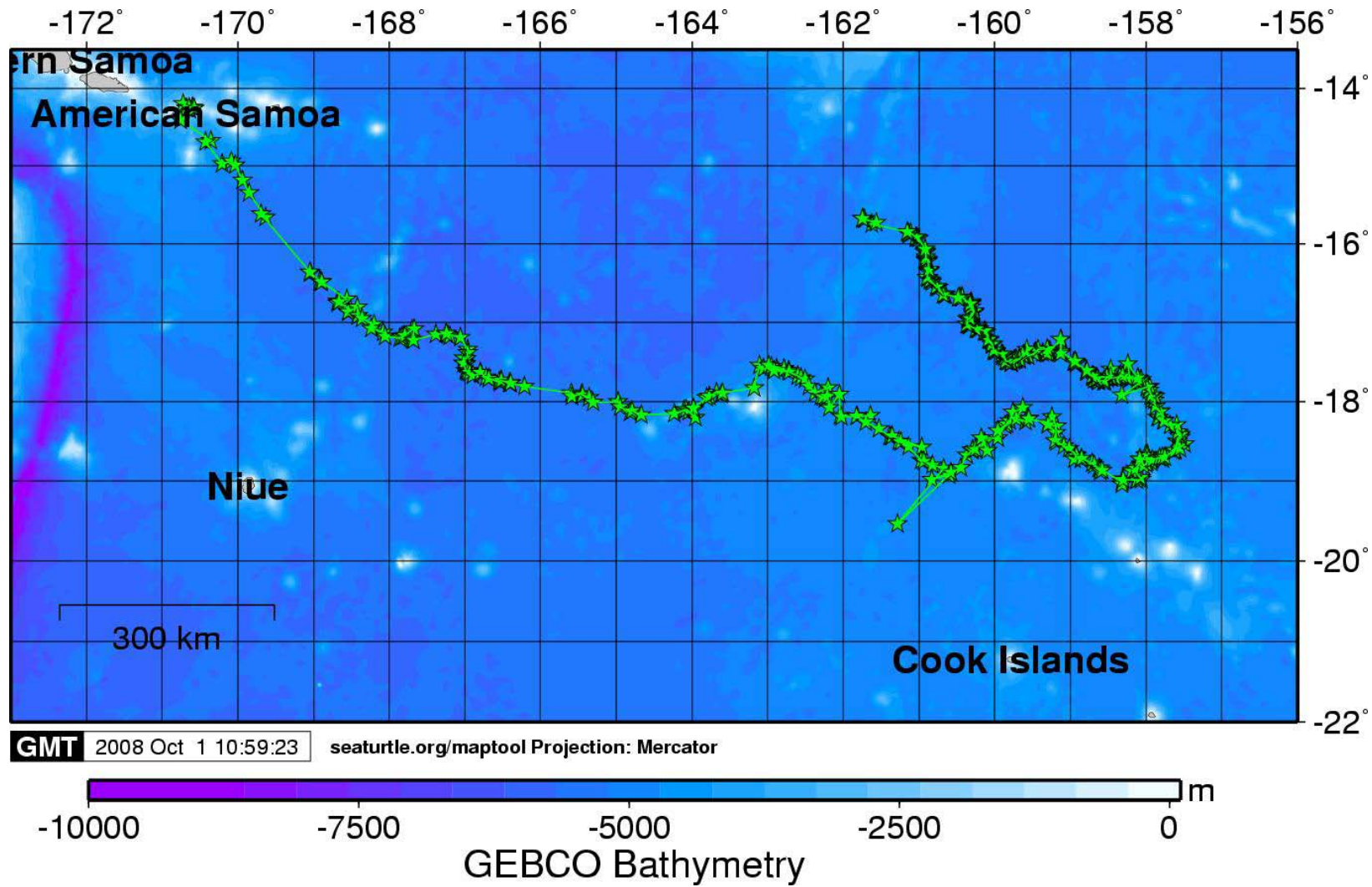
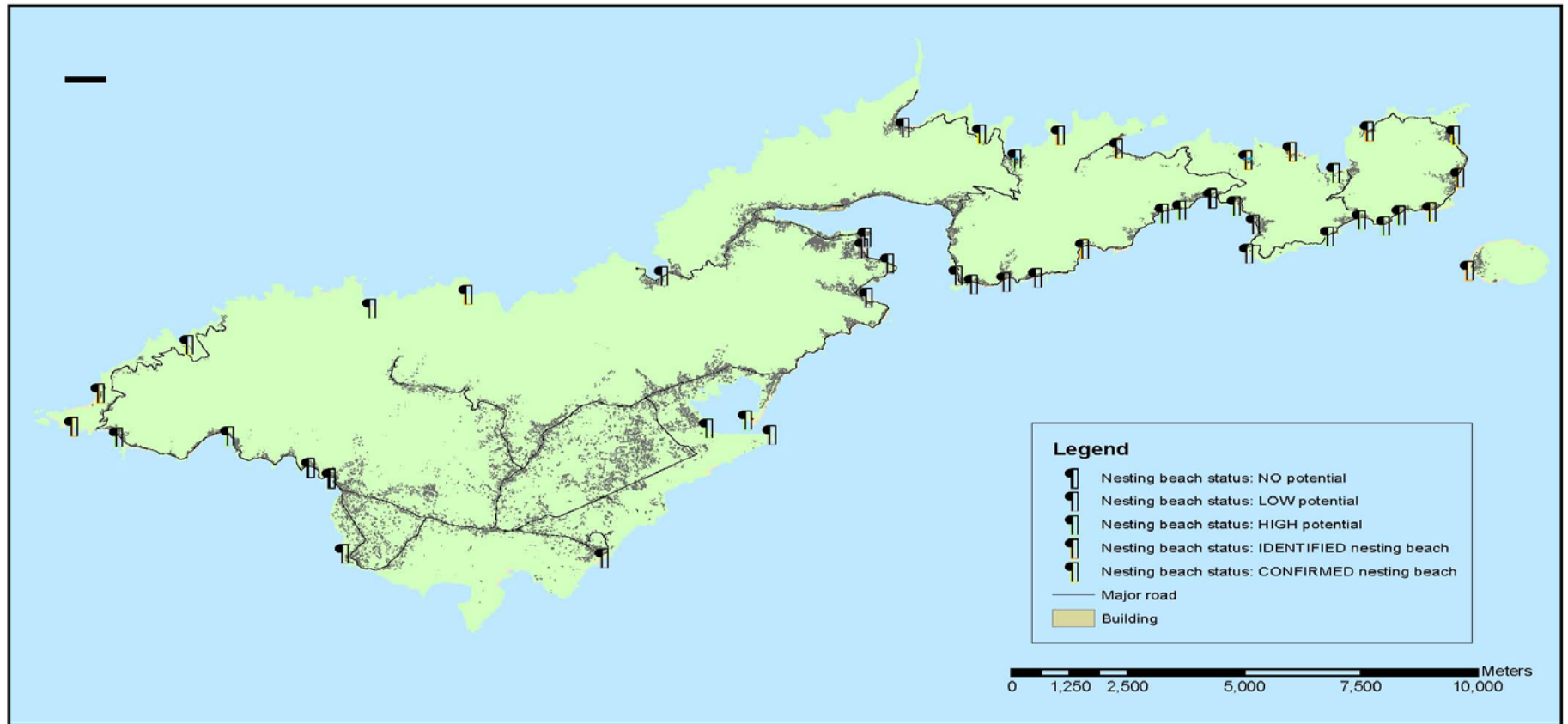


Figure 4. Potential Nesting Beaches of Tutuila

Tutuila, American Samoa
Hawksbill Sea Turtle Nesting Beach Status

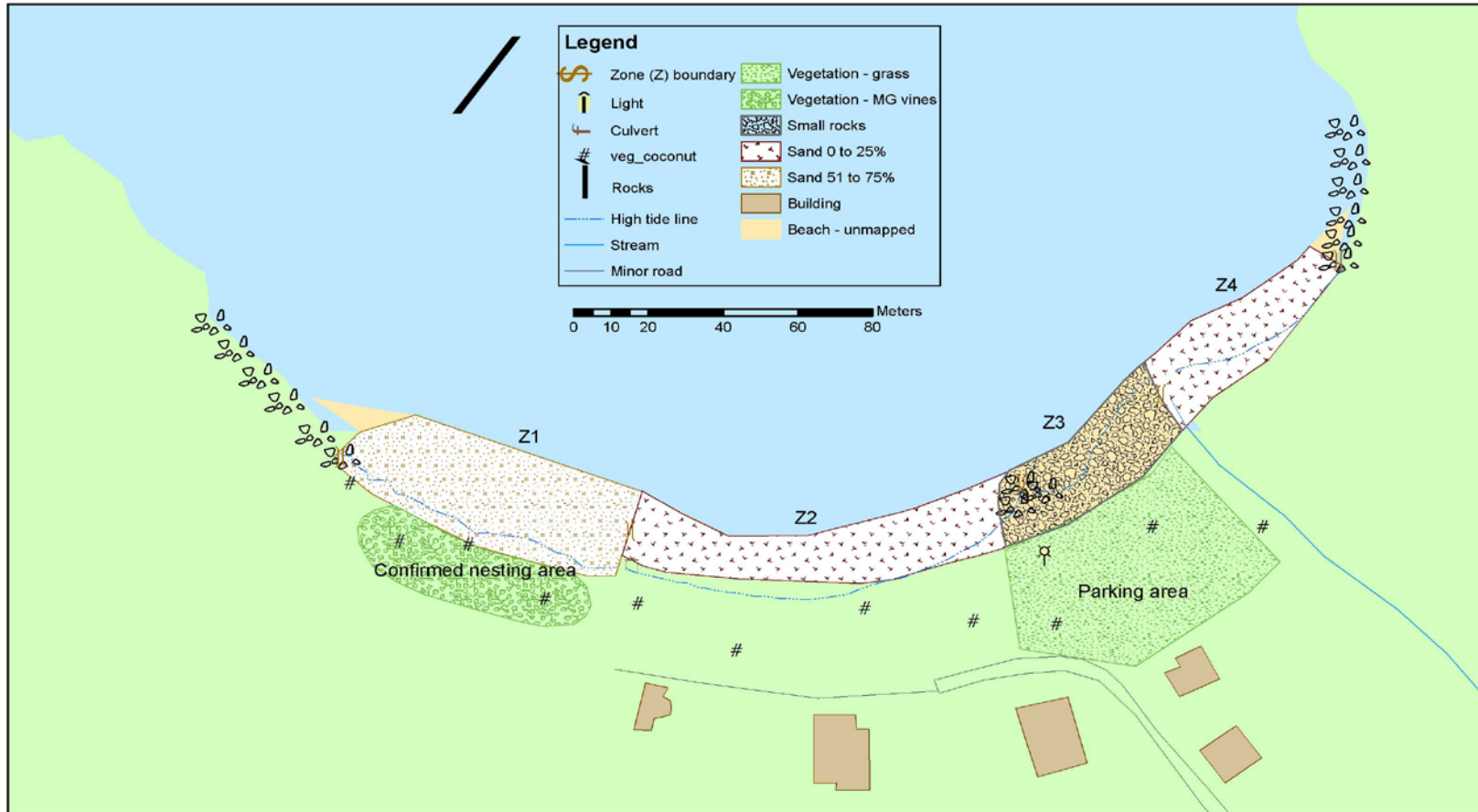


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Figure 5. Malota Nesting Beach

MALOATA
 Tutuila, American Samoa
 Hawksbill Sea Turtle Nesting Beach Status: **CONFIRMED**

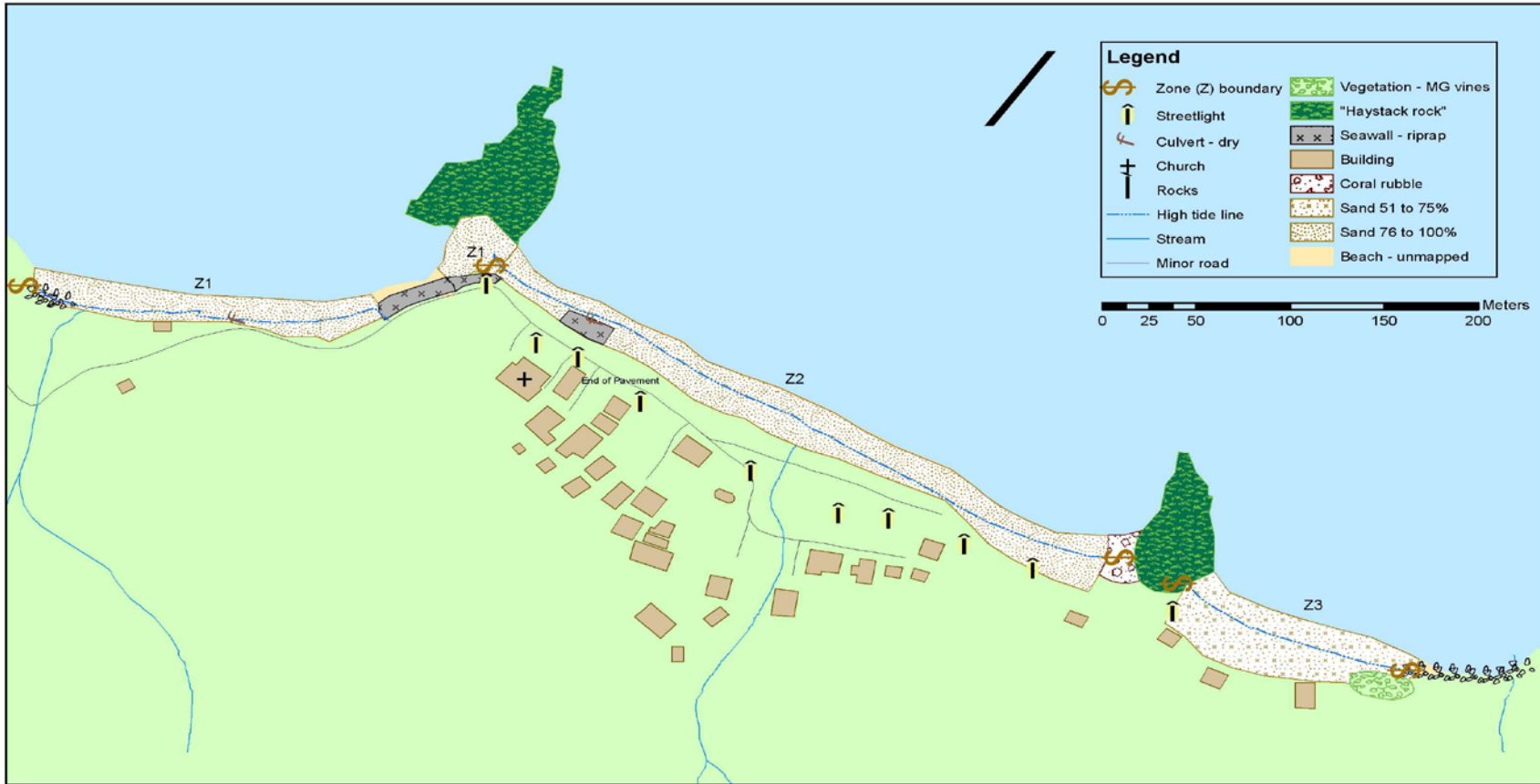


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Figure 6. Sailele Nesting Beach

SA'ILELE
Tutuila, American Samoa
Hawksbill Sea Turtle Nesting Beach Status: CONFIRMED

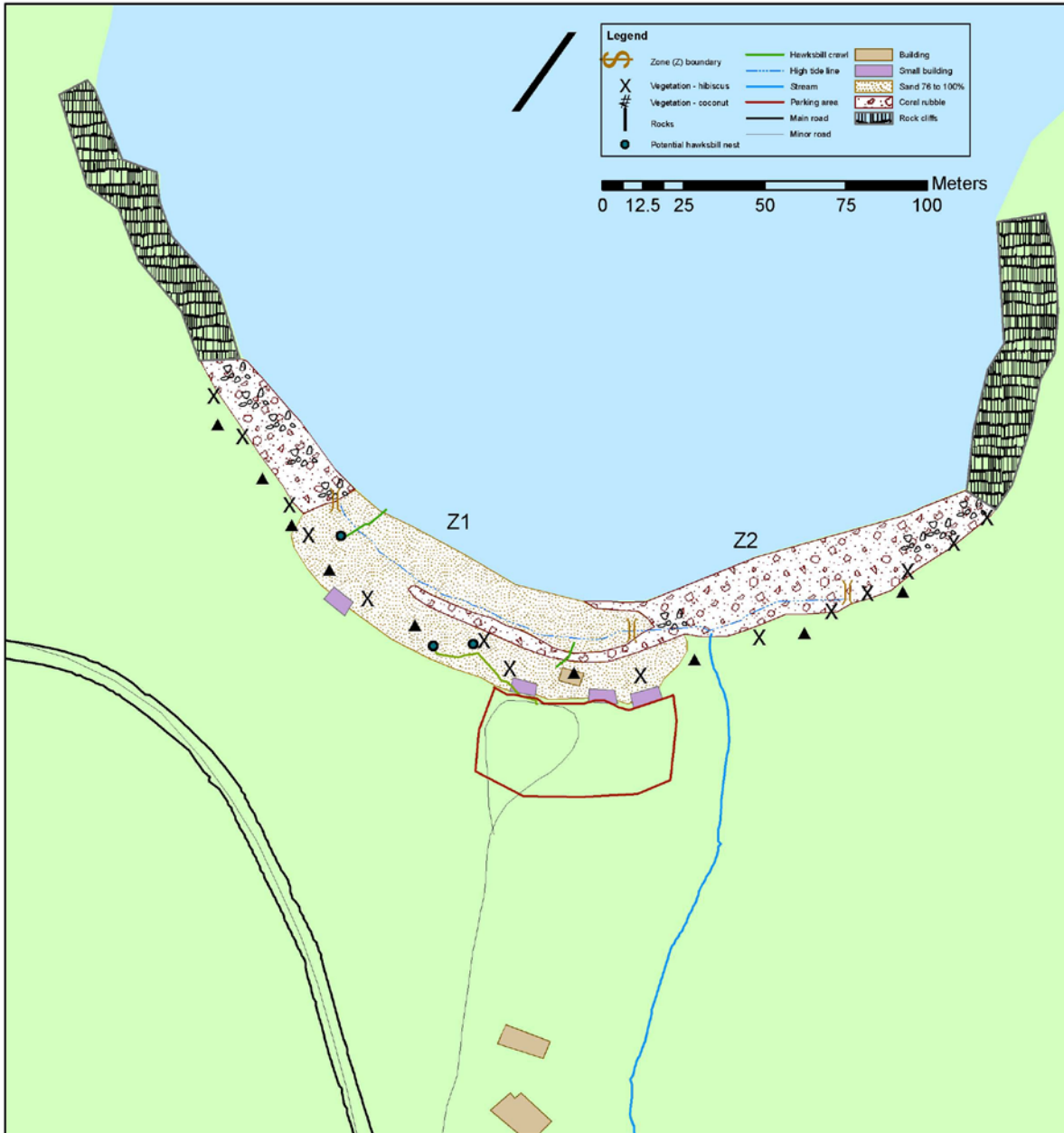


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Figure 7. Amalau Nesting Beach

AMALAU
Tutuila, American Samoa
Hawksbill Sea Turtle Nesting Beach Status: CONFIRMED

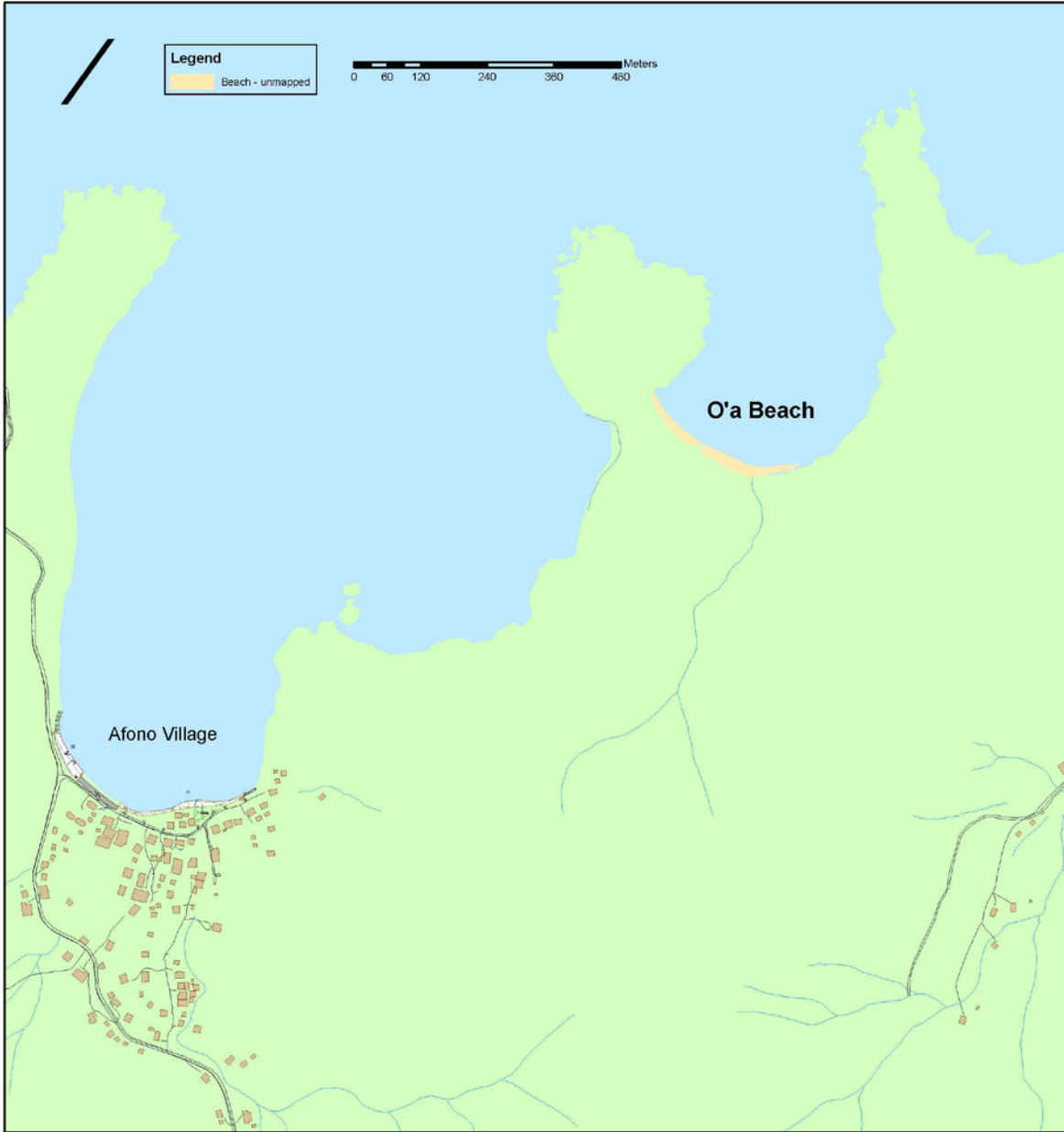


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Figure 8. O'a Nesting Beach

O'A BEACH
Tutuila, American Samoa
Hawksbill Sea Turtle Nesting Beach Status: CONFIRMED

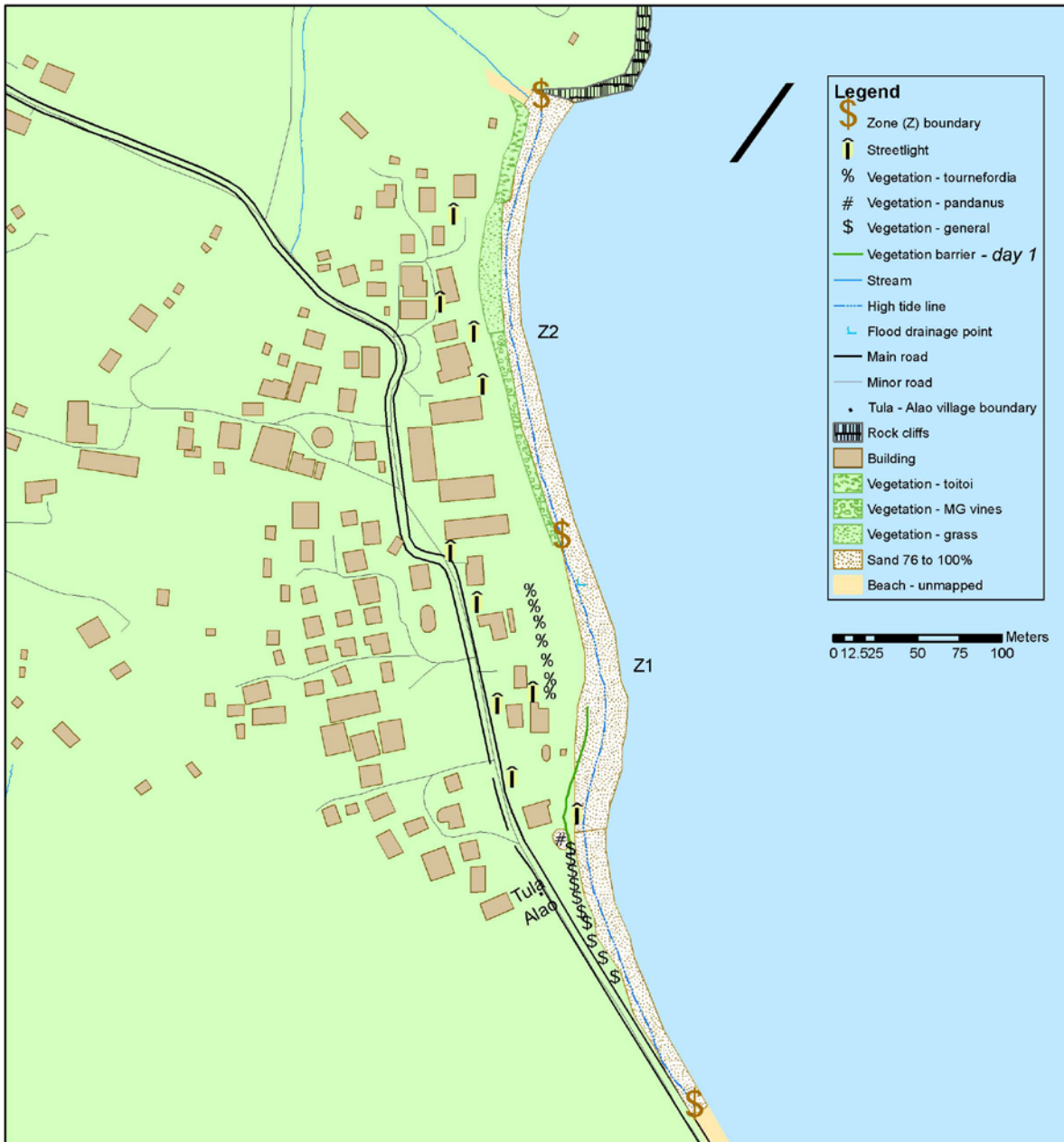


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Figure 9. Tula Nesting Beach

TULA
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 Hawksbill Sea Turtle Nesting Beach Status: CONFIRMED



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Figure 10. Amanave Nesting Beach

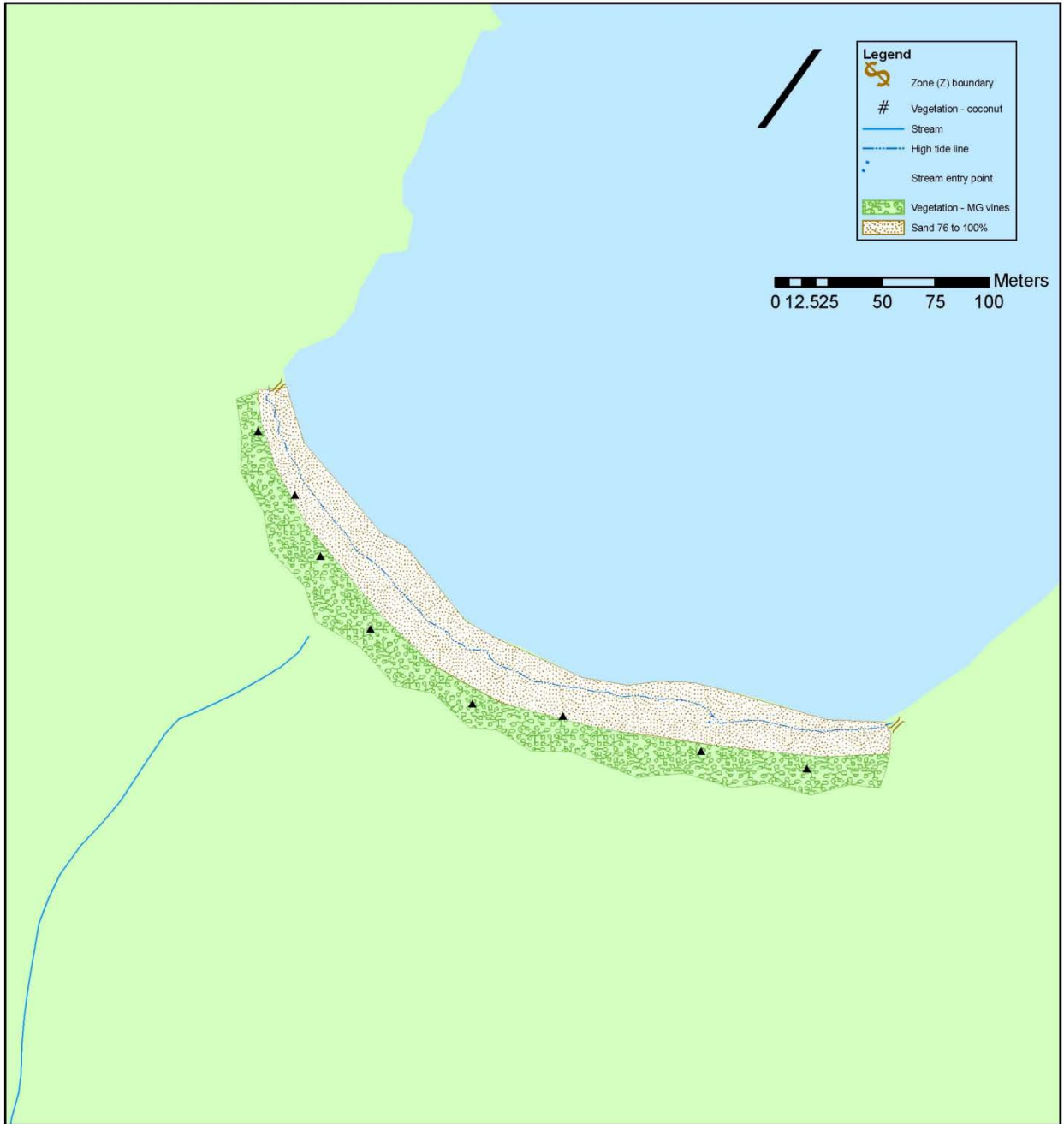
AMANAVE
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 Hawksbill Sea Turtle Nesting Beach Status: CONFIRMED



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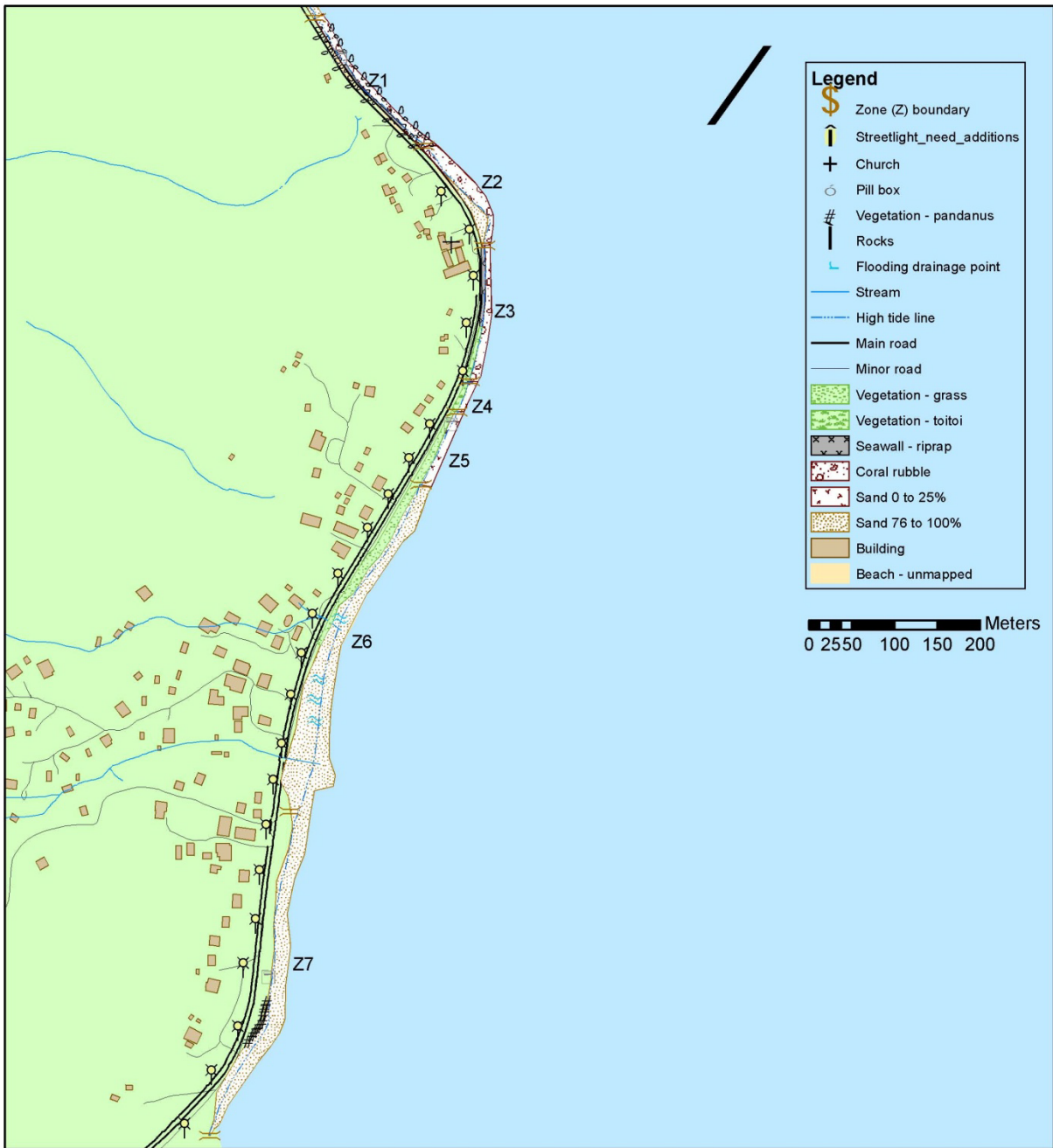
A'ASU
Tutuila, American Samoa
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ALAO
 Tutuila, American Samoa
 Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED

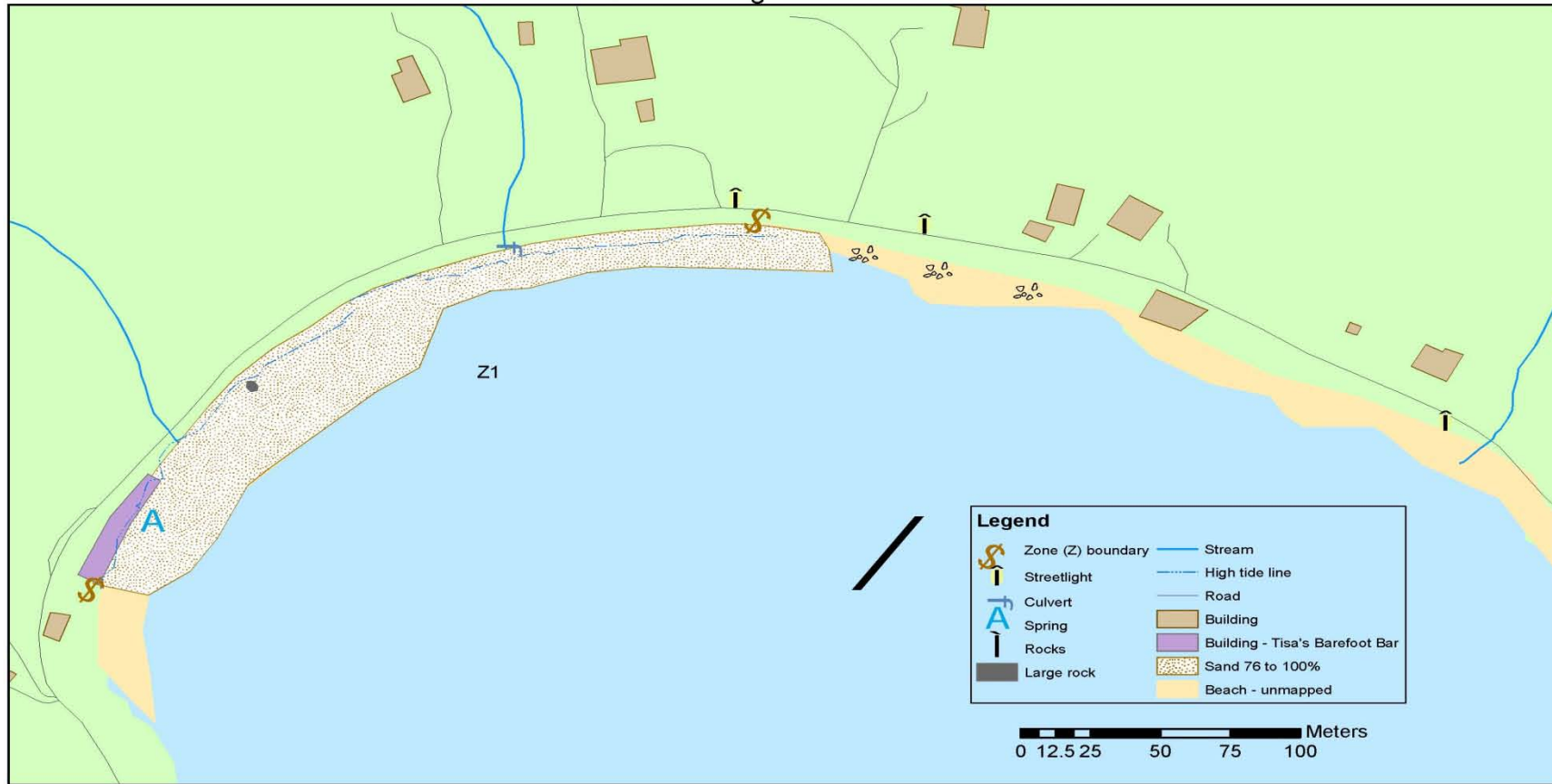


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APPENDIX 3

ALEGA
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 Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED



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APPENDIX 4

AUNU'U
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 Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED

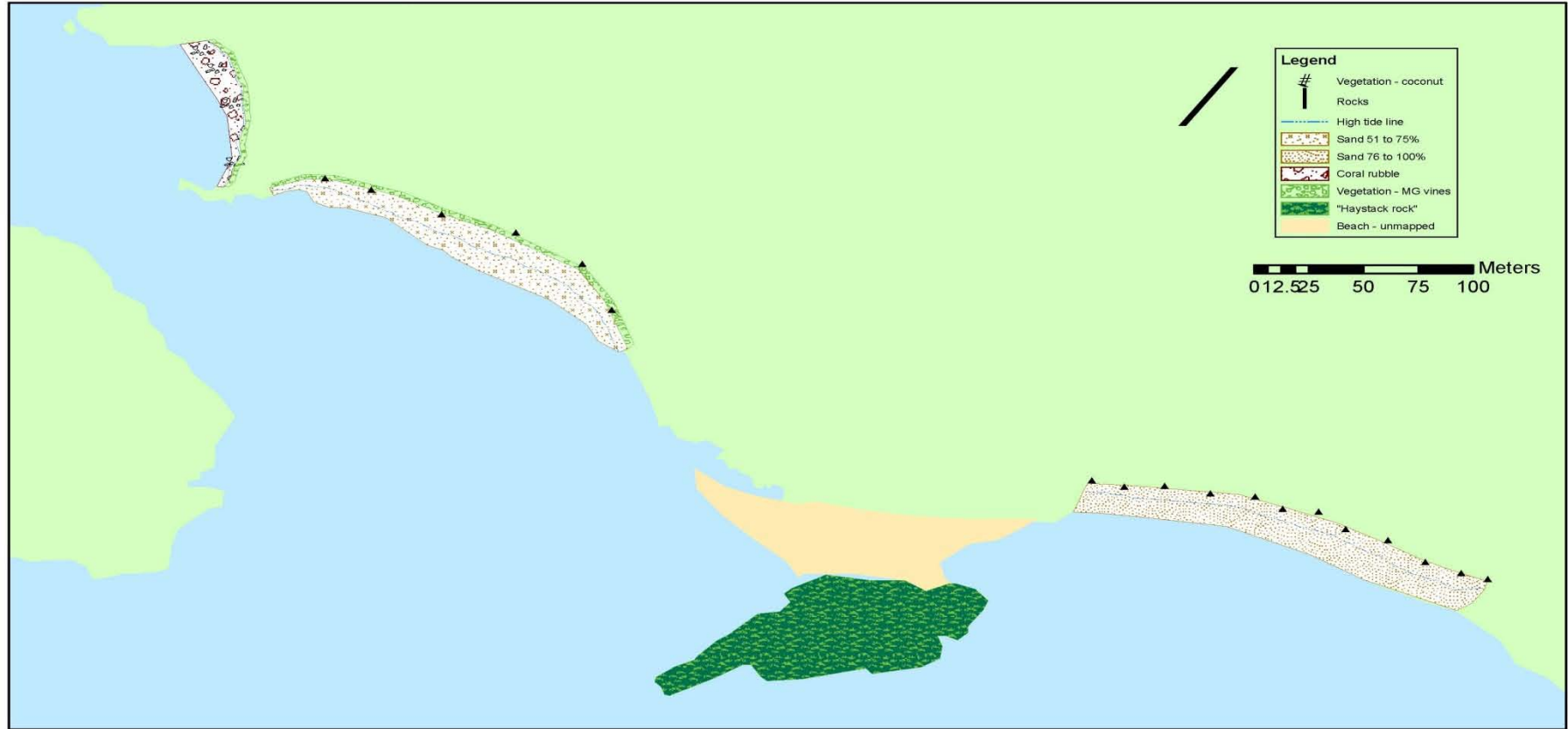


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APPENDIX 5

LO'A BEACH
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Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED



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APPENDIX 6

MASAUSI
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 Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED

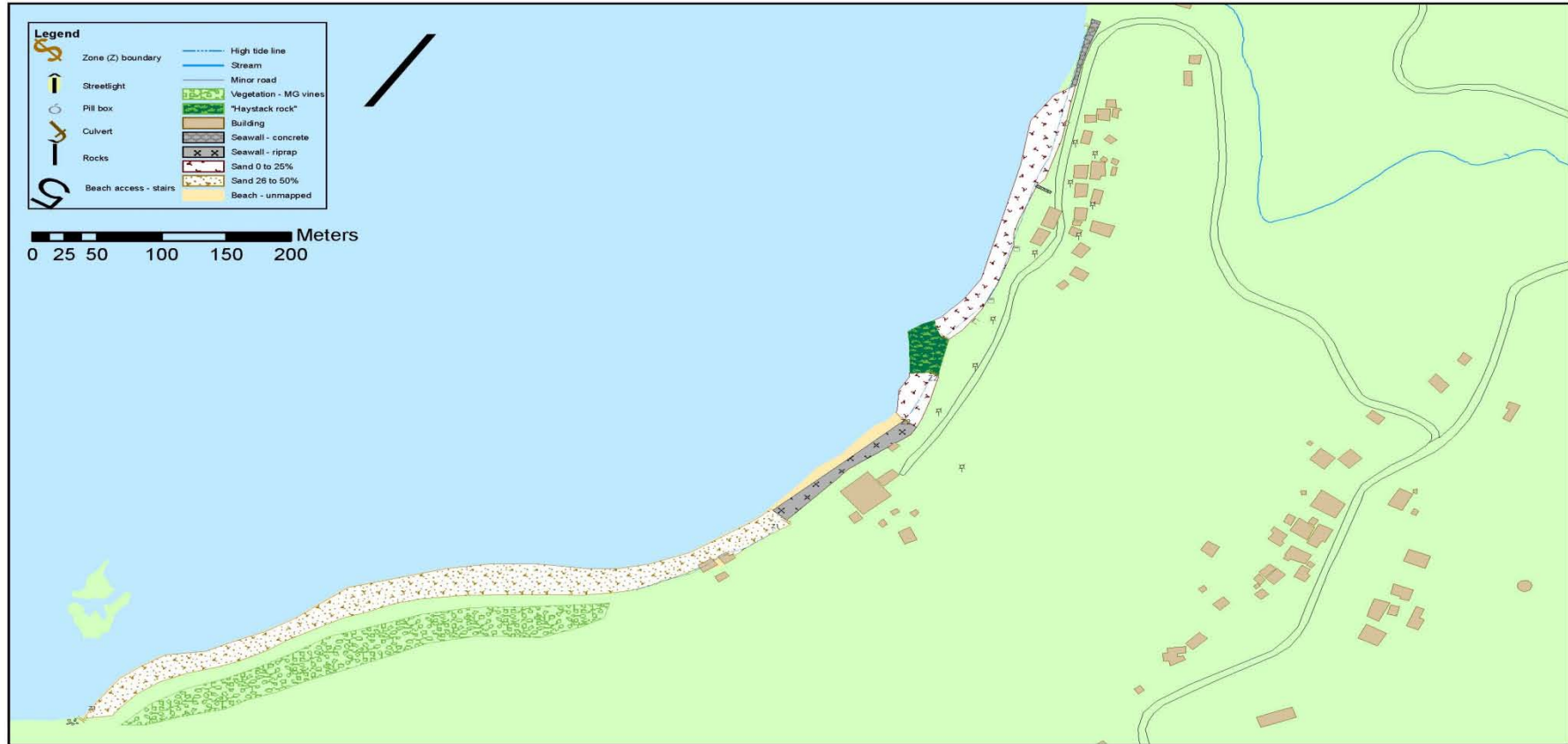


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APPENDIX 7

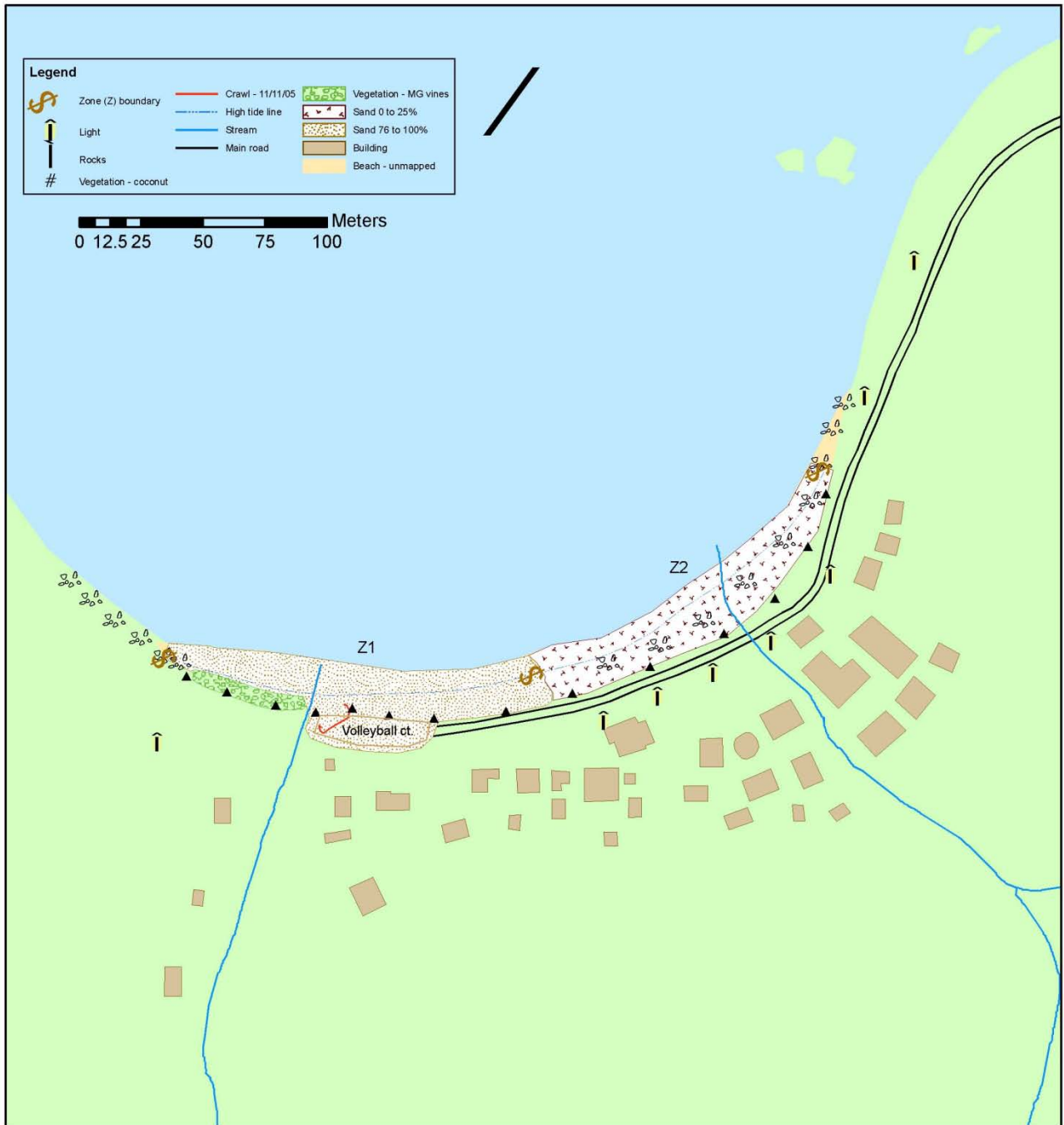
POLOA
Tutuila, American Samoa
Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED



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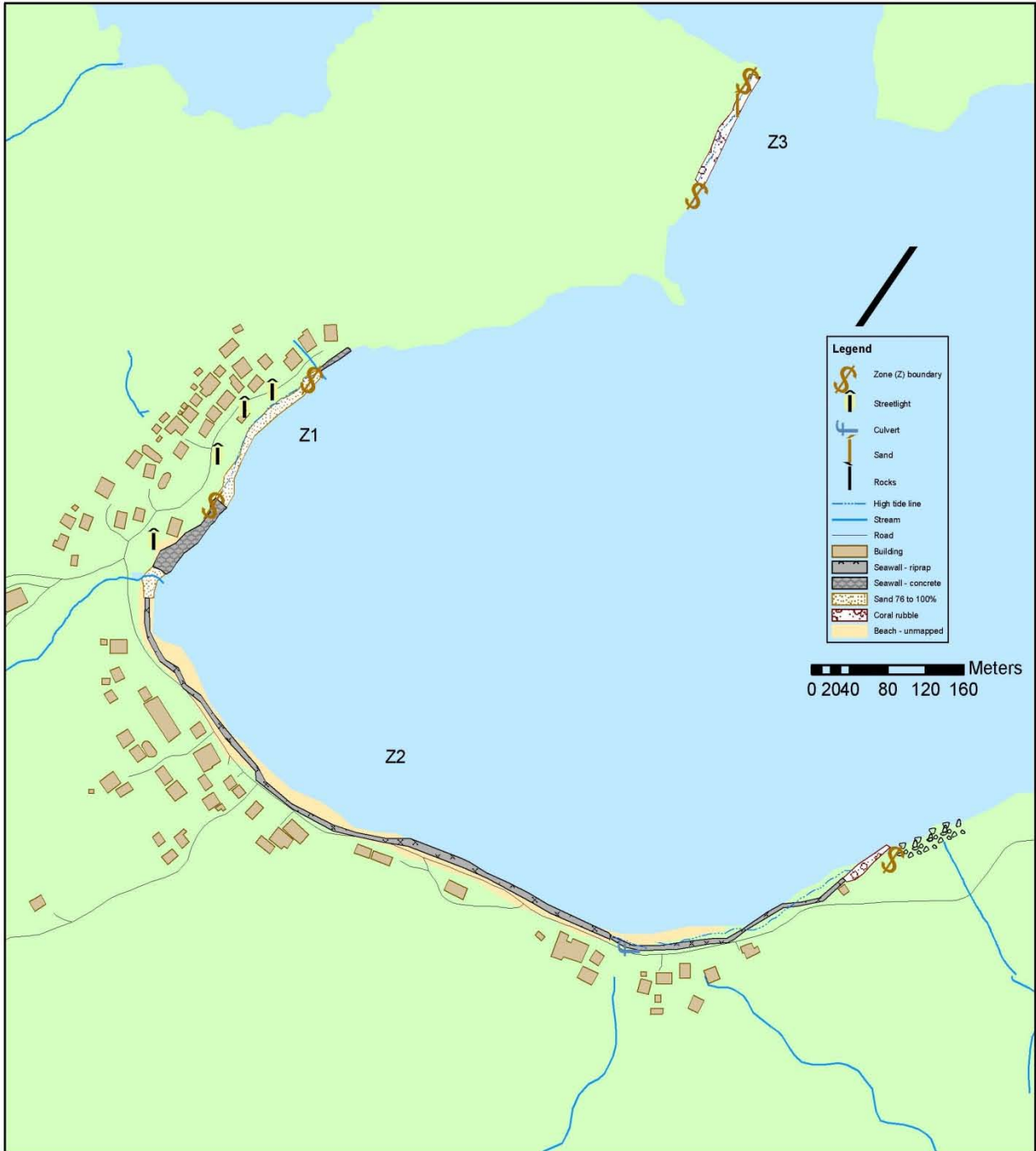
ONENOA
 Tutuila, American Samoa
 Hawksbill Sea Turtle Nesting Beach Status: IDENTIFIED



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MASEFAU
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