



GNARALOO TURTLE CONSERVATION PROGRAM 2011/12

GNARALOO CAPE FARQUHAR ROOKERY

REPORT ON SECOND RECONNAISSANCE SURVEY (21 – 23 JANUARY 2012)

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1. Introduction

The Gnaraloo Cape Farquhar Rookery (**GCFR**) was identified as a potential additional significant sea turtle rookery during aerial surveys of the Gnaraloo coastline undertaken for the Gnaraloo Turtle Conservation Program (**GTCP**) during the seasons 2009/10 and 2010/11. The GCFR could be of significance to the larger area, including the Gnaraloo Bay Rookery (**GBR**) and the Ningaloo Marine Park. As the two rookeries are close to each other (the GCFR is about 22km north of the GBR), it is possible that sea turtles use both locations for nesting purposes. New data collected at the GCFR is very important as comprehensive sea turtle data sets are lacking for Western Australia even though it supports the third largest loggerhead (*Caretta caretta*) turtle population in the world.

The first on-ground survey of the GCFR was undertaken during December 2011 (refer to GCFR Report, 21 – 23 December 2011). The second survey of the GCFR took place during 21 – 23 January 2012. This report details the findings of the survey and contains advice and recommendations for the remaining survey of the GCFR scheduled to take place during February 2012.

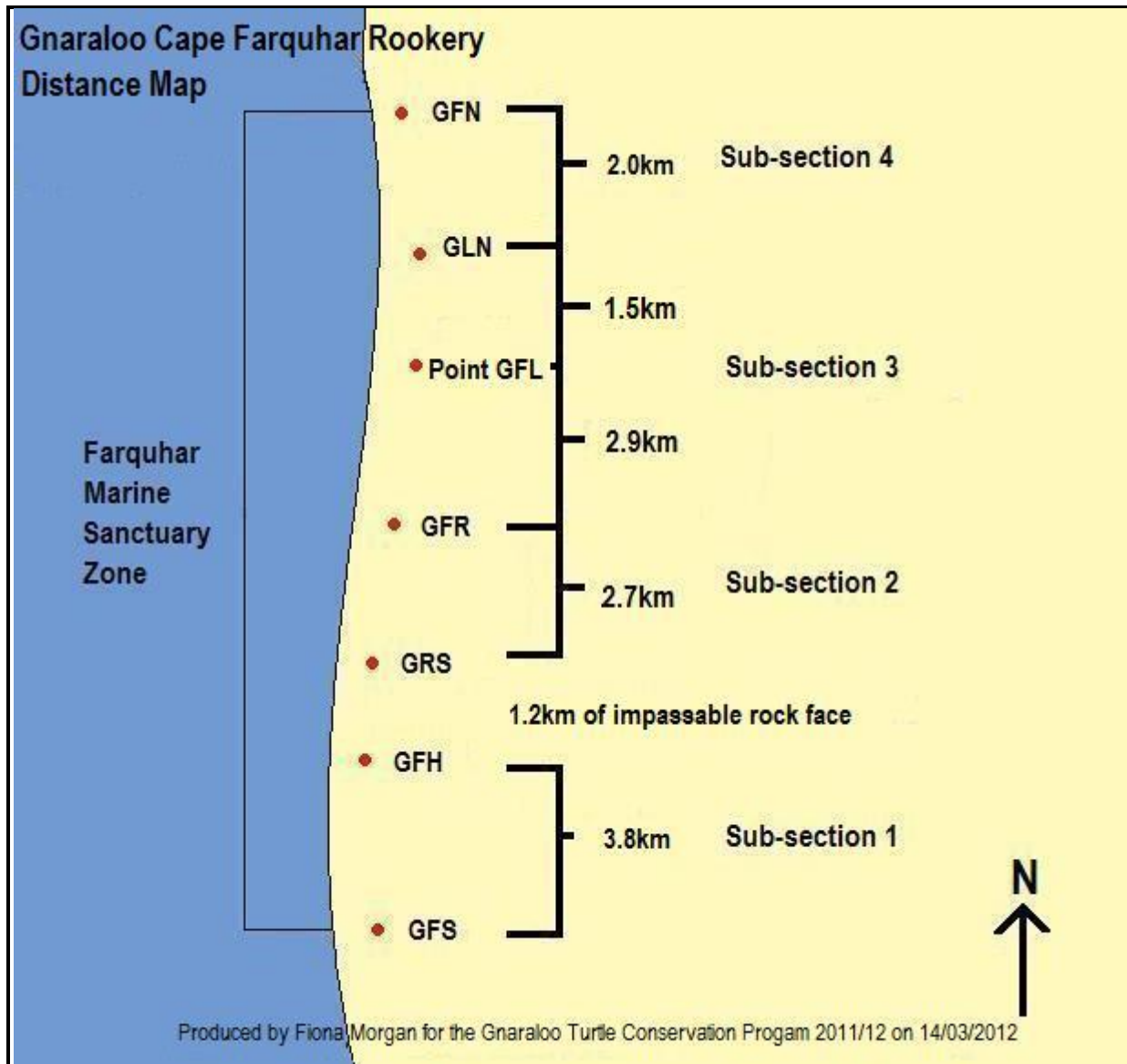
2. GCFR Study Area 2011/12

The GCFR extends from the southernmost boundary of the Cape Farquhar Marine Sanctuary Zone (**MSZ**) of the Ningaloo Marine Park (corresponding to Sub-section point GFS at -23.64168/113.61544) to the northernmost boundary of the Cape Farquhar MSZ (corresponding to Sub-section point GFN at -23.57697/113.69830), a distance of approximately 14km. Refer to Map 1.

2.1. Gnaraloo Farquhar South (GFS) to Gnaraloo Farquhar Hut (GFH)

Sub-section point GFS (-23.64168/113.61544) is located at the southernmost point of the Cape Farquhar MSZ. Sub-section point GFH (-23.62084/113.63540) is situated slightly north of the Gnaraloo Farquhar pastoral hut (-23.622023/113.634134) at the beginning of an elevated outcrop of reef rock. Sub-section GFS – GFH (i.e. Sub-section 1) contains calm beach with reef bordering the shoreline. This section is approximately 3.8km long and can be covered on foot in approximately 45 minutes.

North of Sub-section point GFH there is a section of approximately 1.2km of impassible reef rock to the start of Sub-section point Gnaraloo Runway South (**GRS**).



Map 1: Mud map of Gnaraloo Cape Farquhar Rookery (Season 2011/12)

2.2. Gnaraloo Runway South (GRS) to Gnaraloo Farquhar Runway (GFR)

There is a rocky outcrop at GFH. This sub-section begins north of this outcrop at GRS (-23.61336/113.64379) to GFR (-23.59641/113.660832). GRS – GFR (i.e. Sub-section 2) is approximately 2.7km long and takes approximately 40 minutes to walk. This sub-section is defined by a large dune system with little vegetation towards its southern half and low lying vegetation in the northern half. There is a small, protected cove south of GRS, though the narrow beach and rocky substrata render it unlikely to support any turtle activity.

2.3. Gnaraloo Farquhar Runway (GFR) to Gnaraloo Lagoon North (GLN)

Sub-section GFR – GLN (i.e. Sub-section 3) is situated immediately north of Sub-section GRS – GFR. This Sub-section commences at a section of protruding reef rocks at -23.59641/113.66083 and ends at -23.57697/113.69828. Between GFR – GLN, the beach is made up of low lying vegetation and is fringed completely by shallow reef. This section is approximately 4.4km long and can be travelled on foot in approximately 50 minutes.

Note: this Sub-section includes the coastal area known as the Gnaraloo Farquhar Lagoon (-23.58491/113.68602). It is approximately 2.9km from GFR to the Gnaraloo Farquhar Lagoon and approximately 1.5km from the Gnaraloo Farquhar Lagoon to GLN.

2.4. Gnaraloo Lagoon North (GLN) to Gnaraloo Farquhar North (GFN)

This sub-section extends north past the rocky outcrop at GLN (-23.57697/113.69828) to the northernmost boundary of the Gnaraloo Cape Farquhar MSZ (-23.57697/113.6983). This sub-section is approximately 2km long and takes approximately 20 minutes to walk. GLN – GFN (i.e. Sub-section 4) is defined by large sand dune systems with little vegetation.

3. Materials and methods

The December 2011 survey monitored the Sub-sections GFS – GFH (Sub-section 1) and GFR – GLN (Sub-section 3).

The January 2012 survey monitored the following sub-sections:

- GRS – GFR (Sub-section 2);
- GFR – GLN (Sub-section 3); and
- GLN – GFN (Sub-section 4).

GFS – GFH (Sub-section 1) was not re-surveyed due to the low amount of activity recorded during the December 2011 survey. Because it was determined as the sub-section with the most sea turtle nest activities during December 2011, GFR – GLN was monitored every day during 21 – 23 January 2012.

Beach patrols were conducted at first light each morning from 21 – 23 January 2012. The survey work was carried out by Kimmie Riskas (GTCP Team leader 2011/12) and Robert Edman (GTCP Community Volunteer Co-ordinator 2011/12). Track and nest monitoring protocols and data sheets were identical to those used for the regularly monitored GBR.



The morning patrol on 21 January 2012 consisted of walking Sub-section GFR – GLN (Sub-section 3) and the sub-section immediately to its north, GLN – GFN (Sub-section 4). As the patrol of GLN – GFN was treated as an initial reconnaissance patrol only, data on sea turtle activities present (species, activity type, GPS co-ordinates, beach position) were not recorded. Observations were noted on the amount of sea turtle activity in this area.

The morning patrol on 22 January 2012 consisted of walking Sub-section GFR – GLN again and the sub-section immediately to its south, GRS – GFR (Sub-section 2).

Sub-section GFR – GLN was again patrolled on 23 January 2012. During this patrol, the 2 GTCP researchers each walked half the sub-section in order to complete the patrol more efficiently. One researcher started at GFR and walked north to the point GFL. The other researcher drove from the informal campsite at GFR to point GFL, parked and walked north to GNL before walking back to point GFL.

A new GTCP data sheet was created to record 'old' turtle activities in the GCFR more efficiently (refer to Tables 2 and 3 below). 'Old' turtle activities are defined as activities that occurred prior to the night immediately preceding the initial morning patrol. Although originally surveys of the GCFR were intended to only record new turtle activities (i.e. activities that occurred the night immediately preceding the morning patrol), the large amount of old activities observed during the survey in January 2012 suggested that old activities should also be recorded. While recording new turtle activities provides a snap shot of what is happening at the GCFR at a specific time, also recording the old activities allows for a broader view of what happens at the rookery over the nesting season between surveys. The new data sheet was also created because it was often difficult to differentiate between different old turtle activities when there were no remaining tracks due to weathering by wind, tides and other environmental conditions and the only visible features were old body pits. It was also difficult to determine if a group of old body pits without any visible tracks represented only one activity or multiple activities by separate nesting turtles. Because of this as well as the fact that the Sub-section GFR – GLN (Sub-section 3) (which is 4.4km long) contained old turtle activities about every 5m (which is often the accuracy limit of the GPS units), the GPS locations of old activities were not recorded during the January 2012 survey.

The new GTCP data sheet contains 5 columns based on what part of the old nest activity was visible. Tallies were made in each column based on the old activity type. The columns included:

- old nests with visible tracks;
- old nests without visible tracks;
- old UNAs with visible tracks;
- old UNAs without visible tracks; and
- old body pits without visible tracks.

A decision was made to count groups of old body pits found together without any visible tracks as one activity. This was marked as one tally in the column 'Old body pits without visible tracks'.

Old activities were also grouped in the new GTCP data sheet based on what position they were on the beach:

- H zone (area between the high water mark and the vegetation line);
- E zone (area between the edge of vegetation and the base of the foredune); or
- D zone (area from the base of the foredune and beyond).

The I zone (inter-tidal area between the water's edge and below the high water mark) was not included on the new GTCP data sheet as old activities in this zone would have been washed away.

If an old activity had discernible tracks, tallies in the new GTCP data sheet were divided by species as well.

Similar to the December 2011 survey, no night patrols or in-water snorkeling surveys were undertaken during 21 – 23 January 2012.

Semi-permanent sub-section markers were erected where necessary to demarcate the different sub-sections in the GCFR. The southern and northern most points of the GCFR are demarcated by the Cape Farquhar MSZ yellow markers installed by DEC. Sub-section points GFR and GLN and location marker GFL were marked using semi-permanent markers consisting of 2m long wooden stakes (approximately 4cm wide) with the top 30cm painted. The names of the sub-sections were written on the painted area of the stakes. Stakes were then pounded in with a sledgehammer at the sub-section points to keep them from being blown over by the strong winds that are prevalent in the area or being washed away by tides. Neon green flagging tape was also attached at two points on the marker to make it more visible.

An informal swag camp was set-up in an open area off the track leading to sub-section point GFR. This camp allowed the GTCP researchers easy access to the beginning of the subsection GFR – GLN (Sub-section 3) for the morning patrols. Sleeping occurred both in and on top of the GTCP Turtle Wagon depending on the weather, also assuring that the researchers would be off-ground and away from any animals (snakes, scorpions, crabs, centipedes, etc) during the night.

4. Results

4.1. New turtle activities

A total of 19 new (i.e. occurred the night immediately preceding the morning patrol) turtle activities (including nests, unsuccessful nesting attempts (**UNA**), U-tracks and unidentified activities) were observed in monitored sub-sections of the GCFR during 21 - 23 January 2012, with nearly all the activities in the Sub-section GFR – GLN (Sub-section 3) (refer Table 1 and Map 2).

A total of 18 new turtle activities were recorded in Sub-section GFR – GLN during 21 - 23 January 2012, identified as belonging to:

- 17 loggerhead (*Caretta caretta*);
- 0 green (*Chelonia mydas*);
- 0 hawksbill turtle (*Eretmochelys imbricata*); and
- 1 unidentified species given weathering of the tracks by wind, tides and other environmental conditions.

The breakdown of the new turtle activities in Sub-section GFR – GLN included (refer Table 1):

- 9 nests;
- 5 UNAs; and
- 4 U-tracks.

Only 1 new turtle activity (a nest) was observed in Sub-section GLN – GFN (Sub-section 4) patrolled on 21 January 2012 (note: species and GPS coordinates were not recorded for this nest). No new turtle activities were recorded in Sub-section GRS – GFR (Sub-section 2) patrolled on 22 January 2012.

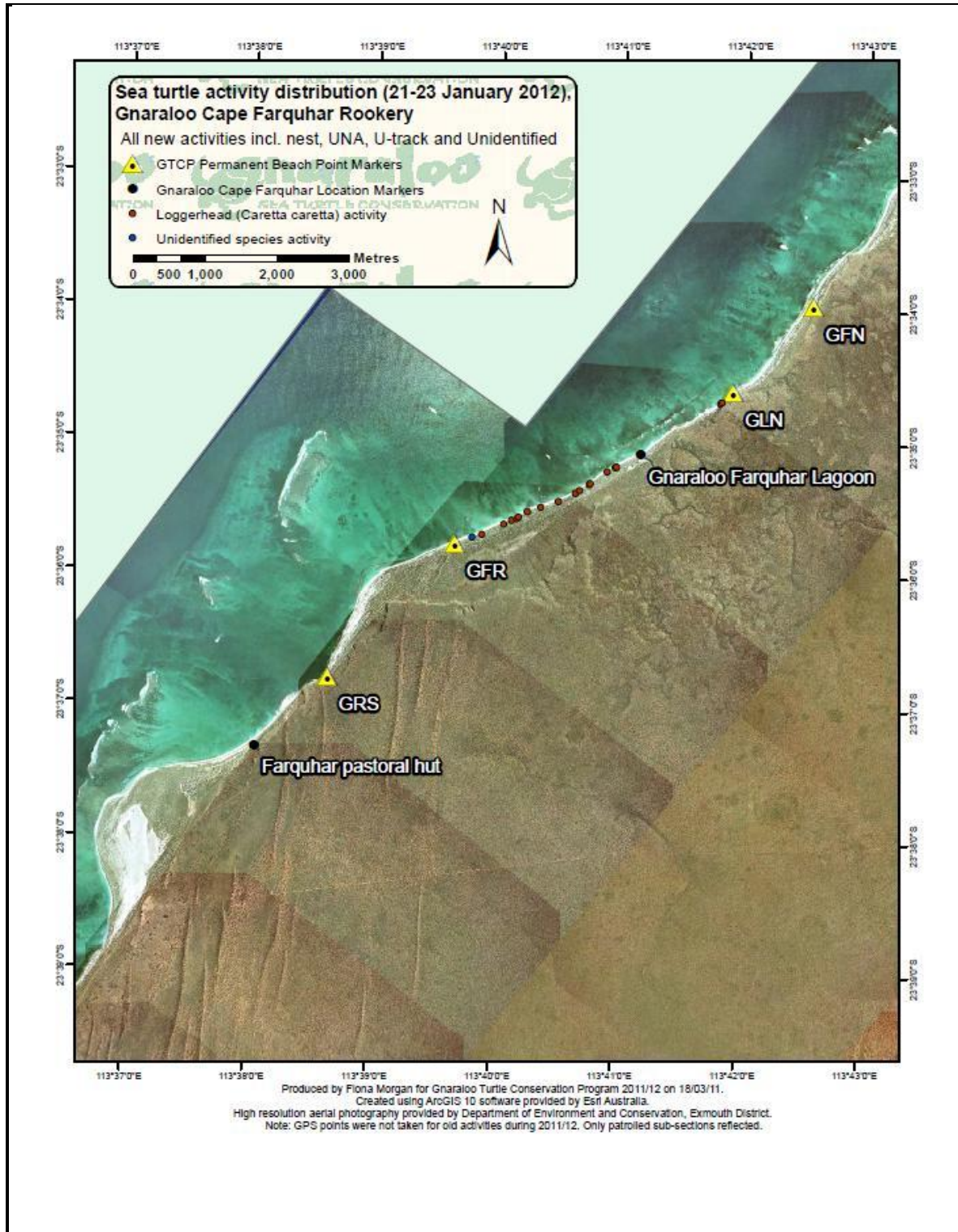
Table 1: Total new turtle activities recorded at Gnaraloo Farquhar Runway to Gnaraloo Lagoon North (21 – 23 January 2012).

Species	Activity	21 Jan 2012	22 Jan 2012	23 Jan 2012
		Sub-section 3 GFR - GLN	Sub-section 3 GFR - GLN	Sub-section 3 GFR - GLN
Loggerhead (<i>Caretta caretta</i>)	Nest	4	4	0
	UNA	0	4	1
	U-track	0	2	2
	Unidentified*	0	0	0
Green (<i>Chelonia mydas</i>)	Nest	0	0	0
	UNA	0	0	0
	U-track	0	0	0
	Unidentified*	0	0	0
Hawksbill (<i>Eretmochelys imbricata</i>)	Nest	0	0	0
	UNA	0	0	0
	U-track	0	0	0
	Unidentified*	0	0	0
Unidentified species	Nest	1	0	0
	UNA	0	0	0
	U-track	0	0	0
	Unidentified*	0	0	0
Total		5	10	3

Notes:

- * i.e. determination of nest vs UNA could not be made given weathering of the tracks by wind, tides and other environmental conditions.

Refer to Map 2 for the distribution of new sea turtle activities in the GCFR sub-sections patrolled during 21 – 23 January 2012.



Map 2: New sea turtle activities recorded in the monitored sub-sections of the Gnaraloo Cape Farquhar Rookery (21 – 23 January 2012)

Concurrent monitoring of the Gnaraloo Bay Rookery (**GBR**) was undertaken by GTCP team member Fiona Morgan (GTCP GIS Cartographer 2011/12) during 21 – 23 January 2012. New turtle activities at the GCFR are compared with the GBR numbers in Table 2 below.

Table 2: Comparison of total new turtle activities at the Gnaraloo Bay Rookery and the Gnaraloo Cape Farquhar Rookery (21 – 23 January 2012).

Species	Activity	21 – 23 Jan 2012	21 – 23 Jan 2012
		Entire GBR*	Monitored sub-sections in GCFR*
Loggerhead (<i>Caretta caretta</i>)	Nest	13	8
	UNA	12	5
	U-track	2	4
	Unidentified	0	0
Green (<i>Chelonia mydas</i>)	Nest	2	0
	UNA	0	0
	U-Track	1	0
	Unidentified	0	0
Hawksbill (<i>Eretmochelys imbricata</i>)	Nest	0	0
	UNA	0	0
	U-Track	0	0
	Unidentified	0	0
Unidentified species	Nest	0	2
	UNA	0	0
	U-Track	0	0
	Unidentified	0	0
TOTALS		30	19

Notes:

* GBR included Sub-sections GBN – BP9. GCFR included Sub-sections GRS – GFR (Sub-section 2), GFR – GLN (Sub-section 3) and GLN – GFN (Sub-section 4).

The 30 new activities recorded in the GBR included:

- 9 activities (all loggerhead) on 21 January 2012;
- 11 activities (9 loggerhead and 2 green) on 22 January 2012; and
- 10 activities (9 loggerhead and 1 green) on 23 January 2012.

Over the course of 21 – 23 January 2012, Sub-section GFR – GLN in the GCFR averaged 6 total new activities per survey day, while the entire GBR (i.e. sub-sections GBN – BP9) averaged 10 new activities per day during the same time period.

4.2. Old turtle activities

Sub-section GFR – GLN (Sub-section 3) was surveyed on 21 January 2012 for signs of old turtle activities since the December 2011 survey. The following total number of old activities was recorded (refer Table 3):

- 111 old activities (27 nests, 40 UNAs and 44 aggregations of body pits that could not be further identified).

All old activities where tracks were still visible were identified as loggerhead activities, with the exception of one green nest.

Table 3: Total old turtle activities recorded at Gnaraloo Farquhar Runway to Gnaraloo Lagoon North (21 January 2012).

Beach position	Species	Old nests with visible tracks	Old nests without visible tracks	Old UNAs with visible tracks	Old UNAs without visible tracks	Old body pits without visible tracks
H	L	1	0	0	1	0
	G	0		0		
E	L	12	13	14	25	44
	G	1		0		
Total		14	13	14	26	44

Notes:

Old turtle activities are defined as those occurring prior to the night immediately preceding the initial morning patrol.

H = Between the high tide line and the vegetation line, E = At and above the vegetation line.

L = loggerhead, G = Green.

Sub-section GLN – GFN (Sub-section 4) was also patrolled for old activities on 21 January 2012. The GTCP researchers observed approximately 10 old turtle activities (note: further data was not recorded).

Sub-section GRS – GFR (Sub-section 2) was surveyed on 22 January 2012 for the first time and signs of old activities were recorded. The following total number of old activities was recorded (refer Table 4):

- 13 old activities (7 nests, 3 UNAs and 3 aggregations of body pits that could not be further identified).

All activities with visible tracks were identified as being characteristic of loggerhead turtles.



Table 4: Total old turtle activities recorded at Gnaraloo Runway South to Gnaraloo Farquhar Runway (22 January 2012).

Beach position	Species	Old nests with visible tracks	Old nests without visible tracks	Old UNAs with visible tracks	Old UNAs without visible tracks	Old body pits without visible tracks
H	L	0	5	0	3	1
	G	0		0		
E	L	2	0	0	0	2
	G	0		0		
Total		2	5	0	3	3

Notes:

Old turtle activities are defined as those occurring prior to the night immediately preceding the initial morning patrol.

H = Between the high tide line and the vegetation line, E = At and above the vegetation line.

L = loggerhead, G = Green.

5. Discussion

The second formal monitoring survey of the GCFR during January 2012 observed the majority of sea turtle activity to occur in Sub-section GFR – GLN (Sub-section 3), specifically between GFR and point GFL. These results concur with the results found during the December 2011 survey.

While sub-sections GRS – GFR (Sub-section 2) and GLN - GFN (Sub-section 4) also serve as nesting grounds for sea turtles, it was recorded during the January 2012 survey that turtles nested at lower densities in these sub-sections compared to the numbers recorded in Sub-section GFR - GLN. However, it must be noted that the number of old turtle activities in Sub-section GFR – GLN (111) is an approximation due to two reasons. Firstly, without tracks present at some of these activities, it was often difficult to determine if a group of old body pits represented only one activity or multiple activities by separate nesting turtles. Groups of body pits found together without any visible tracks were counted as one activity even though they could have possibly belonged to separate activities. Secondly, some of the old activities may have been counted during the December 2011 survey. Although this is unlikely, body pits might conceivably still be visible one month after they were created. It is also worth noting that only 6 total old activities were observed in Subsections GFS – GFH and GFR – GLN during the December 2011 survey, which is only a small number.

The number of new activities observed in the GCFR was again slightly less than that recorded in the GBR during 21 – 23 January 2012. However, on 22 January 2012, 11 new activities were recorded in the entire GBR (GBN – BP9) and 10 were recorded just in Sub-section GFR – GLN of the GCFR.

Results from the December 2011 and January 2012 surveys showed the majority of sea turtles nesting in the GCFR to be loggerheads. There was one new nest of an unidentified species and one old green turtle nest recorded during the January 2012 survey, although some of the unidentified activities could also be from green turtles. This suggests that the sea turtle

population at the GCFR may be similar in composition to the GBR, although it remains to be seen if any hawksbill turtles (*Eretmochelys imbricata*) nest at the former. Sightings of green turtles (juvenile and adult) in the water throughout the GCFR throughout the January 2012 survey suggest that greens may use the area as a potential mating, foraging and/or resting site in addition to nesting.

Based on the activities recorded in Sub-section GFR – GLN (Sub-section 3) during the January 2012 survey, the turtles seemed to preferentially select the E zone (i.e. area between the edge of vegetation and the base of the foredune) in which to attempt to make a nest. This could be due to the topography of this sub-section, as the beach is not very wide and the H zone (i.e. area between the high water mark and the vegetation line) is steep until it flattens out in the E zone. However, because many of the turtle activities observed were old, some activities in the I zone (i.e. inter-tidal area between the water's edge and below the high water mark) and H zone could have been washed away by high tides.

Previous GTCP research teams determined that the seasonal peak for nesting in the GBR occurs around 10 January. This may also be the case at the GCFR. During the first survey, 17 new and 6 old turtle activities were recorded in monitored sub-sections of the GCFR (21 – 23 December 2011). By contrast, during the second survey, 19 new and 134 old turtle activities were recorded in monitored sub-sections of the GCFR (21 – 23 January 2012). Based on these results, it may be that peak nesting in the GCFR occurs around early to mid January. This conclusion needs to be further investigated and confirmed during monitoring of the GCFR in future.

6. Recommendations

6.1. Sub-sections to monitor during February 2012

During the December 2011 and January 2012 surveys, the GTCP researchers monitored the entire coastline of this rookery (i.e. all areas that have passable beach sections in the Cape Farquhar MSZ). Results showed the majority of sea turtle activity to be in Sub-section GFR – GLN (Sub-section 3). This sub-section should again be monitored during the final survey on 21 – 23 February 2012 to allow resources and manpower to be concentrated in one area.

6.2. Patrol of GFR - GLN during February 2012

During 21 - 22 January 2012, the GTCP researchers patrolled the entire Sub-section GFR – GLN (Sub-section 3) together, taking approximately 1 hour and 40 minutes to walk on foot. On 23 January 2012, one member started patrol out of the campsite at GFR and walked north to point GFL. The other member drove and parked at point GFL to then patrol point GFL – GLN on foot. Both researchers arrived back at point GFL at approximately the same time and this greatly reduced the amount of time and distance walked by both patrollers. It is recommended that this method be used in the future for patrolling GFR – GLN.

6.3. Recording of old turtle activities during February 2012

Due to the high number of old activities encountered in Subsection GFR – GLN (Sub-section 3) during the January 2012 survey, a new GTCP data sheet was created to efficiently record all of the old activities. It is recommended that such recording continue during the final survey on 21 – 23 February 2012. Use of the new data sheet does not require the recording of GPS positions of old activities because it is often difficult to determine separate activities when tracks are no longer visible.

6.4. Campsite accommodation during February 2012

During the January 2012 survey, the GTCP researchers camped at an informal campsite located off the track that leads to sub-section point GFR for all three nights. It is recommended that this campsite location again be used during the February 2012 survey as this site is optimally located at the starting point for monitoring Sub-section GFR – GLN. While camping should occur at this site, it is highly recommended that future camping expeditions arrange a better sleeping situation. Researchers slept on the seats, outside on the bonnet and even on the roof of the GTCP Turtle Wagon to avoid unwanted contact from various animals at the campsite. However, these sleeping conditions did not provide restful sleep. During future survey work, researchers would be wise to organize a way to raise swags off the ground to be able to sleep safely and comfortably outside, for example through loan and use of a Gnaraloo pastoral ute.

6.5. Monitoring schedule during 2012/13

To more accurately assess when the peak nesting period occurs at the GCFR, it is recommended that future GTCP teams plan for an additional excursion during the month of January. If the peak nesting period of the GCFR is similar to the GBR (around 10 January), then monitoring the sub-sections closer to and inclusive of such date would provide a more informed view of sea turtle nesting activity at the GCFR. Since it would take place during a different time in the lunar cycle, an additional survey of the GCFR in future would also provide an important opportunity to document activities that are washed away by high spring tides and therefore undetected at the time of surveys during 21 – 23 January.

7. Conclusions

A significant outcome of the December 2011 and January 2012 reconnaissance surveys of the GCFR was the delineation and determination of 4 sub-sections to be regularly monitored by future GTCP research teams.

After patrolling sub-sections not previously monitored during the December 2011 survey, the GTCP team has now cumulatively monitored the entire GCFR (which coincides with the landward boundaries of the Cape Farquhar MSZ) for sea turtle activity.

Based on the high density of new and old turtle activities recorded in Sub-section GFR – GLN (Sub-section 3), a recommendation has been made to concentrate on this sub-section again during the final survey in February 2012, using the new GTCP data sheet created for recording old activities.



Consistent with the results of the December 2011 survey, mostly loggerhead activities were recorded during the January 2012 survey; however there were documented activities of a green turtle and unidentified species. Sightings of green turtles (juvenile and adult) in the water throughout the GCFR were again frequent. This indicates that the loggerhead activities recorded may not entirely describe the extent of turtle presence in the area by other species which may use the area for mating, nesting, foraging and/or resting.

The number of turtle nesting activities found in the monitored sub-sections of the GCFR during 21 - 23 January 2012 suggests the potential significance of the rookery. It is possible that sea turtles nest in both the GBR and GCFR during the same season, which should be further investigated in future through tagging studies. Monitoring efforts during both the season 2011/12 and in future should continue to investigate the GCFR as another potential significant sea turtle rookery on the Gnaraloo coastline.