



## **GNARALOO TURTLE CONSERVATION PROGRAM 2011/12**

### **GNARALOO CAPE FARQUHAR ROOKERY**

#### **REPORT ON FINAL RECONNAISSANCE SURVEY (21 – 23 FEBRUARY 2012)**

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#### **1. Introduction**

The new Gnaraloo Cape Farquhar Rookery (**GCFR**) was monitored three times by GTCP researchers during the season 2011/12. These surveys constituted the first formal on-ground monitoring of the GCFR to determine the significance of the rookery in the context of sea turtle activities on the Gnaraloo coastline and within the Ningaloo Marine Park.

The first on-ground survey of the GCFR was undertaken during December 2011 and the second survey took place during January 2012 (refer to GCFR Reports, 21 – 23 December 2011 and 21 – 23 January 2012). This report details the findings of the final survey of the GCFR during 2011/12 and contains advice and recommendations for future surveys, including the season 2012/13 and beyond.

#### **2. GCFR Study Area 2011/12**

Refer to the detailed information in the GCFR Reports, 21 – 23 December 2011 and 21 – 23 January 2012 and to Map 1 for a mud map of the GCFR.

#### **3. Materials and methods**

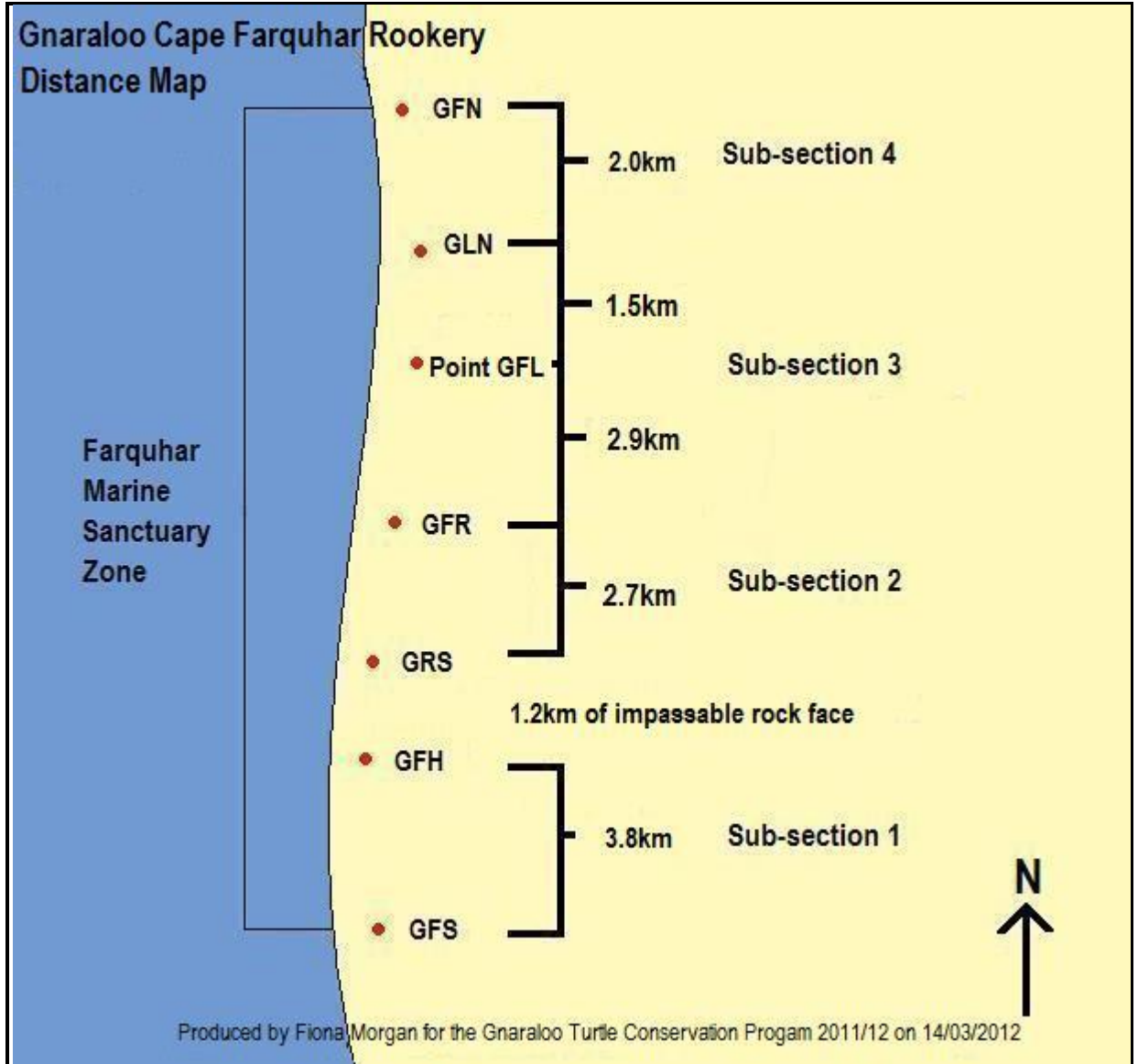
The December 2011 survey monitored the Sub-sections GFS – GFH (Sub-section 1) and GFR – GLN (Sub-section 3).

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).

The February 2012 survey again monitored GRS – GFR (Sub-section 2) and GFR – GLN (Sub-section 3). As recommended by the previous surveys, Sub-section GFR – GLN was patrolled on all three monitoring days as it was the area previously observed to contain the most sea turtle activities at GCFR. Sub-section GRS – GFR was patrolled once on 22 February 2012 in order to erect GTCP semi-permanent sub-section markers. The southernmost Sub-section GFS – GFH and northernmost Sub-section GLN – GFN were not patrolled based on the low amount of turtle activities observed in these areas during the first two surveys during 2011/12.

Beach patrols were conducted at first light each morning from 21 – 23 February 2012. The survey work was carried out by Fiona Morgan (GTCP GIS Cartographer 2011/12) and Robert Edman (GTCP Community Volunteer Co-ordinator 2011/12).



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



Track and nest monitoring protocols and data sheets were identical to those used for the regularly monitored GBR. Due to the high number of old turtle activities witnessed during the January 2012 survey, old activities were again recorded on the new GTCP data sheet created during the January 2012 survey. Old turtle activities are defined as activities that occurred prior to the night immediately preceding the initial morning patrol. New turtle activities were recorded on the standard GTCP track monitoring data sheet used for the GBR. New turtle activities are defined as activities that occurred the night immediately preceding the morning patrol.

Both GTCP researchers patrolled Sub-section GFR – GLN (Sub-section 3) together on 21 February 2012 due to the expected high number of old activities to be recorded. During 22 – 23 February 2012, one GTCP researcher patrolled GFR to point Gnaraloo Farquhar Lagoon (**GFL**), while the other GTCP researcher drove to point GFL and patrolled north to GLN.

As was the case during the previous two December 2011 and January 2012 surveys, no night patrols or in-water snorkeling surveys were undertaken during 21 – 23 February 2012.

Semi-permanent sub-section markers were installed and/or replaced to now indicate all sub-sections in the GCFR. Semi-permanent sub-section markers were erected at sub-section points GFH and GRS. The marker previously erected at GLN was relocated further inland in order to better withstand environmental elements until the season 2012/13 (the previous marker was impacted by significant sand erosion due to tidal movements during 2011/12). All markers are 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 markers to make it more visible. The yellow Cape Farquhar Marine Sanctuary Zone poles of the Ningaloo Marine Park demarcate the southern and northern most points of the GCFR.

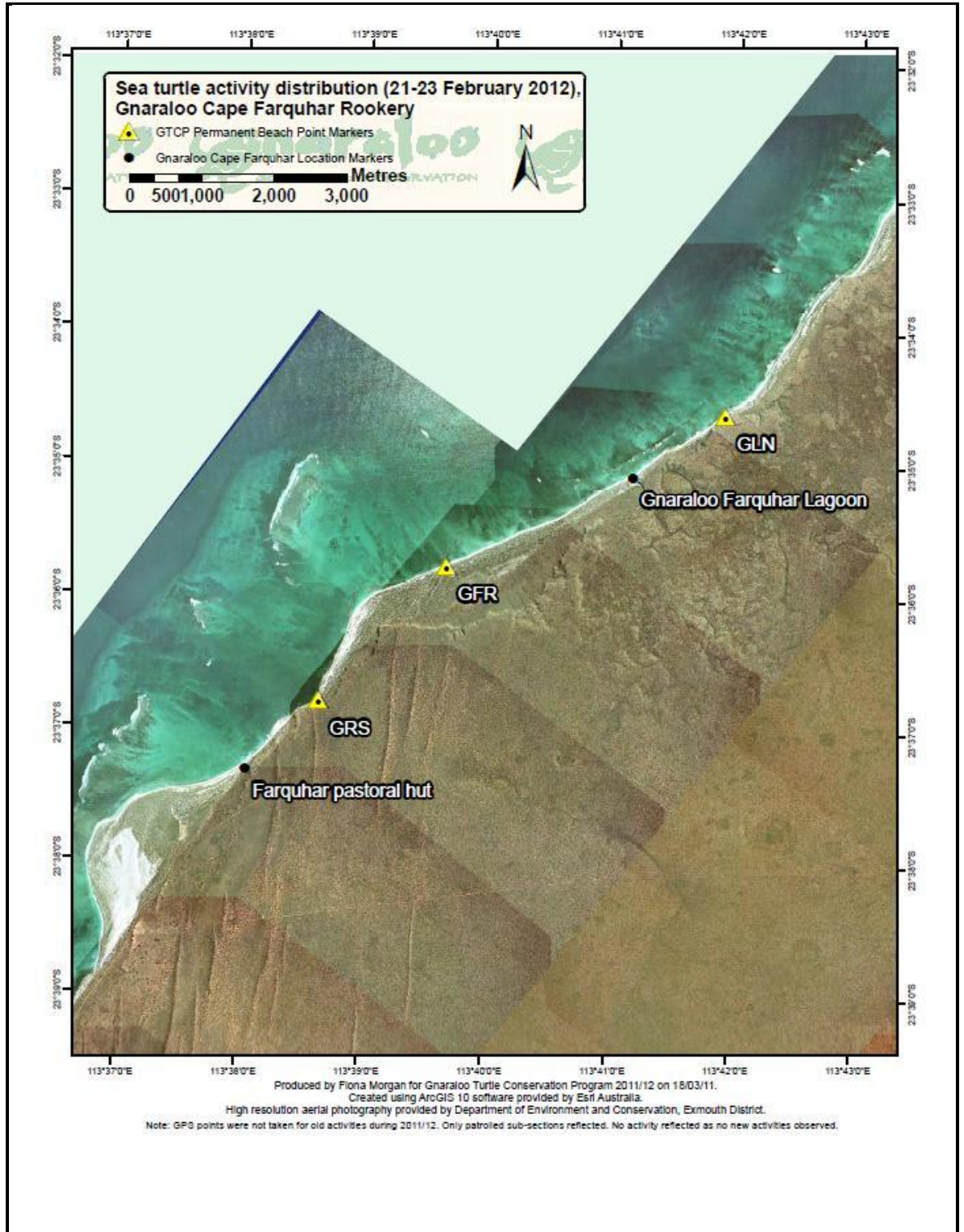
The informal swag camp previously set up at GFR was again used by the GTCP researchers during the February 2012 survey. Researchers slept in the GTCP Turtle Wagon in order to avoid adverse weather conditions and animal contact throughout the night.

## 4. Results

### 4.1. New turtle activities

No new 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 February 2012, including GRS – GFR (Sub-section 2) and GFR – GLN (Sub-section 3) (refer Map 2).

Concurrent monitoring of the Gnaraloo Bay Rookery (**GBR**) was undertaken by GTCP team member Kimmie Riskas (Team leader 2011/12) during 21 – 23 February 2012. New turtle activities at the GCFR are compared with the GBR numbers in Table 1 below.



**Map 2: Sub-sections of the Gnaraloo Cape Farquhar Rookery monitored during 21 – 23 February 2012 (no new sea turtle activities observed)**



**Table 1: Comparison of total new turtle activities at the Gnaraloo Bay Rookery and the Gnaraloo Cape Farquhar Rookery (21 – 23 February 2012).**

Species	Activity	21 – 23 Feb 2012	21 – 23 Feb 2012
		Entire GBR*	Monitored sub-sections in GCFR*
Loggerhead ( <i>Caretta caretta</i> )	Nest	1	0
	UNA	0	0
	U-track	1	0
	Unidentified	0	0
Green ( <i>Chelonia mydas</i> )	Nest	0	0
	UNA	0	0
	U-Track	0	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	0
	UNA	0	0
	U-Track	0	0
	Unidentified	0	0
<b>TOTALS</b>		<b>2</b>	<b>0</b>

**Notes:**

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

**4.2. Old turtle activities**

Sub-section GFR – GLN (Sub-section 3) was surveyed during the morning of 21 February 2012 for signs of old turtle activities since the January 2012 survey. The following total number of old activities was recorded (refer Table 2):

- 45 old activities (6 nests, 15 UNAs and 24 aggregations of body pits that could not be further identified).

Of all old activities observed, only 3 had tracks that were visible: 2 of these were loggerhead (*Caretta caretta*) and 1 was green (*Chelonia mydas*).

**Table 2: Total old turtle activities recorded at Gnaraloo Farquhar Runway to Gnaraloo Lagoon North (21 February 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	0	0	0	0
	G	0		0		
E	L	1	4	1	14	24
	G	1		0		
<b>Total</b>		<b>2</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>24</b>

**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 GRS – GFR (Sub-section 2) was surveyed for old activities on 22 February 2012. Only 1 old activity (1 aggregation of body pits that could not be further identified) was recorded (refer Table 3). There were no visible tracks.

**Table 3: Total old turtle activities recorded at Gnaraloo Runway South to Gnaraloo Farquhar Runway (22 February 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	0	0	0	0
	G	0		0		
E	L	0	0	0	0	1
	G	0		0		
<b>Total</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

**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

It was determined from the December 2011 and January 2012 surveys of the GCFR that the greatest amount of new and old turtle activities occurred within Sub-section GFR – GLN (Sub-section 3). Due to lower numbers of turtle activities observed in the other sub-sections of the GCFR during the previous two surveys, GFR – GLN was the only section repeatedly monitored during the February 2012 survey.

The GTCP researchers observed no new turtle activities (including nests, UNAs, U-tracks or unidentified activities) in the monitored sub-sections of the GCFR (i.e. GRS – GFR and GFR – GLN) during the February 2012 survey. It is therefore likely that the annual turtle nesting period (note: as opposed to the complete hatching period) at the GCFR is close to its end, if not already over, at this time. Turtle activities at the regularly monitored GBR had also mostly ceased by the time of the GCFR survey during February 2012 (only 2 activities were recorded at the GBR during 21 – 23 February 2012, namely 1 loggerhead nest and 1 loggerhead U-track).

Old turtle activities were recorded in both Sub-sections GRS – GFR (Sub-section 2) and GFR – GLN (Sub-section 3) during the February 2012 survey. GRS – GFR contained only 1 old activity consisting of an aggregation of body pits. GFR – GLN contained 45 old turtle activities (the majority being located between GFR to point GFL, as was the case during the January 2012 survey), some tracks of which were still visible. This indicates high nesting activities in Section GFR – GLN, although due to the time elapsed between GCFR surveys it was not possible to determine how recent the activities were. It needs to be noted that the number of old turtle activities is only an estimate due to two reasons. Firstly, without tracks present at some of these activities, it is difficult to determine if a group of old body pits represent 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 January survey 2012. Although this is unlikely, body pits might conceivably still be visible one month after they were created (13 old activities were recorded in GRS – GFR and 111 old activities in GFR – GLN during the January 2012 survey).

Of the 3 old turtle activities (2 nests and 1 UNA) in Sub-section GFR – GLN (Sub-section 3) for which species were able to be determined by tracks, 2 belonged to loggerheads and 1 to a green turtle. These results, as well as those from the January 2012 survey, indicate that green turtles also nest at the GCFR. It is still unknown whether hawksbill turtles (*Eretmochelys imbricata*) nest at the GCFR as no hawksbill tracks have been positively identified during the reconnaissance surveys in 2011/12.

All old activities found in GRS – GFR and GFR – GLN during the February 2012 survey occurred in the E zone (i.e. area between the edge of vegetation and the base of the foredune) of the beach. This is most likely due to the beach topography in the northern half of GRS – GFR and in GFR – GLN. The beach profiles in these areas are very short and sloped in the H zone (i.e. area between the high water mark and the vegetation line) until it flattens out at the E zone, therefore the turtles' observed preference for the higher, flat ground. However, it is also possible that old 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, therefore leaving only activities in the E zone visible.

During the February 2012 survey, several turtle hatchlings were observed in Sub-section GFR – GLN (Sub-section 3). While the majority of these hatchlings were loggerhead, a few green hatchlings were also observed. Most of the hatchlings were dead due to predation by



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crabs and many crabs were observed actively predated on dead hatchlings. A few live hatchlings were observed on the beach, including one that successfully made it to the water.

## **6. Recommendations**

### **6.1. Continue monitoring of the GCFR**

It is strongly recommended that GCFR surveys continue during future GTCP seasons to more fully investigate the significance of this sea turtle rookery on the Gnaraloo coastline. It is recommended that more regular monitoring of the GCFR be undertaken during future seasons of the GTCP if possible. This will provide more robust data on turtle breeding activities as well as better capture the peak nesting period at this rookery. To allow for increased monitoring of the GCFR in future, whilst it is understood that this has resource and cost implications, it is recommended that at least 1 (ideally 2) additional GTCP team member be appointed to the seasonal GTCP scientific team, currently comprising of 3 researchers.

Future research at the GCFR may include a sea turtle tagging program to investigate turtle movements between the GBR and GCFR, whether this is undertaken by external researchers or by the GTCP if funds were available, training was provided and required protocols were established. This would allow researchers to determine if female sea turtles are using both rookeries at Gnaraloo during the nesting season and would provide more accurate estimates of the number of female turtles using the Gnaraloo coastline for nesting activities. Given the current resource restrictions of the GTCP, such work would be best suited to a research project by external university researchers.

### **6.2. Timing of GCFR monitoring surveys during 2012/13**

The lack of new turtle nesting activities in monitored sub-sections of the GCFR during 21 – 23 February 2012 (0 new activities) indicates that the annual turtle nesting period (as opposed to the complete hatching period) was complete at this stage. Fewer old activities were recorded in monitored sub-sections of the GCFR during 21 – 23 February 2012 (46 old activities) than during 21 – 23 January 2012 (134 old activities). It is therefore recommended that a changed survey schedule of the GCFR be adopted by GTCP teams during 2012/13 to better capture the assumed peak nesting period (around 10 January) at the GCFR for the majority of turtle nesting activities. By bringing the final GCFR survey during February 2013 forward it will also reduce stress on the GTCP researchers as the February survey 2012 occurred within 10 days of the overall program end of the GTCP on 28 February 2012.

As an important pre-season program responsibility, in discussion with the Gnaraloo Environmental Advisor (**GEA**), the GTCP team 2012/13 must consider the historical seasonal start, peak and end of the nesting season at the GBR since 2008/09 and the results of the GTCP surveys 2011/12 to determine an ideal monitoring schedule for the GCFR in order to be able to better gauge the start, peak and end of the nesting season at the GCFR (as has already been identified for the GBR). Thereafter, in consultation with GEA and the Gnaraloo leaseholder, a decision may be reached about the number of GCFR surveys that will be undertaken during 2012/13, considering available resources and other essential program responsibilities and commitments.



### **6.3. GCFR sub-sections to monitor during 2012/13**

All subsections of the GCFR monitored during the season 2011/12 should again be monitored during 2012/13 to further investigate and confirm areas with the majority of turtle nesting activities.

### **6.4. GCFR patrol methods during 2012/13**

During the GCFR surveys in 2011/12, two GTCP researchers were always present for patrol of any particular sub-section. During the January and February 2012 surveys, one researcher started patrol out of the informal campsite at sub-section point GFR and walked north to point GFL while the other team member drove and parked at point GFL to then patrol 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 team members. Whilst this method works well on occasions of low turtle activity, on the first day of each survey (when recording old turtle activities) and during times of peak nesting, it is recommended that researchers patrol Sub-section GFR – GLN together.

### **6.5. Recording of old turtle nesting activities in GCFR during 2012/13**

Due to the high number of old activities (134) encountered in monitored sub-sections of the GCFR during the January 2012 survey, a new GTCP data sheet was created to efficiently record all the old activities. This data sheet did not require the recording of GPS co-ordinates of old activities as it was difficult to distinguish between different activities by separate nesting turtles when tracks were no longer visible. This data sheet was again used for recording old activities during the February 2012 survey. It is recommended that the recording of old activities continue during future surveys of the GCFR. However, to allow old turtle activities to be included and reflected in the maps of the GCFR survey results in future, the GTCP team 2012/13, in discussion with the Gnaraloo Environmental Advisor (**GEA**), must consider the need for, difficulty and logistics of recording the GPS co-ordinates of old turtle activities.

### **6.6. Campsite accommodation during 2012/13**

The GTCP researchers regularly camped at the informal campsite located off the track that leads to sub-section point GFR during the GCFR surveys in 2011/12. This was the most convenient area to set up an informal swag camp as the location provided easy access to Sub-section GFR – GLN (Sub-section 3), which was monitored most often during 2011/12. Researchers slept in swags in the patrol vehicle parked at the campsite. Future surveys of the GCFR should include a more formalized campsite in which researchers have a way to either raise their swags off the ground or sleep in an enclosure that is not a vehicle. This will provide better rest whilst protecting researchers from both the elements and animals during the night. Should monitoring of the GCFR become a regular future component of the GTCP, it is recommended that a small out-camp be established in a location at or near the sub-sections in the GCFR that are most frequented by sea turtles in order to sustain surveys for longer than a few days.

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## 7. Conclusions

The GTCP team 2011/12 patrolled the entire GCFR which corresponds to the southern and northern most points of the Cape Farquhar Marine Sanctuary Zone as part of 3 formal reconnaissance surveys during 2011/12.

The first on-ground monitoring survey of the GCFR took place during 21 – 23 December 2011. The GTCP researchers conducted reconnaissance patrols to identify sections of beach in the rookery that received the greatest number of nesting turtles. During the patrols, the GTCP researchers defined 2 new sub-sections: GFS – GFH (Sub-section 1) and GFR – GLN (Sub-section 3) and recorded GFR – GLN to receive the most new turtle activities.

The second monitoring survey of the GCFR took place during 21 – 23 January 2012. During these reconnaissance patrols, the GTCP researchers defined additional sub-sections of beach that hadn't been surveyed for turtle activity during December 2011: namely GRS – GFR (Sub-section 2) and GLN – GFN (Sub-section 4). These sub-sections were monitored for the first time to determine levels of sea turtle activity and repeat patrols were undertaken of Sub-section GFR – GLN (Sub-section 3). GFR – GLN was again recorded to receive the most turtle activities. GFS – GFH (Sub-section 1) was not monitored due to the low amount of turtle activities observed there during December 2011.

The final monitoring survey of the GCFR took place during 21 – 23 February 2012. The GTCP researchers patrolled GRS – GFR (Sub-section 2) and GFR – GLN (Sub-section 3). While no new turtle activities were recorded during this survey, old activities were recorded in both sub-sections (GFR – GLN had the most old activities). This indicates that while sea turtles had been present in the rookery recently that the majority of nesting activities (as opposed to hatching activities) in the monitored sub-sections of the GCFR had ceased at the time of the February 2012 survey. During the February 2012 survey period, both loggerhead and green hatchlings were observed on the beach in Subsection GFR – GLN. While the majority of these hatchlings were predated by crabs in this sub-section, a few hatchlings were seen alive. The presence of green turtle hatchlings, as well as one old green turtle nest recorded in GFR – GLN during the February 2012 survey (an old green turtle nest was also recorded during the January 2012 survey, in GFR – GLN), supports the theory that green turtles also use the GCFR for nesting purposes. Following the February 2012 survey, all sub-sections of the GCFR have either permanent or semi-permanent sub-section markers.

The results of the December 2011, January 2012 and February 2012 surveys highlight the need for continued future monitoring of the GCFR as another potential significant sea turtle rookery on the Gnaraloo coastline. The total number of turtle activities recorded at this rookery during 2011/12 suggests its potential significance for nesting loggerheads. It may also be used for mating, nesting, foraging and/or resting purposes by other sea turtle species, including greens. The most significant achievements of the reconnaissance surveys of the GCFR during 2011/12 include the commencement of on-ground research at the rookery; the identification, naming, delineation and mapping of the rookery and sub-sections in it; and initial surveys of all the sub-sections for sea turtle activities. However, the majority of research questions concerning the GCFR cannot be definitively answered at this early stage of establishing baseline, including: (a) all turtle species that utilize the rookery, (b) the seasonal number of nests dug at the rookery, (c) sub-sections in it with the highest turtle activities, (d) the start, peak and end of the nesting season at the rookery and (e) the relationship, if any, between the GCFR and the GBR which is located 22km to its south as sea turtles that frequent the Gnaraloo coastline may move between and/or nest in both these rookeries during the same season. As such, on-ground research of the GCFR needs to continue and be expanded in future in order to be able to answer these questions and to determine the significance of the GCFR.