

HICATEE MONITORING IN THE RIO GRANDE RIVER: 2011-2014



Results of 2011-2014 monitoring surveys
Research and Monitoring Department 2017
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HICATEE REPORT 2017

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Acronyms

BAS	Belize Audubon Society
IUCN	International Union for Conservation of Nature
MMMC	Maya Mountain Marine Corridor
NHCN	National Hicatee Conservation Network
SATIIM	Sarstoon-Temash Institute for Indigenous Management
TIDE	Toledo Institute for Development and Environment
TPPL	Tide Private Protected Lands
UB ERI	University of Belize Environmental Research Institute
YCT	Ya'axché Conservation Trust

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Introduction

TIDE and Maya Mountain Marine Corridor

The majority of TIDE's Private Protected Lands are located on the banks of the Rio Grande and Golden Stream rivers, a riparian corridor where visitors can spot the endangered West Indian manatee and the endangered hicatee turtle. The lands are located in the MMMC, and are part of a block of large, unfragmented, moist tropical forest that serves as a biological corridor for important species such as jaguar, puma, margay, ocelot and jaguarundi, which require large units of forest for their mobility and survival. The area is also known for its abundance of migratory birds that nest in the TPPL managed by TIDE. TIDE rangers jointly with the Belize Forest Department and Ya'axché Conservation Trust rangers conserve and protect this section of the MMMC by patrolling rivers for illegal fishing and logging, patrolling forest for illegal hunting and poaching, collecting data on biodiversity, and conducting community outreach and educational programs to families around the buffer zones.

Hicatees, threats and protection in Belize

The Central American river turtle, *Dematemys mawii*, or fresh water hicatee can be found from southern Mexico (Yucatan) to northern Guatemala and Belize (Alvarez del Toro 1979; Iverson and Mittermeier 1980; Iverson 1986; Ernst and Barbour 1989; Lee 1996). Its status in Guatemala remains unclear and it has been eliminated from much of its range in Mexico. Belize is the world's last stronghold for *D. mawii*, which is in serious danger of extinction primarily due to overhunting. Hicatees are indeed over-harvested by the community for consumption and sale among community markets (Moll 1986; Polisar 1994, 1995) and are considered as one of the world's most heavily exploited turtles. In Belize, hicatees are very much in demand by communities as a food staple, and are a main source of income for communities. The months of April and May yield the highest demand for hicatees due to cultural reasons such as Easter festivities. The river being shallower during the dry season, it makes it easier to catch turtles and to access turtle grounds, and the turtles are not being given a chance to breed. The hicatee's habitat is also being affected by large-scale land clearing at the river banks for slash and burn agriculture and cattle pastures.

Presently, the fresh water hicatee is the only survivor of the family Dermatemydidae (Iverson and Mittermeier, 1980). Given its historical value and the small area in which it lives, the species today is listed by IUCN as a Critically Endangered species (Vogt *et al.* 2006). In response, the Belize Fisheries Department drafted a national legislation (Statutory Instrument No. 55, of April 1993, revised 2011) to control the level of harvest and establish some protected populations. The legislation states that no person shall (Polisar 1994, 1995, 1997; Polisar and Horwich 1994):

- Have in his possession more than three, or transport on any vehicle more than five hicatees.
- Fish for female hicatee that are greater than 43cm (17.2 inches) or smaller than 38cm (15.2 inches).
- Possess or use a net to take Hicatee.
- All must obey the closed season: 1st May to 31st May, inclusive in any year.
- Sell or purchase such turtles
- Fish for hicatee in a series of protected zones in northern Belize:
 - Belize River: Beaver Dam Creek to Labouring Creek.
 - New River: Irish Creek to Water Bank
 - Rio Bravo: Upstream from Dos Bocas Dam, also Booth's River
 - Cox and Mucklehany Lagoons, headwaters of Mussel Creek

- Northern and Southern Lagoons and tributaries (Manatee lagoons and Manatee River).

The fine for any breach of this regulation is BZ\$2,000 and/or imprisonment.

Hicatee conservation efforts in Belize

In 2010 a country-wide survey was conducted on the species in 30 localities (Rainwater *et al.* 2012), including the Rio Grande river. The study compared its results with a previous country-wide survey conducted in 1983 and 1984 (Moll 1986). The survey indicated that hicatee were heavily depleted in most of Belize and only remained in a few remote areas. The findings were alarming as the number of turtles seen were much reduced compared to the previous surveys and the Rio Grande river appeared to be one of the last stronghold remaining for the species.

In 2011 the National Hicatee Conservation Network was created and formed of YCT, the University of Belize Environmental Research Institute, Belize Audubon Society, the Belize Fisheries Department, and TIDE. The Belize Foundation for Research and Environmental Education (BFREE) is also an active player in hicatee conservation with the creation of the Hicatee Conservation Research Center in 2011 which implemented a captive breeding program to release hicatees in the wild (Marlin 2012, 2013).

The NHCN has identified widespread monitoring, strengthening legislation, and raising awareness as the most important short-term actions to save the hicatee. The network of organizations is coordinating these efforts as follows:

- UB ERI has done social surveys of attitudes toward hicatee consumption.
- BAS, TIDE, and the Belize Fisheries Department are carrying out enforcement.
- TIDE has completed a hunter survey, and has begun research into the status of the population in the Rio Grande (Requena *et al.* 2015).
- TIDE is conducting education and outreach in communities near the Rio Grande.

In 2013-2014, TIDE also continued the national awareness campaign that was initiated in 2012-2013 by YCT (Requena and Lord, 2014).

Using spotlight and net surveys TIDE initiated a hicatee monitoring program during the dry season of 2011 in the Rio Grande river. The goal of the monitoring was to assess the hicatee population within this watershed. After this initial event the terrestrial research team continued to do monitoring when the weather permitted and conducted more surveys in 2012 and 2013. In 2014, a grant from the Conservation Leadership Program was provided to make an ecological and distribution assessment of the hicatee in the Rio Grande river (Requena *et al.* 2015). This report presents the results of these monitoring efforts.

Methods

The data collected was compared with the results found in 2010 during the last nation-wide survey (Rainwater *et al.* 2012).

Study site

The surveys were conducted in the main Rio Grande river in southern Belize (Figure 1), in the foothills of the Maya Mountains and the heart of the Toledo District. Harvesting in the Rio Grande is regulated with increased law enforcement by TIDE rangers. They conduct daily patrols during the closed season for hicatee (May 1-31st), and periodic patrols during open season.

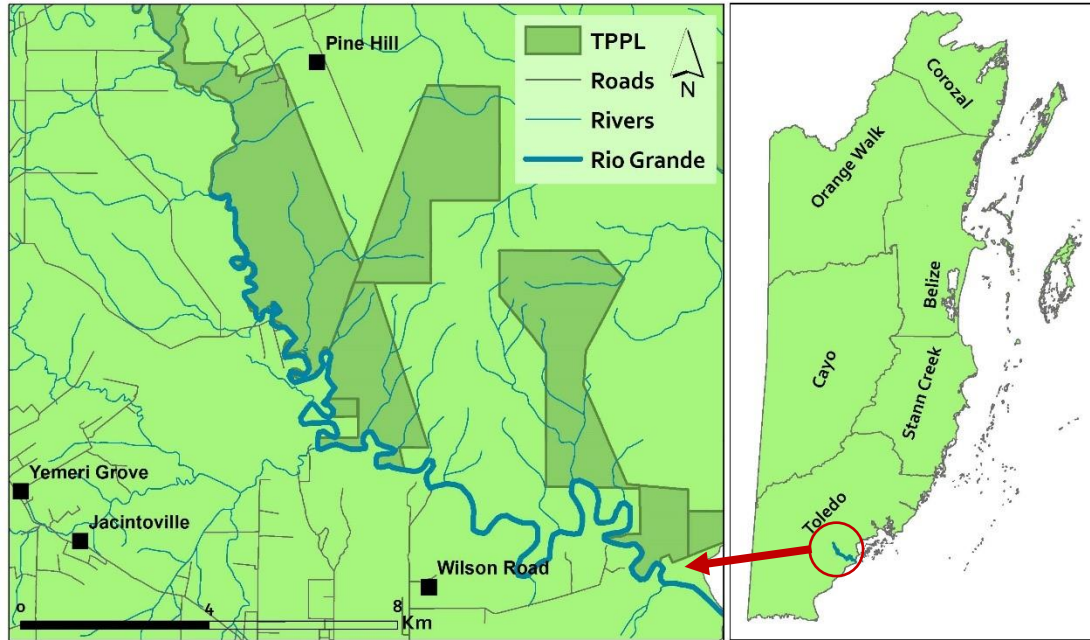


Figure 1: Location of the main Rio Grande river

Field trips

Table 1: Planning of the spotlight (S) and netting (N) surveys from 2010 to 2014

Year	Feb	Mar	Apr	May	Jun
2010*			S/N		
2011	N	S/N			S
2012		S	S	S/N	N
2013		N		N	
2014**	S/N	N	N	S/N	

*Rainwater *et al.* 2012, **Requena *et al.* 2015

Field trips were made each year during the dry season to conduct spotlight and/or netting surveys (Table 1). In 2011, surveys were conducted with members from TIDE, YCT, Belize Fisheries Department and Sarstoon-Temash Institute for Indigenous Management. In 2012 and 2013, monitoring efforts were completed by TIDE. In 2014, the Hicatee Research and Education group conducted surveys to assess the population with funds from the Conservation Leadership Program (Requena *et al.* 2015).

Data collection

Spotlight surveys

Spotlight surveys were conducted from motor boat at low speed (Rainwater *et al.* 2012) and on both sides of the boat. A dip net was used to capture turtles from the boat during the surveys. The start and end points of each survey were marked using a GPS. Each year, different portions of the river were surveyed as presented in Figure 2.

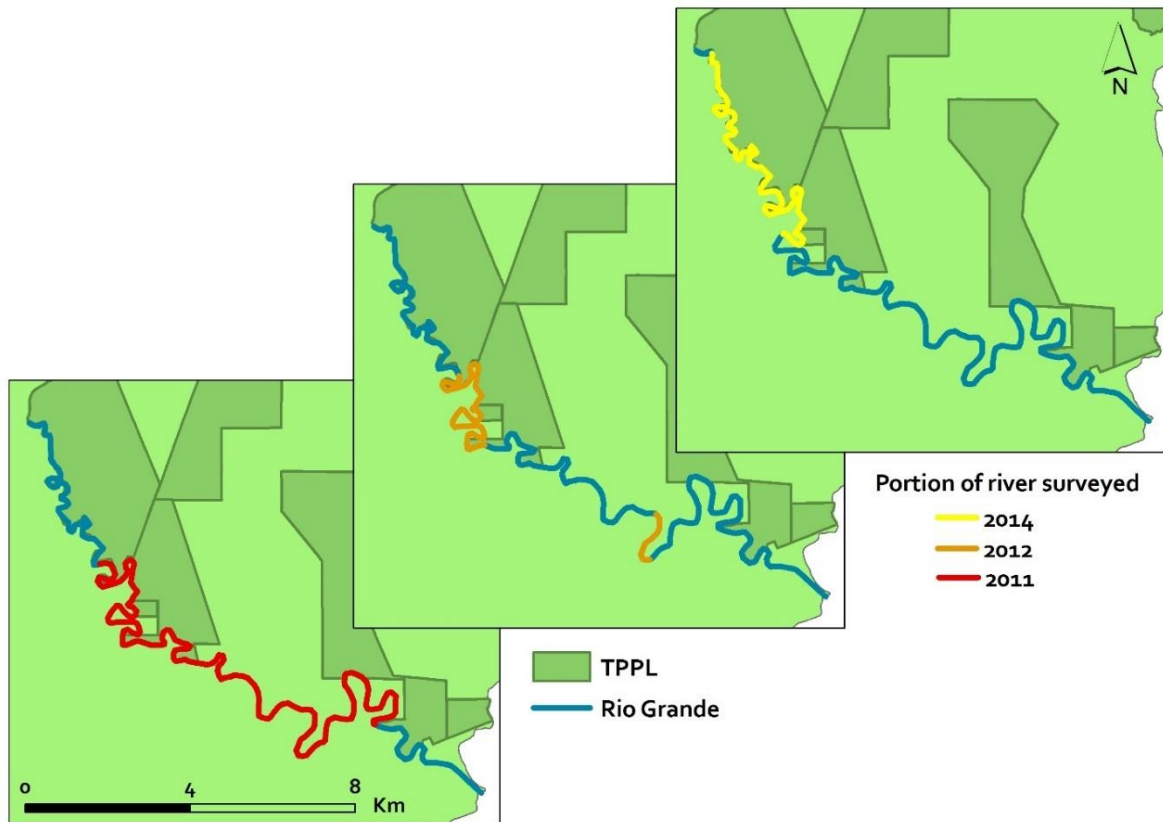


Figure 2: Location of the spotlight surveys from 2011 to 2013

Netting surveys

Twine double ply trammel nets (50x2m with a mesh size of 10x10cm and 36x36cm) were used to catch and release hicatees. The nets were installed where hicatee were previously observed and captured (Figure 3 and Table 2).

Table 2: Number of net locations

	# net locations
2010*	3
2011	9
2012	12
2013	4
2014**	23

*Rainwater et al. 2012,

**Requena et al. 2015

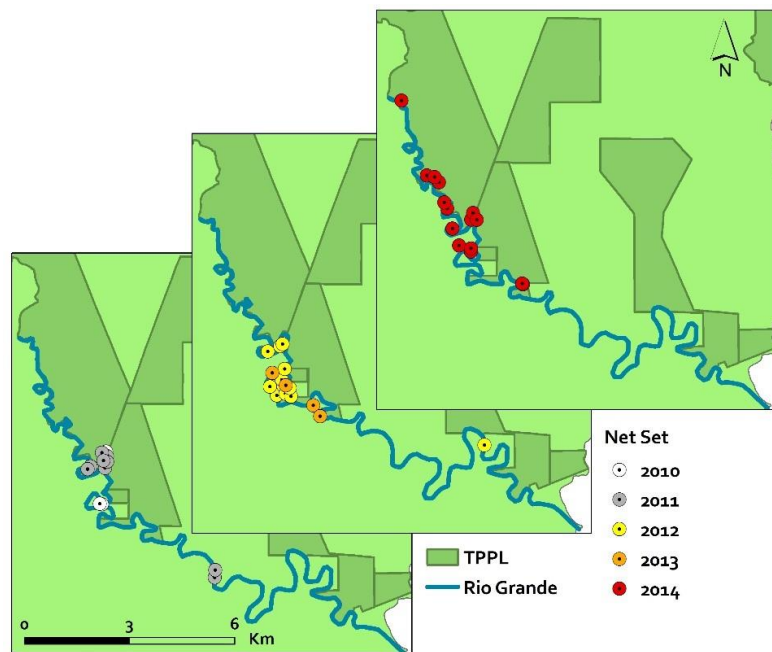


Figure 3: Location of the trammel nets from 2010 to 2014

Turtle capture, identification and telemetry

In 2011 a team comprised of staff from SATIIM, TIDE and YCT conducted the first collaborative hicatee mark and recapture monitoring in the Rio Grande river.

For each turtle captured, data was collected on:

- straight line carapace length (CL)
- plastron length (PL)
- shell depth (SD) using an aluminium tree caliper
- weight, using a handheld scale

Hicatees were then marked using a unique numbering system by drilling a small hole on the outer scute with a battery powered hand drill.



Figure 4: Hicatee being marked with a hand drill

In 2014, a radio telemetry transmitter was attached to four individuals, and then tracked using a handled receiver and Yago antenna (Requena *et al.* 2015). The locations of the individuals recorded by telemetry will be presented in this report, as well as additional data collected that were not presented by Requena *et al.* (2015).

Results

Spotlight surveys

A total of 15 hicatees were observed in 2011, 6 in 2012 and 1 in 2014 during spotlight surveys. Encounter rates were 2.5, 1.16 and 0.2 hicatee/km survey route respectively, and the number of hicatee observed per hour were 4, 2.33 and 0.4, respectively (Table 3). From 2011 to 2014, the average number (\pm SE) of hicatees observed per hour was 2.24 (\pm 1.0).

Table 3: Results of the spotlight surveys

	Distance traveled during survey (km)	Hours surveyed	# of turtles observed	Encounter rate (# of turtles / km survey route)	# of turtles observed / hour
1983-84*		20	46		2.3
2010**	11.9	2.7	8	0.67	2.9
2011	14.4	7.7	15	2.5	4
2012	18.18	6	6	1.19	2.33
2014***	21.5	6.25	1	0.2	0.4

*Moll 1986, **Rainwater *et al.* 2012, ***Requena *et al.* 2015

Net surveys

In 2011, 2012, 2013 and 2014, a total of 1, 2, 0 and 10 hicatees were captured on the nets, respectively (Table 5). The average number (\pm S.E.) of turtle captured per hour was 0.58 (\pm 1.1). The captures occurred along the river boundary of TPPL (Figure 5).

Table 4: Results of the netting surveys

	Hours deployed	# turtles captured	# turtles captured / hour
2010*	18.8	0	0
2011	17.2	1	0.25
2012	23	2	1.2
2013	4.4	0	0
2014	105.4	10	2.01

*Rainwater et al. 2012, **Requena et al. 2015

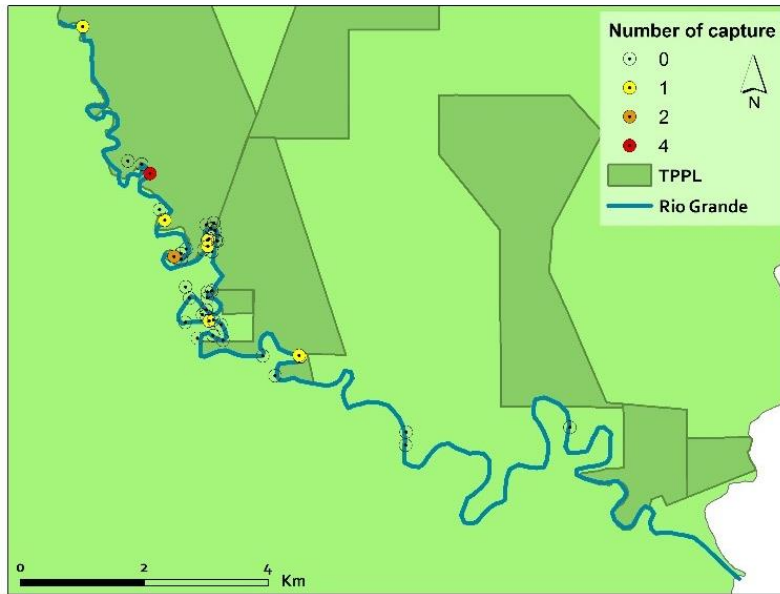


Figure 5: Location of the nets and number of captures from 2010 to 2014

Capture and measurements

In order to be marked and measured, 4 females and 1 male hicatees were captured in 2011 during spotlight and netting surveys. In 2012, only 2 female hicatees were captured. In 2014, a total of 10 females and 1 male were captured.

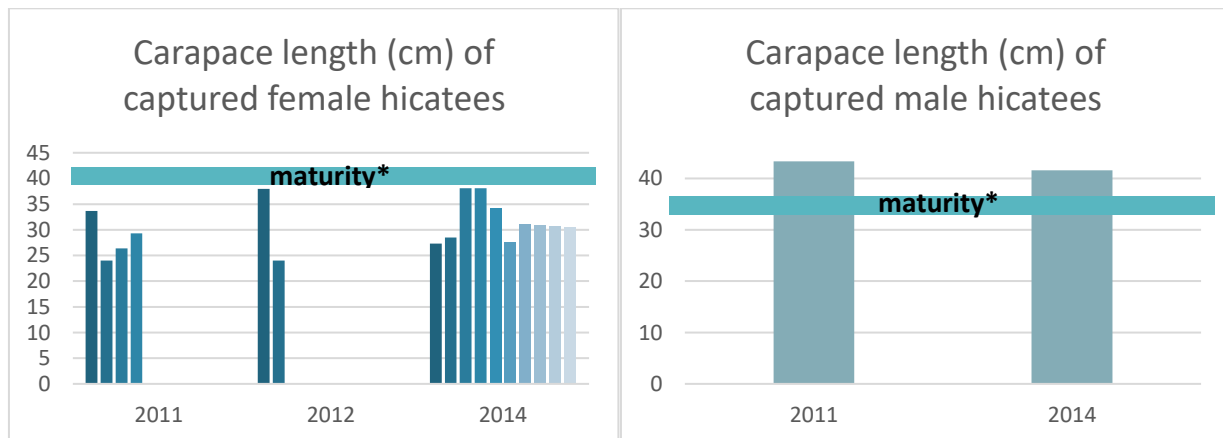


Figure 6: Carapace length of captured female (left) and male (right) turtles (*Legler and Vogt 2013)

The measurements collected in 2011, 2012 and by Requena *et al.* (2015) in 2014 are presented in Table 5 and Figure 6. Mean (\pm S.E.) CL of female hicatee captured during the surveys was 28.3 ± 2.1 (n=4) in 2011, 31 ± 7.0 (n=2) in 2012 and 31.7 ± 1.2 (n=10) in 2014. CL of male hicatee captured in 2011 and 2014 was 43.3 and 41.6 respectively.

Table 5: Identification and measurements of the captured turtles in 2011 and 2012, and by Requena *et al.* (2015) in 2014. In bold are the turtles marked for telemetry.

Date	ID #	Sex	Carapace length (cm)	Plastron length (cm)	Weight (kg)	Shell width (cm)	Shell depth (cm)
13-mar-11	7000	F	33.7	27.7	5.25	25.7	12.1
14-mar-11	7001	F	24	17.5	1.25	16.8	8.6
14-mar-11	7002	F	26.4	22.8	2.75	22.9	10.2
14-mar-11	7003	F	29.3	24.3	3.25	22.7	10.8
14-mar-11	7004	M	43.3	33.5	12.25	32.6	16.3
24-may-12	7006	F	38	30.5	6.8	28	16
27-may-12	7007	F	24	20.1	1.36	19	9
14-feb-14	7009	F	27.3	23.4	3	22.1	10.3
26-feb-14	7010	F	28.5	23	2	22	10.5
05-mar-14	7011	F	38.1	30.5	6	25.9	12.7
05-mar-14	7012	F	38.1	29.2	6	25.9	15.2
22-mar-14	7013	F	34.2	27.6	1.81	23.5	15.2
24-apr-14	7013B	F	27.6	22.3	2.27	20.6	10
06-may-14	7016	F	31	25.6	3.4	23.8	11.9
07-may-14	7017	M	41.6	32.6	8.39	30.4	15
25-apr-14	7015	F	30.9	25.7	3.18	23.3	11.6
24-apr-14	7012B	F	30.6	25.4	3.63	22.9	11.5
24-apr-14	7014	F	30.5	24	3.18	23	12

Telemetry survey

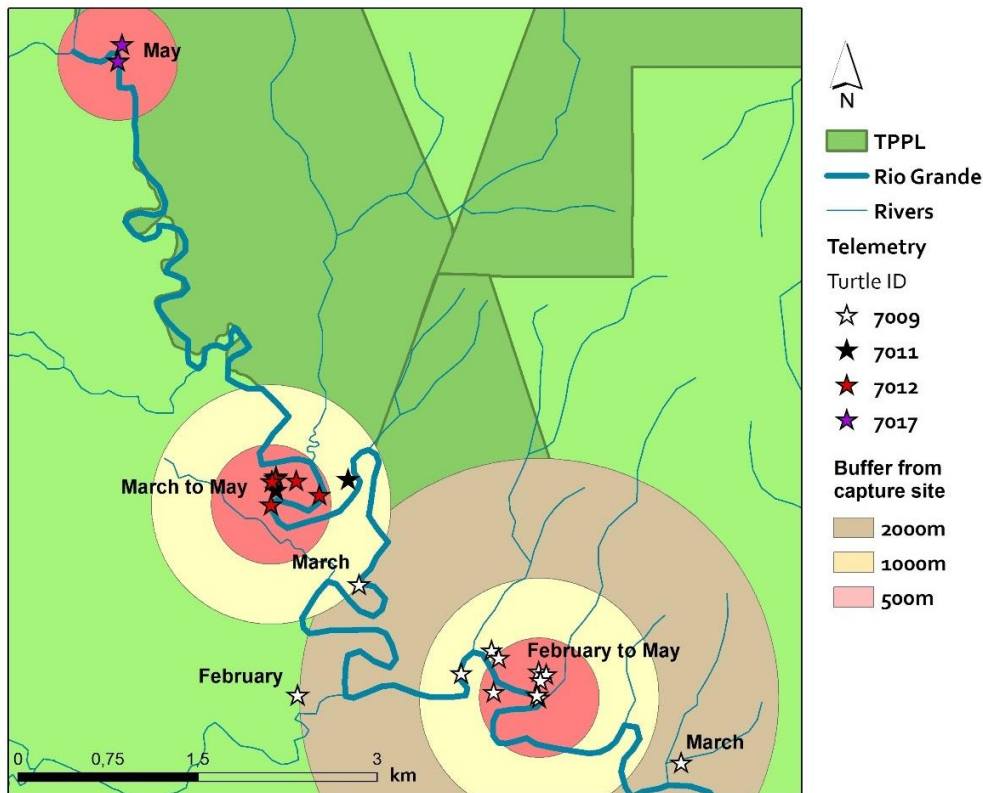


Figure 7: Locations of the marked turtles by telemetry

In 2014, individual 7009, 7011, 7012 and 7017 were studied for a length of around 15, 12, 12 and 3 weeks, respectively, and were located 13, 5, 6 and 3 times (Table 6). The locations of the turtles were mapped in Figure 7. Individuals 7017 and 7012 were located within a 500m buffer around the capture site. Individual 7011 and 7009 were located mostly within the 500m buffer of their capture site. Individual 7009 dispersed within a river portion of 8.5km.

Table 6: Description of the telemetry surveys

Turtle ID	Start	End	# time located
7009	14-feb-14	29-may-14	13
7011	5-mar-14	29-may-14	5
7012	5-mar-14	29-may-14	6
7017	7-may-14	29-may-14	3

Discussion

As the number of net localities, the portion of river surveyed by spotlight and netting, the time spent on spotlight survey routes and on netting sessions, and the time of the year in which surveys were conducted vary each year, quantitative comparisons between years are difficult and need to be interpreted with caution. For example, the time spent on each site increase the likelihood of encountering or capturing turtles and the abundance of hicatee may not be homogeneous throughout the different portions of the river due to differences in the habitats.

The number of hicatee observed per hour was already low in the study done by Rainwater *et al.* (2012) in 2010 (2.9 hicatee per hour) and it seems that the population is not recovering as the average number between 2011 and 2014 was 2.24 (± 1.0). No turtles were captured by Rainwater *et al.* (2012) in 2010 during netting surveys, and the number of turtles captured per hour seems to have increased slightly: 0.25 in 2011 and 2.01 in 2014, but this could be due to a difference of net localities and/or differences on the time spent on netting sessions as it ranges from 4.4 hours in 2013 to 104.5 hours in 2014.

Few locations were collected by telemetry but as suggested by Requena *et al.* (2015) the study seems to show preferences for certain areas by the turtles marked (ponds where they were captured). It would be interesting to study and map the different habitats along the Rio Grande river to better analyse this data and see if the travels of the turtles are linked to certain habitat types that would therefore need to be protected.

During harvests, large turtles (reproductive adults) are generally targeted by hunters. Female hicatee attain maturity between 39-42 cm carapace length (CL) while males become mature between 36-38cm (Legler and Vogt 2013). According to the CL measurements done from 2011 to 2014, no adult females were captured (only subadults) and the only two adults captured were males. This result is really alarming as it shows that the most demographically important segment of the population is severely affected by hunting. Indeed, according to Legler and Vogt (2013), at least 80% of the population should be adults in unperturbed populations and the high amount of sub-adults. An important awareness raising campaign was conducted in 2014 (Requena *et al.* 2015) to reduce pressure on the hicatee. Other surveys would be needed to evaluate the effectiveness of the campaign and better evaluate the trend of the population in the Rio Grande river with more rigorous protocols.

If the captive breeding program from the Hicatee Conservation Research Center is successful, collaboration to release turtles back into the Rio Grande river could be a good method to help the recovery of the population.

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