University of Glasgow

Tobago Expedition

2018 Preliminary Report

16/09/18

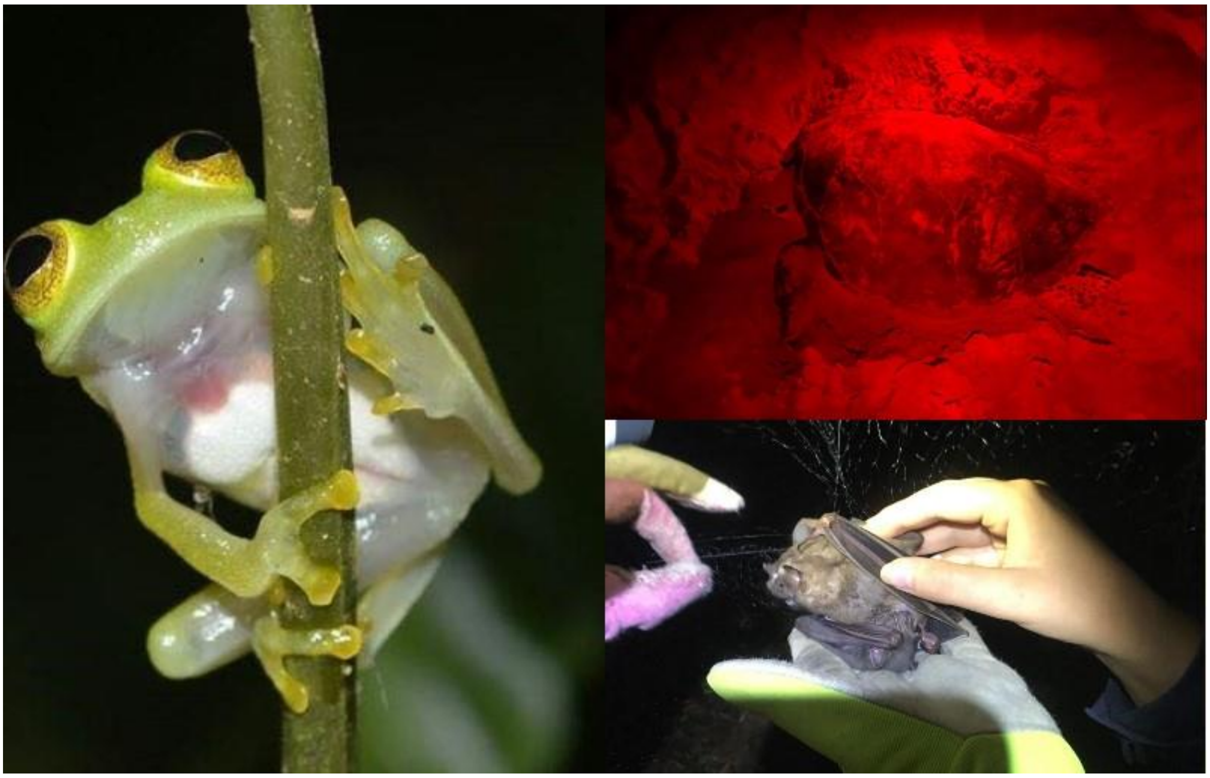

Figure 1: A glass frog (*Hyalinobatrachium orientale*), hawksbill turtle (*Eretmochelys imbricata*) and a female great fruit-eating bat (*Artibeus lituratus*) with her pup feeding.

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Acknowledgements

The team would like to thank all of those at North East Sea Turtles (NEST) for the incredible generosity and support throughout the expedition. In particular, Devon Eastman and Andel Mckenzie who not only patrolled our index beaches but helped in the day to day running of the expedition. We would also like to thank Dr. Luke Rostant of Trinibats for providing members of the team with the training and equipment to carry out our research; as well as Pat Turpin who provided the team with advice and accommodation during our time in Charlotteville. Moreover, we would like to thank Dion for providing transportation on numerous occasions. Additionally, we would like to thank the Tobago House of Assembly for granting us the permits which allowed us to carry out our fieldwork.

We would like to express thanks to those at home who helped with the organisation and running of the expedition. We would like to thank Prof Malcolm Kennedy for his support throughout the expedition and supervising the turtle projects carried out by the team, Prof Roger Downie for his advice and supervision of the amphibian work and Dr Stewart White for supervising the bat work.

We would also like to acknowledge all of the funding bodies that backed the expedition, namely the Dennis Curry Charitable Trust, the Glasgow University Court and Exploration Society, The Glasgow Natural History Society and the Lindeth Charitable Trust. Our proposals could not have been carried out without their financial aid, for which we are sincerely grateful.

Finally, we would like to thank all of our friends and families for all their wonderful support and encouragement. To everyone who attended our fundraisers, sponsored our hikes and endurance challenges. Every kind word and piece of support has motivated us and contributed towards the expedition.

Figure 2: The expedition team on a trip to Castara.

The Team

The team was made up of twelve undergraduate students from the University of Glasgow; Rory Thomson (co-leader, researcher and first aider), Mhairi Charters (co-leader and first aider), Juliet Adie (fundraiser, first aider and researcher), Beth Clyde (publicity and first aider), Ruadhan Currie (grant distribution and first aider), Leah Graham (accounts and researcher), Kate Hedley (secretary and researcher), Meysoun Khan (fundraising), Robbie Leckie (publicity and researcher), Jessica McCrone (fundraising), William McGhee (accounts and researcher) and Giovanni Penna (secretary and first aider). Previous expedition team member Katie Allan also helped advise and assist the team in organising the bat projects during and through the lead up to the trip. We would also like to acknowledge Susanna Findlay and Ainslie Mackenzie, both undergraduate University of Glasgow students, who assisted in research during their visits to Tobago.

Figure 3: The team at Charlotteville in their team kit.

Expedition Budget

INCOME

Personal Contributions	Flights	£7,469.40
	Kit	£215.71
	Additional	£2.88
	Personal Contribution Total	**£7,687.99**
Fundraising	Events (pub quiz, themed night, bake sale, ceilidh)	£1,610
	Donations	£1,873.39
	Online Donations	£734.98
	Fundraising Total	**£4,218.37**
Grants	University Court	£3,076.92
	Dennis Curry Charitable Trust	£1,800.00
	Glasgow Natural History Society	£600.00
	Lindeth Charitable Trust	£250.00
	Grants Total	**£5,726.92**
Other	2017 Expedition Surplus	£322.93
	Visitor Contributions	£57.14
	Project Money	£402.70
	Other Total	**£782.77**
	TOTAL	**£18,416.65**

EXPENDITURE

Pre-expedition Costs	Flights	**£7,469.40**
	Team Kit	£215.71
	Fundraising	£80
	Equipment	£130.46
	Previous Report Printing	£17.95
	Total	**£7,913.52**
In Country Travel Costs	Bat Training Flights	£144.48
	Car Hire	£3,569.93
	Car Damages	£365.22
	Petrol	£307.89 (2739TTD)
	Private Transport	£230.44 (2550 TTD)
	Total	**£4,617.96**
In Country Costs of Living	Accommodation	£4,667.32 (41520TTD)
	Food	£806.55 (7,175TTD)
	Phone top ups	£34.06
	Total	**£5,507.93**
Other	International transfer fees	£301.34
	Research Permits	£75.90 (100 USD)
	Total	**£377.24**
	TOTAL	**18,416.65**

The exchange rate used for this budget is £1 = 8.8959TTD and £1 = 1.3176USD accurate for June 2018. (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/718649/exrates-monthly-0718.csv/preview)

Travel and Logistics

On the 5th June, the team flew from London Gatwick to A.N.R. Robinson International Airport. From here the team travelled by a pre-arranged maxi and hired cars to our accommodation in Charlotteville. In Charlotteville the team stayed in cottages close by to NEST on Man O War Bay. Once in Charlotteville 5 days were taken to acclimatise and set up the expedition, with work beginning on the 10th June. The expedition ran from the 5th June until the 15th August. For the majority of the expedition hired cars were used for transport. However, after an incident involving one of the vehicles, the budget was adjusted, and private taxis were organised to transport the team to fieldwork locations.

Itinerary

Acclimatisation Period

Day 1 (Tuesday 5th June) – flights from London Gatwick to Tobago
Day 2 – Both leaders and two drivers went to the bank and did the first weekly food shop.
Day 3 – Those carrying out research involving bats and taking samples back to the UK went to the Forestry Division, within in the Ministry of Agriculture, Land and Fisheries.
Day 4 - A meeting with NEST was held to introduce the team and the voluntary work was explained and demonstrated in more detail
Day 5 – Four members of the team went to the William Beebe Tropical Research Station in Trinidad to undergo a session of bat training.

Work

Week 1 (10th -16th June)
Members of the team set up transects for frog work at various sites across north-east Tobago during the daytime. At night, all members of the team patrolled our two index beaches, accompanied by members of NEST. Furthermore, two bat training nights were carried out at the cottages involving 4 of the team members.

Week 2 (17th – 23rd June)

Night time frog work was introduced. One more training night was carried out for the bat projects, with the first night of data collection also being carried out during week 2. Pilot studies for projects were also carried out and it was decided that one of the original projects was unfeasible. This was then discussed with Roger Downie and Malcolm Kennedy, who visited the team from the 18th to the 21st June. From discussions it was decided to scale down the beach profiling project and investigate the sand scattering phase of nesting in more detail. Two members of the team made a trip to the hospital on the 17th June due to issues with an individual's eye. Unfortunately, on the 23rd June one member of the team had to leave the expedition due to circumstances out with their own control, limiting the team to eleven people. This meant the rota system had to be adjusted by the team's leader.

Weeks 3 (24th- 30th June)

Work continued with 2 nights of bat work and 5 nights of frog work every week. This was accompanied by patrolling both Cambleton and Hermitage beaches every night. During this week, Susana Findlay – a member of the Tobago 2016 expedition team – visited the team on the 27th June and assisted with research. On the 27th June, three members of the team were involved in a serious car incident. They were immediately sent to the hospital, with one member being taken by ambulance and the other two members being driven by convoy. After individuals had been given the all clear from the doctors, the team was given the 28th June as a day and night off before returning to normal work.

Week 4 (1st – 7th July)

Susanna Findlay left Tobago on the 3rd July. After expressing concerns over the reaction of the car hire company to the incident previously mentioned, it was decided by staff associated with the Exploration Council and the team that this car hire company should no longer be used. This meant that the team had no form of transport on the 7th July, so only patrols on Cambleton bay could be carried out.

Week 5 (8th - 14th July)

The team continued to have no access to cars and only patrolled Cambleton on the 8th and 9th July. However, the whole team was given the 10th July off work due to high levels of stress and a new car hire was organised and began on the 11th July. Due to not receiving a full refund from the original car hire company and paying a higher price for the new car, the team was limited to one car, instead of two and Hermitage bay patrols were carried out by boat four nights a week. Frog work was also limited to two nights a week, one for each of the main frog projects. This also meant the budget was reassessed.

Week 6 & 7(15th - 28th July)

Work was carried out as normal, with two nights of bat work, two of frog work, four nights patrolling Hermitage bay and seven nights of patrolling Cambleton bay. At this point, it was also discussed with Devon Eastman of NEST as to whether the team could use data from nights which had none of the expedition team present, to ensure data could be compared to previous years. The team was also visited by Ainslie Mackenzie, a member of the society's Trinidad team, from the 18th to the 22nd July. Ainslie assisted with turtle work each of these nights, having been trained by members of Turtle Village Trust at Fishing Pond.

Week 8 (29th – 4th August)

After the sole rental car was dented, the budget was reassessed, and the car was returned on the 1st August. After this the team used private maxis, recommended by Andel Mackenzie, to carry out bat and frog research. It was ensured the frog project involving driving transects was completed before the car was returned.

Week 9 & 10 (5th – 15th August)

Frog and bat work was completed by adjusting the number of nights of both to ensure completion of each project. Patrols on index beaches continued till the final night (15th August). Two members of the team then returned to the UK on the 17th August, with the remaining nine members of the team opting to take part in a holiday period out with the expedition before leaving Tobago on the 28th August, arriving in London Gatwick on the morning of the 29th.

Overview of Studies

Marine Turtle Work

Marine Turtle Monitoring
- Rory Thomson

Introduction

The team continued the long-term monitoring of both index beaches - Cambleton and Hermitage Bay – alongside members of NEST. Hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*) turtles are the most commonly found turtles on the island of Tobago, with hawksbills classified as critically endangered with a decreasing population (Mortimer and Donnelly, 2008) and leatherbacks as vulnerable, with a decreasing population (Wallace *et al*., 2013). Both index beaches are suitable for hawksbill nesting. However, only Cambleton is suitable for the nesting of leatherbacks due the lack of coral. Green turtle nesting has also been found on Cambleton bay in previous years, although this is very rare.

Many believe that the use of tagging is the most reliable method of long-term population monitoring on these nesting beaches (Seminoff *et al*., 2004), allowing for individuals to be recognised by tag numbers. The long-term monitoring of sea turtles can be difficult for multiple reasons associated with the life history of turtles, such as long lifespans, late sexual maturity and the two to three-year gap in female breeding seasons. By collaborating with NEST, the Tobago expedition has accumulated an extensive database of turtle nesting activity on both Cambleton and Hermitage Bay. The importance of this is highlighted by the decline in marine turtles' species previously mentioned. Moreover, the presence of the team on these beaches helps to prevent poaching of these species, which is often carried out to collect flipper meat as food.

Monitoring of the index beaches aimed to add to the already large database collected by previous teams, which was done successfully despite limitations (Byrne *et al.,* 2018).

Methods

Teams of three or four were present on both Cambleton Bay every night, and Hermitage Bay as many nights as possible, between 8pm and 3am. Patrols using red light occurred every 30 minutes to minimise disturbance to nesting females. When a turtle was seen, the time and nesting phase was noted. With the phases being classified as:

1. **Approach**: movement from the sea to upper beach
2. **Body-pitting**: preparation of the nest site for excavaton (note that following body-pitting an individual may move to a new nesting site if not suitable or return to sea).
3. **Digging:** Excavation of the of the clutch chamber using rear flippers
4. **Laying**: Deposition of eggs into the clutch chamber
5. **Covering**: covering of the deposited eggs with sand suing rear flippers.
6. **Sand scattering:** excess sand is 'scattered' in the area surrounding the nest, mainly using front flippers
7. **Return:** the return of the nesting female to sea

When an individual was seen, the phase and time was noted. The team then kept their distance from the individual with red lights switched off to minimise the chance of a human induced false crawl. Once the female began laying, measurements were taken. This is due to individuals entering a 'trance' like phase while laying meaning they are less likely to be disturbed. During this phase individuals were checked for tags. If tags on the front flipper were present the numbers were noted. If tags were not present, the female was then tagged, using a tag applicator provided by NEST. This process was also demonstrated by members of NEST and the team were observed while doing this. Once tagged, the length and the width of the turtle was measured and GPS for the nest was recorded. Any noticeable marks or damages were also noted, as well as noting the presence and position of barnacles on the nesting female. Once measurements were taken, the team then went back to maintaining a distance from the turtle and noted the time of the return to sea, as well as the outcome of the nesting event. These outcomes could be:

1. **Confirmed Lay:** individuals were seen to deposit eggs
2. **Estimated Lay:** Individuals were thought to have deposited eggs but were not seen to.
3. **False crawl:** individuals approached the beach but did not lay before returning to sea.
4. **Poaching:** evidence of poaching was present
5. **Unknown:** the activity of a turtle could not be determined. For example, if an individual came on to the beach and left between patrols.
6. **Full carcass:** the presence of a dead individual on the beach

Due to limitations with transport, the team could not access Hermitage Bay every night as planned. However, this issue was overcome as members of NEST were present on Hermitage every night, meaning that data could be collected without the presence of the team. These data were then passed on to the team, allowing for a complete dataset.

Data were not actively collected for Man O War Bay, the beach on which the team were staying, but if a turtle was seen its activity was recorded.

Results

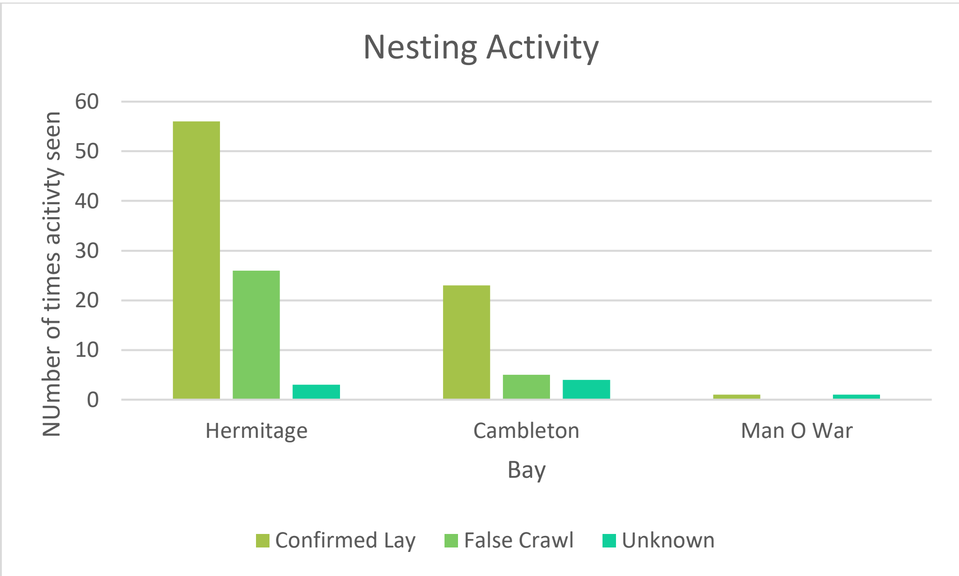

Figure 4: The number of nesting activities of hawksbills recorded on each beach

These results will be compared to previous years data and plotted and statistically tested using RStudio to find if the changes in turtle numbers are statistically significant.

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Thermobiology of nesting hawksbill turtles *(Eretmochelys imbricata)* *- Robbie Leckie*

Introduction

Hawksbill turtles *(Eretmochelys imbricata)* have a circum-global distribution and are found in tropical and sub-tropical waters often migrating from foraging sites *(Munoz-Perez et al, 2017).* They feed mostly on sea sponges, but will also eat corals, sea anemones, cnidarians and other invertebrate species. Their thick skin provides great protection against the stinging cells of most of these organisms. They also control the population of sponges in tropical waters, helping to maintain the wellbeing of coral reefs *(L. Ferreira et al, 2018).* Hawksbills are Tobago's main marine turtle species to use the island's many beaches as nesting sites. Although over recent years hawksbill populations have been reduced due to anthropogenic threats. Poaching is a major issue for nesting sea turtles, they are extremely vulnerable when out of the water and an easy catch for poachers, their meat is also sought after as a delicacy and it is due to these actions that the hawksbill turtle is listed as Critically endangered on the IUCN list and continues to stay there *(IUCN, 2015)*. Over recent years, with the right conservation efforts and education small populations of hawksbills have been seen to increase. However, worldwide they are still very much in decline *(*Mortimer & Donnelly, *2018).*

Atmosphere and sea temperatures are predicted to increase 1-3°C by the end of the century *(Bjorndal et al, 2017)* which could have a damaging effect on the hawksbill population, as is thought to be the case for other marine species *(*Uthicke *et. al, 2014).* A recent study on green turtle populations along the west coast of Australia found that north of the great barrier reef there is a higher proportion of females than in the cooler south of the reef, a trend that has been observed over two decades *(Jenson et al. 2018).* In addition to how hawksbill populations may respond to rising sea temperatures is that rising incubation temperatures could mean that this species could face the same fate seen in that of the green turtle populations along the west coast of Australia.

Data have been collected on hawksbill egg temperatures from 2013-2018 in Tobago. This is a globally unique study that has already shown that the body temperatures of this species are more diverse within the population and variable from year to year than in leatherback turtles. The 2017 expedition also observed that the core temperatures of the turtles suddenly increased in August of this season, although how common this is, is unknown. The 2018 expedition observed the opposite of this; a decrease was observed in core temperature in August. This increases the question of whether this species is particularly susceptible to sea temperature changes associated with climate change. Now that we have 6 years' worth of data it will be compared to the population's annual core body temperature to local sea temperatures and to whether the year has experienced an El Nino or a La Nina year, to determine whether there is a correlation between these factors. This fluctuation could potentially relate to the effects of global climate change and the distribution of nesting beaches for turtles and their reproductive success.

Methods

This project utilised two prime turtle nesting sites in the North East region of Tobago. The two beaches monitored were Cambleton and Hermitage Bay. Hermitage is NEST'S prime location for turtle conservation and has been monitored by the organisation since it was first founded. Hermitage beach only receives hawksbill turtles as there are high amounts of coral in the bay preventing larger turtle species such as leatherbacks from accessing the beach. Cambleton receives all species as it is much more accessible to the marine visitors. The two beaches were monitored in groups no less than 3 individuals from 8pm-3am every night, from the 10th of June to the 15th of August. A patrol would take place every 30 minutes looking for turtle tracks in the sand to determine whether one had approached the beach to nest. At this point no red lights were used to reduce the amount of disturbance on the beach as this may have prevented turtles from coming up to nest. The tracks in the sand were relatively easy to see and if one was found then it was traced to its current location and the nesting phase it was discovered in was notified.

When the turtle began nesting red lights were used to help take further measurements. One individual would measure the temperature of the eggs by carefully excavating sand from the rear of the nesting site to gain access to the eggs. The egg temperatures were recorded using a hand-held infrared laser thermometer with a set emissivity (EMS) reading of 0.98. All surfaces contain an EMS reading and it was the EMS of water that the IR laser thermometers were calibrated with. Each beach had a set IR Thermometer to keep measurements consistent. The temperature was taken as soon as the egg was dropped from the cloaca at a distance of no more than 20cm. The quicker the reading was taken the more accurate the reading would be of the internal core temperature of a turtle. Any egg that had high amounts of sand were discarded from measurements as the sand obscured readings. To ensure accuracy of readings the person scribing would call back the temperature stated by the person taking the egg temperature measurements. Another individual would scribe.

Preliminary Results

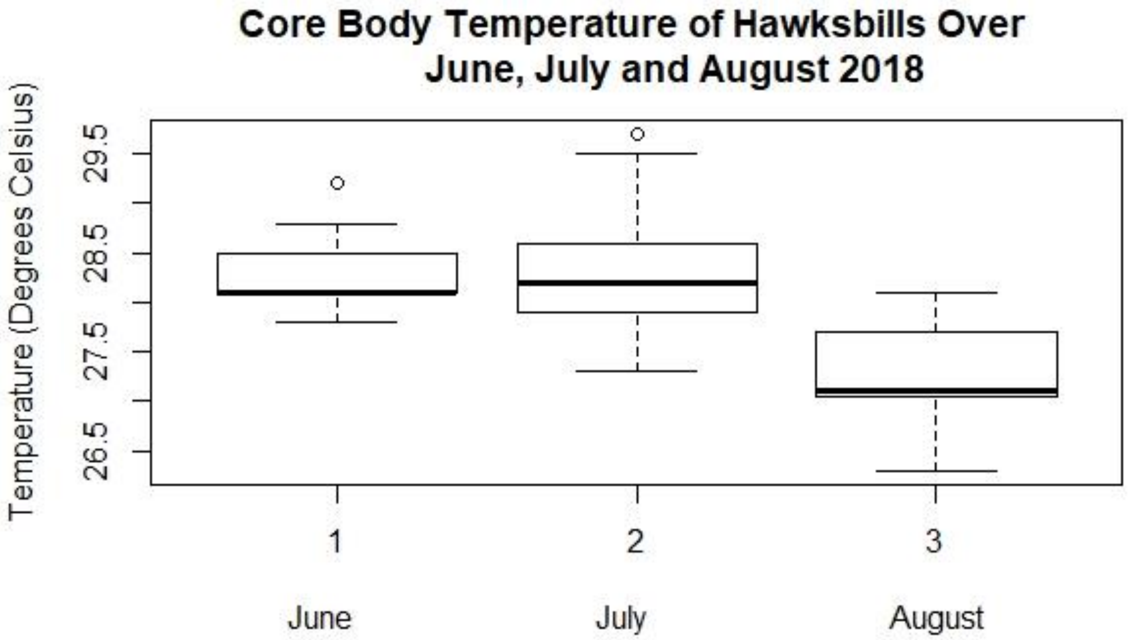

Figure 5: Boxplot showing the distribution of hawksbill core body temperatures over the months of June, July and August

From observational analysis seen in Figure 1 core body temperature of Hawksbills is seen to decrease during the month of August. This is unusual as in previous years temperatures have been found to increase throughout August. Also, on average this whole season was much cooler than previous seasons further indicating that an environmental change could be causing this. Further statistical analysis of this data set will be conducted to see whether there is any significance for the given hypotheses.

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Investigation into the physiological and temporal investment of the sand scattering phase of hawksbill turtles (*Eretmochelys imbricata)* in comparison to other nesting phases
- Rory Thomson

Introduction

All seven species of marine turtle have a common sequence of nesting phases, which can be referred to as behaviours or modal action patterns (Witherington, 1992). These can be split into seven phases; approach, body-pitting, digging, laying, covering, sand scattering and return to sea. These phases are often described as pre-programmed, with different individuals showing a similar behaviour, making the nesting process predictable to those with experience of observing this. However, there have often been many debates over the sand scattering phase of this process, during which an individual uses its front flippers to displace sound around the nesting area. The debate surrounding this phase is whether this sand is displaced to create a decoy or disguise the newly made nest.

This was investigated in Trinidad, using leatherback turtles (*Dermochelys coriacea).* During this research it was found that this species had a large temporal and physical investment during this sand scattering phase, exceeding that of the digging phase. Thus, questions regarding the purpose of this phase arose (Burns et al., 2016). The leatherback turtle is the only member of the family Dermochelyidae, with remaining turtle species being part of the family Chelonidae - including hawksbills. This split occurred over 100 million years ago, with both leatherbacks and hawksbills being biologically different as well (Prichard, 1997). Due to the lack of quantitative data for this, the project aimed to:

1. To investigate the physiological and temporal investments of hawksbill turtles in 4 different phases of nesting.
2. To study the behaviour and movements of hawksbills during the sand scattering phase and compare individuals within the same population.
3. To compare the physiological and temporal investment of these four phases between hawksbill and leatherback species.

The aims of this project were met successfully, with the unexpected addition of the collection of breathing rates and maps for leatherback individuals for comparison, in addition, to leatherback data previously collected.

Methods

Research was conducted on two index beaches – Hermitage and Cambleton Bay. The beaches were patrolled every 30 minutes from 8pm, until 3am. Red lights were used when patrolling beaches to minimise disturbance to the target species. Once spotted, distance was kept from the individual turtle due to their skittish nature, thus, preventing any human disturbance-induced false crawls. The phase of nesting behaviour was noted; approach, digging, laying, covering, sand scattering or leaving.

Breathing Rates

Breathing rates were collected using a night vision camera and stopwatch. The stopwatch was started when the turtle was seen to take a breath, with a lap taken on the stopwatch every time the turtle took a breath. Breaths were characterised by the nesting female lifting her head while opening her mouth. These rates were taken during the digging, laying, covering and sand scattering phases. When the second researcher, acting as a scribe, noticed the turtle switching from one to phase to another, they alerted the researcher taking breathing rates. They then told the scribe which lap the turtle changed phases at. The laps were then written up with the laps used to distinguish between the phases.

The same technique was used for both hawksbill and leatherback turtles.

Sand Scattering Maps

The sand scattering maps also required two researchers, the scribe and another to place markers in the sand. During the sand scattering phase, a nesting female displaces sand using their front flippers. They then move from one position on the beach to another, before displacing more sand. Each of these points are called a sand scattering station. One researcher placed a 'flag' made of a pencil and duct tape, at each of these stations once the turtle had moved. The scribe then marked these points on a blank piece of paper, creating a sketch of the turtles' movements. Ensuring that the direction of each point to north and the sea was made clear. The distance was then measured between each 'flag' using a measuring tape. Moreover, a bearing was measured from north between each flag. This sketch was then drawn to scale using a protractor and ruler the next morning.

The same technique was used for both hawksbill and leatherbacks. However, larger sticks were collected and used in the presence of leatherbacks, as the pencils were buried under the sand by this species.

Results

The data collected will be combined with a dataset collected in 2017 and will include comparisons with leatherback turtles which has not been previously done. Graphs will be plotted, and statistical analysis used will carried out using RStudio.

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Amphibian Work

The Distribution of *Pristimantis charlottevillesis, P. urichi, P. turpinorum* and *Hyalinobatrachium orientale tobagoensis* in Tobago, West Indies. - *William McGhee*

Introduction

Although the known number of amphibian species is increasing by over 100 each year, amphibian populations worldwide are in serious trouble. IUCN's Amphibian Specialist Group published a Global Amphibian Assessment (Stuart *et al*, 2004) that established that 32.5% of amphibian species are threatened with extinction. There are several factors underlying these threats, including habitat loss and alteration, climate change and the effects of emergent diseases.

Of the 37 amphibian species that AmphibiaWeb (2018) listed for the Republic of Trinidad and Tobago (with 14 species present in Tobago), five species are listed as Vulnerable or Endangered by an IUCN Red List assessment in 2013. Of these threatened species, three are regarded as stable but still threatened because of their very restricted distributions. The other two are regarded as decreasing with the justifications of the assessments mostly including habitat decline/fragmentation, but also restricted distributions in some cases.

This project focussed on finding the distributions of the 14 frog species of Tobago, but with main interest in *Pristimantis charlottevillesis*, *P. urichi*, *P. turpinorum and Hyalinobatrachium orientale tobagoensis* due to these being four of the five species which are regarded as vulnerable/endangered.

Methods

To measure island distribution of frogs, three roads were chosen in different areas of the island. These were: The North-East loop road which went from Charlotteville, through Speyside, Roxborough, the Main Ridge Forest Reserve and back to Charlotteville; the main road from Castara to Mason Hall; and the small track road which went past Hillsborough Dam. Road routes are marked in green in Figure 1.

Figure 6: Map of Tobago showing the 3 driving routes in green

Measurements were taken from a car, stopping at every kilometre along the road. At each stopping point along the road, the observers listened for frog species for one minute and noted down which frog species were heard. Also noted was the GPS coordinate, the temperature, humidity, elevation, whether or not it was raining and the time at which the minute begun. After taking all these readings, the observers drove one kilometre along the road (measured on the cars odometer) and took all the readings again. Care was taken not to stay out taking results past 22:30 due to *Pristimantis* species being reported to stop calling at around 23:00.

The GPS coordinates of where each frog species was heard will now be used in a GIS program to make maps of the distribution of the frog species of Tobago around the island. The results will also be analysed in RStudio to find whether factors such as temperature or humidity affect the calling habits of frog species.

Preliminary Results

The results from this project will focus mainly around distribution maps created using GIS software. These have not been completed yet, but it has already been observed that many species have a much larger range than was previously thought. The Tobago glass frog, for example, has been observed at Hillsborough dam and just outside Castara. These locations are much farther South than previous research has found, with their range previously thought to have been just the North-East.

Limitations

Initially, the team began to take data from many different walking transects around the island to gather additional data on *Pristimantis* species and the Tobago glass frog. However, due to an unforeseen incident which affected transportation ability, we could not gather this information on top of the driving transects to measure island distribution.

This incident also changed the number of times we could gather information from each transect. Due to the small track road at Hillsborough dam we only had the ability to gather data from this road twice as we no longer had access to a 4x4 which was required.

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Comparison of the three Pristimantis species – *P. turpinorum, P. charlottevillensis, P. urichi* – and research into the behaviour and ecology of *P. turpinorum*
- Leah Graham

Introduction

This year's expedition to Tobago had multiple frog surveys taking place, one of which focused on *Pristimantis turpinorum*. This was a new project to the expedition and there had been very little previous work done. The behaviour, ecology and habitat preferences were the main areas investigated in order to gain as much knowledge as possible. This frog species is endemic to Tobago and was only found once in 2001. There has been very little research and investigation gone into this species so there is a huge lack of knowledge which is why this project is very important (Hardy, 2004).

Figure 7: Pristomantis turpinorum individual

Pristimantis is a genus of frogs which are part of the Strabomantidae included in the order, Anura. They are thought of as one of the most diverse frog groups in terms of species richness (Bustamante and Mendelson, 2008). There are currently thought to be over 400 species of this genus. Many of these species were previously named *Eleutherodactylus* but further investigations into the taxon arrangements changed this (Padial and De La Riva, 2009). *Pristimantis* species are characterized by their lack of tadpole stage and their terrestrial oviposition. There are two species endemic to Tobago which are *Pristimantis charlottevillensis* and *Pristimantis turpinorum*, and one other species, Prisitmantis urichi found in both Trinidad and Tobago. (Downie, 2013).

One of the aims of this project was to look at distribution of the *Pristimantis* species *P.turpinorum* in particular as they have only been identified in under 5 locations classing them as vulnerable on the IUCN red list. They have only been found in areas in the north east of Tobago in forestry land abundant in palm trees. The palm leaves known as fronds are used by males to perch in and make vocal projections to attract females which tend to be on the ground of the forest. Knowledge was gained on their distribution and this can now be used to help update their records (Hardy, 2004). There are very few research papers that mention *P.turpinorum* which is why the data from this project was needed and now the species can be compared to the two other *Pristimantis* found on Tobago.

Methods

The sites already known to have the three *Pristimantis* species, P.*charlottevillensis, P.urichi, P.turpinorum*, were first located to check the sites were still suitable to survey in and if the species were still present. Once confirmed this was confirmed, site transects were set out. The transect began where the vegetation was most likely to contain *Pristimantis* species. There were different numbers of transects at each site depending on how far the suitable habitat spanned. The transect points were set out 25m apart from each other and a point was marked on duct tape and stuck to a tree or plant. There was one site being used at the start of the 3-month period and by the end 3 sites as circumstances changed and certain sites became less assessible.

New sites were searched when in the field during the day then located again at night to check for *Pristimantis* species. If the species were found upon the check then transects were set out.

Upon arrival at a site the team would all stand at the start of the first transect and 2 people would check the area to the left and 2 would check the area to the right. To look for the frogs a torch was needed and shone on the foliage and ground all the way along the transect. When a frog was spotted it would be put into a petri dish to be measured. The time at which the frog was seen was recorded as was the location showing which transect it was found in. A light meter was used to calculate light level and a temperature/Humidity device used to calculate these two measurements. The weather at the time was also noted, whether it was dry or raining and how heavy the rain was. A measuring tape was then used to calculate the height from ground the specimen was found at and the type of foliage was looked at to see if it could be identified and if not labelled as unknown. Whether the frog was found on the ground, in foliage or in a tree was also recorded.

The frogs which were accessible and put in petri dishes were all individually identified by looking at the colour of the iris and the shape of the back of the frog. Snout-vent length was measured with callipers. The petri dish with the specimen in it was then placed on a set of digital scales and this weight was recorded, the frog was released, and the empty petri dish was weighed. The weight of the dish was subtracted from the weight of the frog and dish to get the specimen weight. The length and weight were then used to identify the lifecycle stage at which the frog was at: Adult, Juvenile or Froglet.

In some cases, the individual was found out with transect boundaries; therefore a GPS of their location was taken and noted down. Photographs of each species were taken to help with identifying in the future. Some photographs of the foliage were occasionally taken to check if they could be identified. When the frogs were found calling this was recorded and times at which calling was heard was also noted down.

To test for DNA some frog samples were collected. These were collected during surveys. Three of each species were taken and put into separate plastic bags then put in a freezer to kill them humanely. Once dead they were stored in plastic tubes containing ethanol to be brought back to the UK. An export licence was provided by the Tobago House of Assembly.

Preliminary results

Pristimantis turpinorum was investigated and information on distribution, calling times and preferred habitats was found. The species was not found in as high abundance as the other two *Pristimantis* species therefore not as much was discovered as hoped for. Enough data has been collected to compare the three species in terms of habitat preference and so far it appears they all inhabited very similar niches in terms of temperature, rainfall and foliage. Nearly every specimen we spotted was found on foliage rather than on the ground and the older more adult frogs tended to be higher up than the younger frogs. The temperature at which specimens were spotted ranged from 25-31 degrees Celsius and it seems as though the species prefer a more humid environment with humidity levels of 64% and above. Graphs will be made to show each species and the temperature, humidity and weather at which most were found to gain knowledge on the conditions each species prefers.

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Investigating the effects of human disturbance on bat community composition and parasite load in North East Tobago – *Juliet Adie and Kate Hedley*

Introduction

In recent years, urbanisation has rapidly spread across the planet's Neotropical regions, including the Republic of Trinidad and Tobago, bringing with it inevitable environmental changes (Neale and Mohammed, 2010). The islands of Trinidad and Tobago are home to 69 species of Neotropical bat (Chiroptera), spanning 9 families (Gomes and Reid, 2015). Native bats can be used as reliable indicators of the effects of disturbance as they represent a wide variety of trophic levels and feeding guilds (Fenton *et al*., 1992).

Figure 8: A Jamaican fruit eating bat (*Artibeus jamaicensis)* being processed.

These flying mammals also function as seed dispersers and pollinators which in turn makes them crucial to the process of reforestation in the areas which they inhabit (Medellín *et a*l, 2000). It is therefore important to monitor the effect the increasing level of anthropogenic disturbance is having to its bat community composition found within its tropical forests. The health of bat populations is also of importance due to the risk of transmission of zoonotic pathogens, of which they are known reservoirs, to humans (Allocati *et al*., 2016). As human populations encroach further into the natural habitats of bats, increased contact between the two species may potentially result in outbreaks of zoonotic disease (Hayman *et al.*, 2013). Bats with reduced fitness are more likely to be susceptible to such diseases and become natural reservoirs. This reduced fitness can often be attributed to parasitic infection (Lourenço and Palmeirim, 2007). The Chiroptera are host to a wide variety of both endo- and ectoparasites, including the Streblidae family of obligate, blood-feeding parasites known as the bat fly (Patterson, Dick and Dittmar, 2008) and the specialised parasites of the bat wing membrane: wing mites (Spinturnicidae) (Belayeva, Rasnitsyn and Quicke, 2002). In 2017, a study was carried out investigating the interactions between these same parasites and the Jamaican Fruit-eating bat, *Artibeus jamaicensis* (Chiroptera: Phyllostomidae) in primary forest, secondary forest and urban habitats of Tobago (Allan, 2018). As there is such a high diversity of bat species present on the island, it is important to expand upon previous research and include other species. In this case, *C. perspicillata* was selected as the subject of the investigation due to records of high abundance in Northeast Tobago, where the study was carried out.

Methods

Study sites were selected based on their level of anthropogenic disturbance and were categorised as primary forest, secondary forest and urban habitats. Six sites were used in total, each category having two dedicated sites. Data collection occurred for 10 weeks spanning the months of June, July and August 2018. Environmental conditions including temperature, humidity and light intensity were measured throughout data collection hours. Two 12m nylon mist nets were set up separately on ground poles, while three 9m nylon mist nets were set up at different levels on triple high poles equipped with a pulley system. Nets were positioned to intercept possible bat flight paths: under canopies and over ridges. Nets were opened at 6.30pm each night to approximately coincide with sunset and remained open for 4 hours. During instances of heavy rain or high capture rates, nets were closed while time and duration of closure were noted. Checks were carried out at the nets every 15 minutes. When an individual was caught, time of capture and net level were recorded. Bats were then removed from the net and placed into cotton bags for transfer to the processing station, approx. 100m away from the nets. Several measurements were then carried out on the individuals, such as weight and forearm length. Age, gender and reproductive status were noted and species identified. Individuals were marked on the wing membrane with non-toxic ink to indicate any recapture events. Any *C. perspicillata* individuals were further examined for presence of ectoparasites. The number of ectoparasites were recorded and as many as possible removed and placed in vials of rubbing alcohol for identification. Following this, all individuals were released.

Results

The results of this study are yet to be analyzed. In order to analyze the community composition of bats in the different areas, species abundance and richness will be investigated as well as using Shannon's index in order to investigate the differences in species diversity between the sites. Ectoparasite samples are still to be identified.

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Geography Surveys: Investigation into locals' and tourists' perceptions of the effects and impact of climate change on Tobago's environment
- *Jessica McCrone and Giovanni Penna*

Introduction

Climate change has been becoming an increasingly prominent topic in media and politics. It has global effect. However, in some countries these effects are more prominent than others due to their main economic source, environment, political agenda and contrasts in development (Manandhar *et al*, 2015). Although a country's involvement in climate change is of significance, an individual's personal perception regarding climate change is also significant to invoke change. Thus, this project focussed on individuals' opinions. Individuals' understandings, perception and engagement of climate change is important to research and policy on climate change (Wolf and Mosser, 2011). This project aimed to gain specific insight into local's and tourist's perceptions of climate change. This was research specifically in Tobago, a small island in the Caribbean (300 km^2). Tobago is an island which is increasingly threatened by global warming and rising sea levels. This project wished to see how the global phenomena of climate change impacts locals and tourists on this Caribbean island.

Objectives of the project were:

To determine individual's perception of climate change

To study local's perceptions of climate change and their beliefs on the impact on their countries environment

To study tourist's perception of climate change and whether their experience on the island has led them to believe that climate change is impacting Tobago

Methods

Due to the complex historical trajectory of Trinidad and Tobago particular attention was paid to this when research methods were being selected. Information on the diverse cultures and social and economic characteristics was gained through academic research, newspapers and direct observation. Further insight was gained through information gathered through a meeting with a local N.G.O, Environmental Research Institute Charlotteville (ERIC) who provided the information that locals were often extremely hesitant when being surveyed in a formal environment and often felt pressured into giving what they believed to be the 'correct' answer. Therefore, the primary methods of research were qualitative. Informal surveys were used to create a relaxed setting in which participants felt comfortable answering the questions. This allowed informants to expand their answers giving further information which could be analysed. Allowing more information to be attained which is crucial as little information of individuals perception of climate change, specifically locals, is available through secondary resources.

Questionnaires were therefore utilised to gauge locals and tourist's respective views on climate change and the relationship between the island and climate change. Questions were asked surrounding participants perception of climate change both globally and locally, the environmental impacts of Tobago's main economic sectors and opinions on the responsibility of leading Tobago to further sustainability. The interviews took into account both global and local environmental events. The interviewees' awareness of these topics was cause for reflection on the conditions of the post-modern 'global village' (McLuhan, 1964) and 'global sense of place' (Massey, 1994) in Tobago. One survey would be used to question all participants whether they were a tourist or a local. This would make it easier to determine differences in perception and prevent manipulation of answers through catering them to tourists or locals. All participants received a consent form and information sheet prior to the interview. Before the interview, participants will be reminded of the content of the information sheet and that they can stop the interview at any time.

Due to project limitations of lack of transport research sites were limited. Furthermore, E.R.I.C highlighted that some areas, such as Charlotteville, were often used for research purposes and therefore locals felt that they pawns in scientific research and would possibly have a negative outlook on answering research questions. Therefore, it was decided that a main research site would be used. This was the mall in Scarborough, the capital of Tobago. The mall is visited by people from all over the small island. This would be viewed as a hub for locals of the area for shopping and activities (reference). This allowed for a wide variety of participants to be questioned from various locations around the island and also form various travel destinations. The mall was visited on three separate occasions. These all occurred on different days of the week and lasted 2 hours each time. This further allowed for a wider pool of participants to be selected due to the different times the mall was visited by different people to create variety with the participant selection. A simple random sampling technique was used to select participants of the surveys.

Results

Initial impressions of results were that the majority of those surveyed had a basic understanding of the impacts climate change presents to the island. Many recognised the existence of climate change globally, however, some debate was presented in individual's beliefs of the existence of climate change specifically in Tobago. Majority of individuals who expressed recognition of climate change were passionate about the effects of climate change, giving specific examples.

Data collected will be further analysed.

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