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RAPHIA

Newsletter of Caño Palma Biological Station

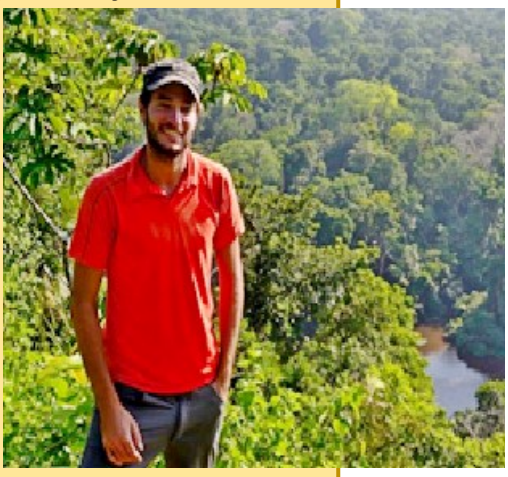
OR

CANADIAN ORGANIZATION FOR TROPICAL RESEARCH & RAINFOREST CONSERVATION

In The Winter Issue of Raphia

Feature Stories

1. At Caño Palma, we have an intact ecosystem that provides great green macaws, an Endangered species, with the habitat they require to live and hopefully breed. Regrettably, not a lot of research has been done on the greens. To fill part of that gap, Mathieu Jegu, through many, many hours of observations, discovered that the greens are using the beach almendro, an abundant tree in our area, for much of their feeding. As well, he has found indirect evidence of breeding -- though that will require more direct proof before it can be confirmed.



2. On the other hand, a BBC video (link on P. 6) takes a look at the trash, mainly plastics, swirling around the Caribbean (pictured below). And Charlotte describes (on Page 7) the enormous effort volunteers at the station have put into our marine-debris survey for the last two years. Where does the trash come from? Both articles give us a pretty good idea.

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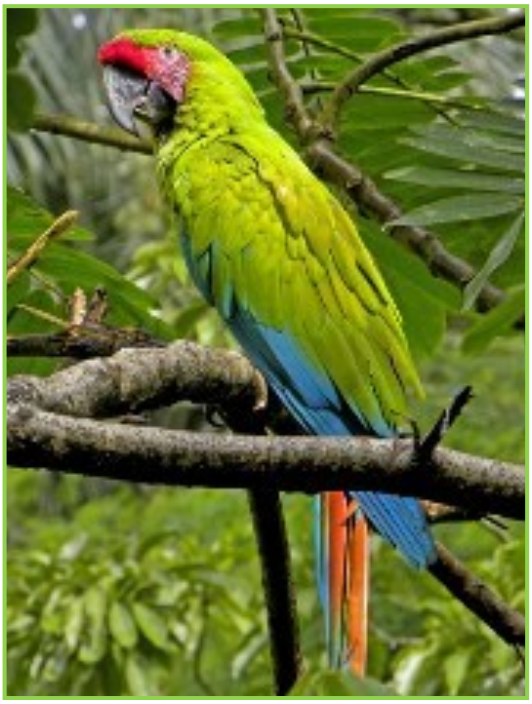
Great Green Macaws - Looking for Answers by Mathieu Jegu

Mathieu is from Rennes in Brittany in the west of France. In his chosen field of Ecology, he decided to specialize in tropical ecology as he could take advantage of French overseas territories to do his Master's studies. He spent his first year on the island of Guadeloupe, and the second year in French Guiana where he had access to the Amazon rainforest. His specific interests are birds and reptiles. Mathieu hopes to return to French Guiana to work in tropical-forest management with the Office National des Forêts. Mathieu took all the great green macaw photos in this issue.

It's always been a dream of mine to come to Costa Rica. So, when I had to choose which project to work on for my internship for my Master's thesis (Master of Ecology) at the West Indies University of France, with no hesitation I picked Caño Palma to study the great green macaws.

Like most French people, I have some difficulties in English compared to most countries of Europe (and I don't know why actually…), so the first weeks were a little bit hard for me to get used to the atmosphere and start to be at ease. But after a certain point I started to feel at home, with less comfort of course, but with awesome people and really good food as well (top marks to Top Chef Charlotte).



Another really nice thing that we tend to forget when we stay at Caño Palma for a long period is how many species we closely encounter every day, like snakes, otters, caimans, macaws, monkeys, iguanas, toucans, trogons, araçaris and on and on.

But let's get back to the reason I came to Caño Palma, the great green macaw (GGM). Regrettably, this species hasn't been studied much and I hadn't realized that my survey would be the first GGM survey done on the Caribbean coast of Costa Rica. Estimates about the population size in CR are frequently quoted, but it was really important to do my project in order to get a more precise estimate of the abundance in the Tortuguero/ Caño Palma area. To do that, I used 4 sites: Caño Palma station, the Cerro, and the villages of San Francisco and Tortuguero.

In the end, 432 hours of survey work were done and I came up with a minimum estimate of 61 individual green macaws for our area. This estimate is deduced by first determining the potential abundance. By that, I mean that when we had two or more flocks flying in the same direction, we counted the number of individuals in total. As long as the flocks were separated by not more than 10 minutes, we could be absolutely sure that they were different – BUT we cannot prove scientifically that they were. Once I'd used statistical models to work with the numbers, I came up with 61 as the minimum number of GGMs in our area. But potentially we know there are more.

We also found that there are likely two groups of GGMs. One inhabits Tortuguero. The other appears in San Francisco, the Cerro and Caño Palma. During March, this latter group disappeared. Though we continued our observations, it was discouraging to sit there day after day with nothing happening. However, we hypothesize that this group of greens may have been nesting. That would account for their disappearance since both female and male stay close to the nest during the nesting period, and February/March is the peak of nesting season for greens. This is a potentially exciting finding. During March, the Tortuguero group continued to appear as usual.

After saying all this, it's important to note that we didn't find any visual evidence of nesting. That may be because the almendro trees in which the greens usually nest are difficult to observe. Future studies will give us more answers. Still, we did find our area likely provides all the nesting requirements – as found at other GGM sites such as Maquenque

Great Green Macaws (cont'd)

Wildlife Refuge (near the Nicaraguan border) and La Selva (central Costa Rica) – necessary for (cont'd on next page) the green macaws to live and breed here. The almendro (*Dypterix panamensis*), also called the mountain almond, is the GGM's main nesting tree and its density per hectare was clearly sufficient in our area.

As GGM's are secondary cavity nesters (that is, they use natural or abandoned cavities, only making minor alterations), we measured the presence of cavities on each site. We did find cavities on several almendros, but most cavities were on the Gavilan (*Pentaclethra macroloba),* which could be potential nesting sites for the greens.

"...88% of feeding activity took place in the beach almond."

Another interesting finding was the presence of another foraging tree: the beach almond, which was not found here by a 1999 study. During my study, I observed that 88% of feeding activity by GGMs took place in the beach almond. Diet studies in other parts of Costa Rica have found that the fruit of this species is an important source of food for macaws.

If I had to sum up my study in one word, that word would definitely be 'Patience'. The fact is some days were really frustrating and very long, particularly in March when sightings were few. But that was followed by an explosion of sightings in April, which could possibly be accounted for by the nesting process being over, and parents and their young reappearing. Again, caution has to be attached to this assumption.

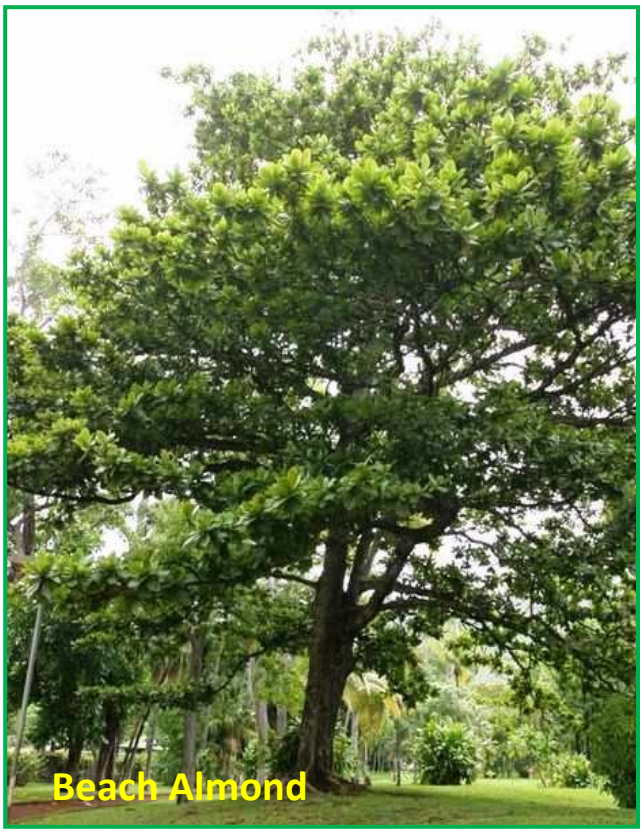
People are really amazed, including me, when they come here to Caño Palma and realize that it's relatively easy to encounter macaws, which is not the case in others parts of Costa Rica. Even the scarlet macaw was quite easy to encounter, especially considering that most scarlet observations occurred around the station. That's interesting because that's the same site where we saw the fewest number of great greens while the nearby village of San Francisco was the site with the highest count.

There is clearly a lot more to learn about the great green macaw and scarlet macaw, and with the increased presence of these two species, Caño Palma will certainly be one of the best spots in Costa Rica to observe and study them.

The great green macaw explosion in April after sightings had dried up in March.

The Beach Almond Tree

The mountain almendro tree (*Dypterix panamensis*) is the great green macaw's favored tree for both feeding and nesting. But carpenters in Central America had long coveted its wood because of its hardness. Not only is it durable, but it's also resistant to termites. But its hardness and density made it difficult to cut down and mill. That changed in the mid-80s with the advent of carbon-steel saw blades and diamond-tipping to chain saws. This, along with clearcutting for banana and pineapple plantations, has resulted in the almendro becoming increasingly uncommon.


Beach Almond

So, it should have been no surprise that, with the decline of the almendro, the great green macaw's IUCN status dropped from Least Concern all the way to Endangered in less than 10 years.

But it was a surprise to discover in Mathieu Jegu's research (Page 3) that great green macaws around Caño Palma and Tortuguero feed on the beach almond tree (*Terminalia catappa)* 88% of the time. Other research from around Costa Rica is showing similar results. (It should be noted that the 88% figure is likely biased upward because almendros are often in locations where they're difficult to observe.)

Macaws remain highly dependent on almendros for nesting as these trees are large enough to provide the spacious hollows that greens require for their large nests. That's one reason why the almendro should be emphasized whenever reforestation efforts are undertaken. As for reforestation using the beach almond, caution is advised as it's an introduced species and it could cause negative effects on the surrounding community that haven't been discovered as yet.


Fruit of the beach almond

Still, a 2014 research paper (https://revistas.ucr.ac.cr/index.php/rbt/article/view/14060/14695) on the scarlet macaw points out that introduced species can sometimes have beneficial effects. As mentioned, one benefit of the beach almond is as a substitute food source for the great green macaw (and the scarlet macaw) as the almendro becomes scarcer. As well, as its name indicates, the beach almond is most prevalent in the vicinity of beaches due to its "high tolerance to wind and salt stress". It also helps to prevent beach erosion, and provides food and shelter for humans and other animals.

Research from the above-mentioned paper took place on the central Pacific coast of Costa Rica. The beaches most preferred by the scarlets were near a resort called Punta Leona, which had done extensive planting of the beach almond along the coast. The researchers conclude that, since it's helping the recovery of an endangered species, the beach almond should be part of any reforestation efforts. However, in Maquenque Wildlife Reserve, a key habitat for the great green macaw about 70 K west of Caño Palma, their reforestation efforts focus on the almendro.

The Ara Project, which is based on the Pacific side of Costa Rica, should also be mentioned. It takes in macaws confiscated by MINAE, macaws no longer wanted as pets, or injured macaws. They choose to feed their macaws fruit from the beach almond and teach them to pick fruit from that tree prior to releasing them.

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Coming to a Beach Near You

When we look at the plastic debris on the beaches close to Caño Palma, we know that some of it comes from the river near San Francisco. And that's the sad story of so many villages along the Caribbean coast of Central America – they don't have garbage-collection systems so that garbage often ends up being dumped near rivers. A good downpour in the rainy season can then wash the garbage into the sea. The Blue Planet Society (BPS), a volunteer pressure group dedicated to ending the overexploitation of our oceans, traced the trail of plastic in the video (http://www.bbc.com/news/av/world-41898953/sea-of-plastic) and the picture below to the Montigua River in Guatemala. So, like the enormous gyres of plastics floating around our oceans, the Caribbean Sea is now being invaded.

John Hourston of the BPS describes the 8 million metric tons of plastic and other trash that flow and are dumped into our oceans every year as "a barren, polluted, heated, acidic hellscape". Oceans will be barren because we will have killed off so many sea creatures, not just from overfishing, but also from poisoning them. When pesticides and industrial chemical emissions bind to plastic, plankton may ingest it. It then works its way up the food chain, injecting poisons into all sea creatures as well as us – that's the ultimate irony, we're poisoning ourselves.

"This is the first time that a picture has brought the attention of the plastic problem in the Caribbean Sea to the public. We've known about the Pacific gyres for quite a long time, but problems in the Caribbean - I've never seen a photo that illustrates how bad the problem is." John Hourston, founder of Blue Planet Society.

Of course, the plastics work their dirty tricks in other ways. Turtles, fish and whales can become entangled in plastic fishing nets. They can also swallow plastic, and perhaps choke on it or starve to death because their stomachs can't digest the indigestible. Microbeads, non-biodegradable bits of plastic, can cause blockages, dehydration and death in fish that mistake them for food.

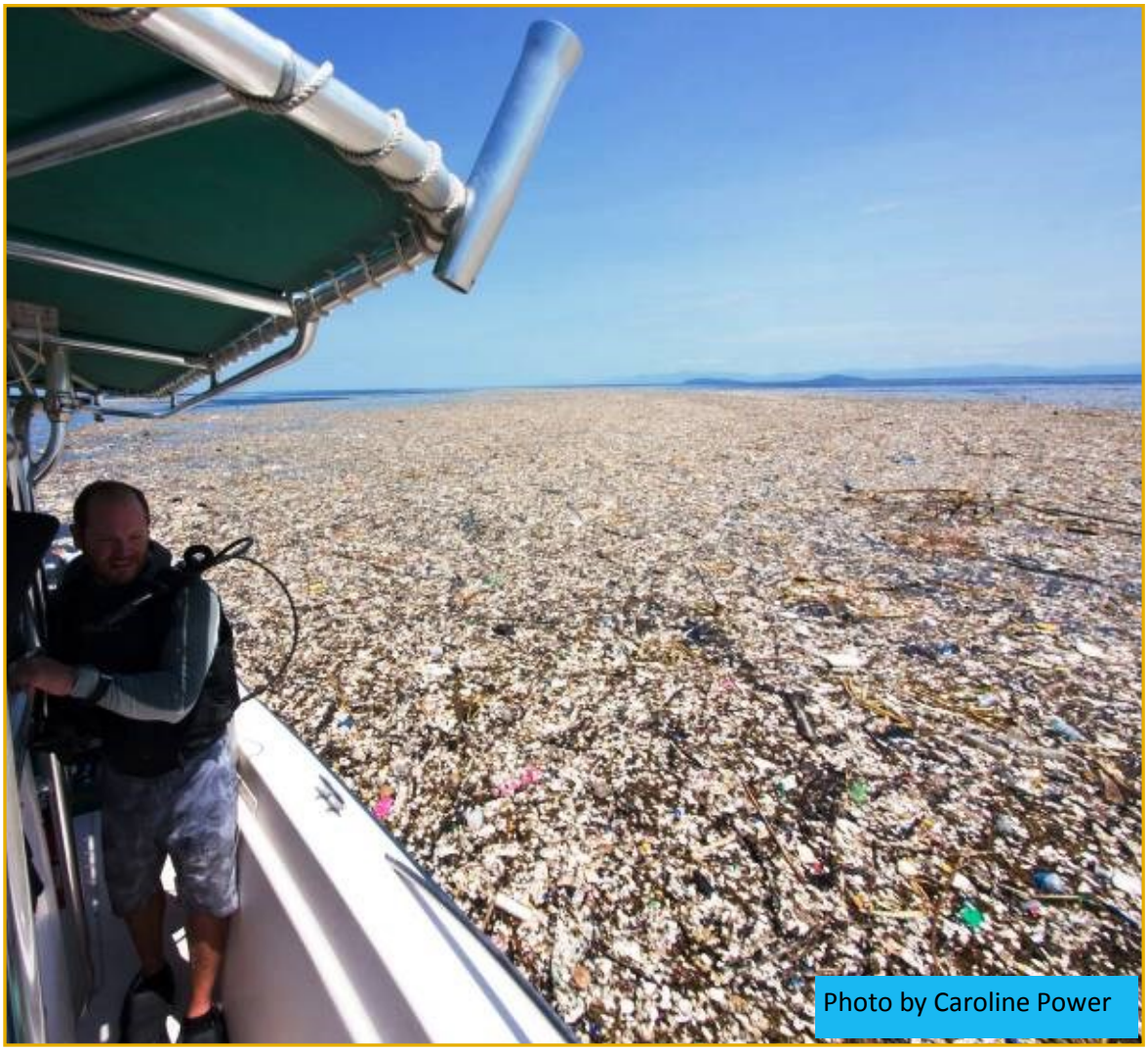

Photo by Caroline Power

What's the answer to preventing the hellscape? Action by both individuals and governments. In fact, Hourston says that photos like this one have spurred the governments of Guatemala and Honduras "to commit to action including trapping the garbage."

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Notes from the Station by Charlotte Foale

January 10th 2018 - On this day, we conduct the last marine-debris survey in our 2-year study. It takes 4 people 4 hours to clean a 100-meter stretch of beach. Cue the sound of jaws dropping as the people who participated in our first survey read that. In 2016, that same 100-meter stretch took 10 people over a week to clean. Then they started counting the 50,655 pieces of trash they removed.

Joy is not the look we have seen once a month as groups have headed to the beach to clean a measly 100 meters of tropical paradise. Marine debris, how bad can it be?

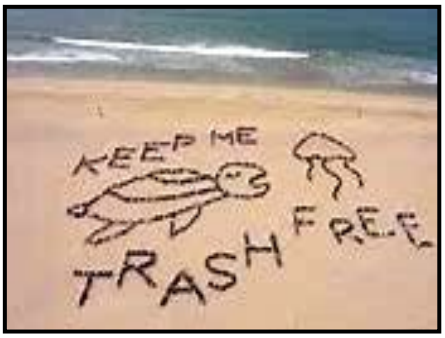
Our home is the Caribbean coast of Costa Rica. Natural paradise. Where national park meets wildlife refuge. This is one of the most popular spots in Costa Rica for eco-tourists to enjoy the country's biodiversity, and witness the splendor of majestic turtles coming up at night to nest. These things, for many people, conjure up the image of pristine, unspoiled beaches. But, for those who've joined us on our turtle project, the truth has been shocking.

Please remove my temptations

TV's, refrigerators, bags of diapers, shoes, doll parts, fishing debris, tooth-brushes, lighters, and 1000's upon 1000's of plastic bottles.

We've always done regular beach cleans,. We'd have drinks and snacks to lure local kids down to help, as well as the occasional adult. In 2015, we were invited to join a local committee dedicated to winning the "Bandera Azul", an environmental award for beach cleanliness. This really felt like a turning point - the community was focused on a project to clean the beach. But it wasn't long before locals became disheartened because the trash is never-ending.

On a beach clean, we'd collect TONNES of trash. After finishing, you couldn't tell we'd had a beach clean. It wasn't just locals. Volunteers would feel a huge sense of accomplishment looking at the amount we'd removed, and then be completely disheartened to spend the night with plastic crunching underfoot as they worked with turtles.



And then the real kick - the Tortuguero recycling center told us they wouldn't accept the beach trash because we were collecting too much! Fortunately, San Francisco opened their own center, and to profit from our recyclable items, they were more than happy to take the marine debris. Around this time, we saw the need to quantify our efforts, and not only evaluate if we were really making a difference, but determine if there was a way for us to make a bigger impact. Using NOAA protocols, we started our marine-debris surveys.

We had two main objectives for this project:

1. To see, over time, if cleaning the beach had a positive impact on the amount of debris that accumulates. That is, would all this work result in locals being able to enjoy a relatively trash-free space to relax with their families. This could play a key part in motivating them to help with this effort.

2. To find out the origin of the trash so that we can see if there are other more political methods we can employ to reduce the trash on our beach. Many areas of Costa Rica still don't have responsible options for trash disposal. They just bury, burn or throw trash over river banks.

And what were the basics of our marine-debris survey? Every 28 days we focus on the same 100 meters of beach, and collect every piece of trash that is fingernail-sized and larger, all the way down to the high-tide line. (cont'd)

Notes from the Station (cont'd)

Now, as the first part of this project draws to a close, we'll start a more in-depth analysis of the items we've encountered, and move on to the next phase: communicating results to locals and politicians alike.

We've seen rubbish from around the world, including water sachets from a cargo ship that hasn't left Europe for 5 years. But we also see a lot of garbage from Costa Rica. Looking at off-shore weather and weather events within Costa Rica, we hope to determine which has the greater impact: overseas trash or trash from our area. Our working hypothesis is that the majority of the garbage comes through the river systems.

In the months that followed the first heart-breaking survey, the trash collected per month ranged between 3,086 and 15,541 pieces. Our average was 8,311.

To put that in the broader context of the beach on which we work with nesting marine turtles, for every meter we cleaned on our very first outing, there were 500 pieces of trash. Our turtle survey area is 5029 meters long. So if we cleaned the entire transect, we could expect to remove approximately 2,514,000 pieces of trash. Day one.

I am working hard to think of a way to use this information to motivate locals to help…it can be overwhelming, but it's not hopeless.

We know that the Station's efforts won't keep the entire beach clean, but we have modest aspirations. The local Ministry for the Environment, MINAE, is looking to include the Tortuguero River mouth in a long-term tourism plan. As this area has the greatest usage by locals, and now has the potential to be part of a tourism venture that will make locals money, we are hoping to motivate locals to help beautify this area. We will be emphasizing the reduced time required when constant effort is applied, as well as continuing to bribe kids to help. We will also be utilizing some of our talented local political figures to use our data to push for better regional policies for trash collection and recycling.

You already know what you can do to help.

Stop using non-essential plastics.

Stop using one-use plastics.

Reuse, reduce, educate…and volunteer. Here or in your local area, wherever you are, the problem of trash in our waterways is serious, and everyone needs to do their part.

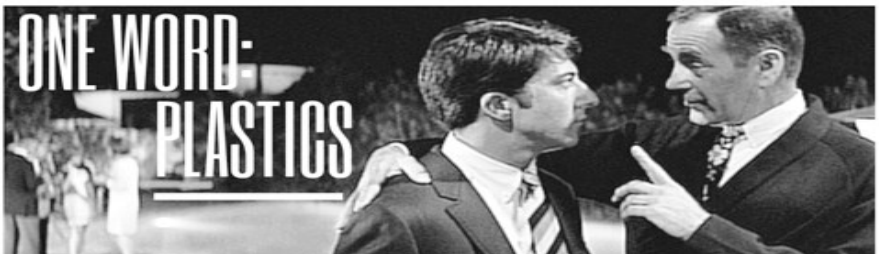
Here's a fun project we can all participate in.

Marine-Debris Survey

	Feb/**16**	May	July	Nov	Feb/**17**	May	July	Oct	Nov
Total Items Collected	50,667	10,307	3097	4581	8967	9449	13,980	731	4372
Plastics	34,221	10,117	3070	4334	8615	9043	12,996	708	4190

The Plastic Revolution

In the 1967 movie "The Graduate", a businessman acquaintance of the newly graduated Benjamin (Dustin Hoffman) takes him aside and advises: "*There's a great future in plastics. Think about it. Will you think about it?*"



In the age of self-absorbed flower children, we scoffed at any such future for ourselves. We were out to change the world so plastics wouldn't be on our list of career possibilities. The 60s weren't about 'boring'.

So, while we were talking about changing the world, boring old plastics quietly went out and actually did it. And, while we tend to focus on the negatives that plastics bring to the world, I'd like to focus on a few of the benefits.

> "*Most advances of human society over the past century have been facilitated by the use of plastics.*"
> Dr Rolf Halden, Global Institute of Sustainability

Why Plastics? – Maybe the best way to define plastic is by thinking of Donald Trump's hair for as one dictionary states: ***Plastics are synthetic materials that can be molded into another shape when heated, and then set into a rigid or slightly elastic form that will irreversibly hold its shape.*** But plastics have more advantages than the Donald. They're cheap, easy to manufacture, versatile, strong, durable, and impervious to water. They're chemically inert so that substances from acid to gasoline can be safely stored in them. They're light so replacing heavier materials with plastic saves enormous amounts of energy, meaning far less carbon dioxide is spewed into the air. That's important in the climate-change era when we need to reduce our greenhouse-gas emissions (carbon footprints). For example, in transporting freight, both the goods and vehicle (up to 20% plastic) would weigh less, meaning less fuel is used and fewer trips may be required. For transporting people, Boeing's new 787 Dreamliner is about 50% plastic, delivering a 20% savings in fuel use.

Plastic is often good for our health. Plastic pipes, whether transporting drinking water or sewage, greatly reduce health risks. Plastic can be used to repair or replace bone, cartilage, skin, blood vessels and many other bodily tissues. Plastic is the bone cement in hip replacements. Though it sounds contradictory, single-use syringes have saved untold numbers of lives because the risk of transmitting blood-borne infectious diseases (e.g. HIV, hepatitis B) is greatly reduced.

Whether you know it or not, much of your clothing contains plastic. It's estimated that 80% of clothes sold in the US contain Spandex (aka Lycra). Usually it's a small amount, maybe 2-5% – but it's popular because it expands (Spandex is an anagram) to comfortably fit our growing body sizes. Gore-Tex, waterproof and breathable, is basically a stretched version of Teflon, another plastic. Think that fleece you're wearing is natural. Look again. Much of the fleece used today for clothes, blankets and high-performance outdoor clothing is 100% plastic, making it a vegan's dream. Polyester, with its high resistance to tearing and shrinking, is ubiquitous in clothing sections. Nylon started out as stockings. Now it's found everywhere from your car's engine compartment to packaging where its ability to form an oxygen barrier is useful. Velcro is a combination of polyester and nylon.

We think of plastic and we see landfills; or microbeads, those tiny bits of plastic embedded in soaps and toothpastes that make their way through our water supply into the stomachs of fish, negatively altering their behavior; or garbage patches circulating around our oceans (see Page 6) where the plastic can end up in the stomachs of everything from marine turtles to albatross, steering species towards the path of extinction.

What irony. We children of the 60s who were going to clean up the world have ended up as the problem as we mindlessly dispose of our waste. In a world that annually produces over 300 million tonnes (660 billion pounds) of plastics, we still don't properly recycle it.

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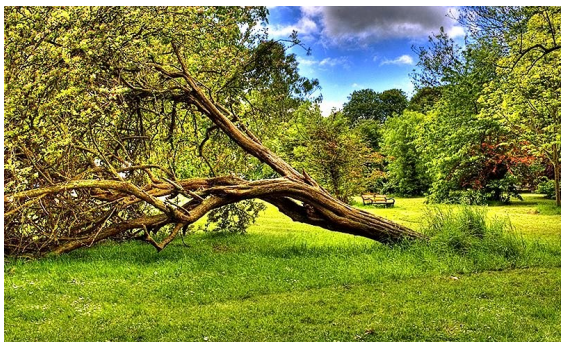
Cellulose - Mother Nature's Miracle Material

It is confusing. Many people think it's cellulite that is the most abundant organic compound on Earth. Of course cellulite, the fatty deposits found on other people's thighs, is certainly abundant. But it's actually cellulose, a carbohydrate found in plants, that is the most bountiful.

CELLULOSE



CELLULITE

What is cellulose? First, any chemical compound ending in the suffix -ose is a sugar. So cellulose is a sugar. Sugars come in 3 varieties:

- Monosaccharides (e.g. **glucose** and **fructose**) are simple sugars because they have but one carbon ring.
- Disaccharides (e.g. **sucrose** and **lactose**) are two monosaccharides that have combined.
- And the complex sugars, or polysaccharides (e.g. **glycogen** and **starch**), are chains of thousands of monosaccharides.

We associate sugars with easy digestibility. Cellulose, a polysaccharide, isn't. Nothing except for certain microorganisms can digest it. Strangely, cellulose is chemically identical to starch except for one chemical bond. That single difference makes starch much easier to digest than indigestible cellulose.

One more thing: An organic compound is a compound based on the element carbon. Carbon is a key component of all life on our planet.

Now let's start linking things up. First comes the sun. Then plants, using photosynthesis, turn the sun's energy into carbohydrates, which plants store as sugars. This energy is then available to carry out the processes that keep plants alive and fuel their growth.

In humans, glucose is our most important energy source. We store it as glycogen. And our primary source of glucose is plants that store it as starch in such globally important foods as potatoes, rice, wheat, cassava and maize.

Okay, it's time to talk cellulose, which we said is a polysaccharide – in its case, like starch, it's a long chain of glucose molecules. In contrast to a starch chain, which coils into an amorphous mass, a cellulose chain maintains a straight line. As well, cellulose is insoluble. In addition, cellulose chains grow side by side in a bunch. They're like a handful of dry spaghetti sticks. Except when you let go of spaghetti sticks, they fall all over the place. Cellulose chains stick together because of hydrogen bonding, a powerful electrostatic attraction that gives the cellulose fibers (called microfibrils) an incredible strength and rigidity. Taken together, such attributes give the trunks, stems, branches and leaves of plants the strength and structure to defy gravity and stay upright.

% of Cellulose in:

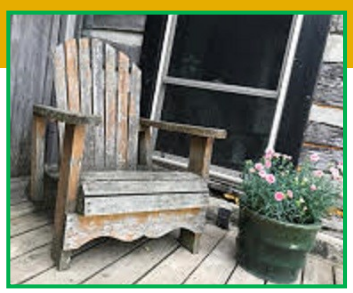
Cotton = 90%

Wood = ~50%

Other plants = ~33%

Where in a plant does cellulose work its magic? As in all other living things, cells are the building blocks of plants. A cell's integument (covering) has to be tough to protect its innards. It can't dissolve in water. It has to have some elasticity so the plant will bounce back into shape in the wind. Finally, given its name, it's not surprising that it's in a plant's cell walls where you'll find cellulose. In fact, it's the main constituent of plants. And given the ubiquity of plants, that's why cellulose is the world's most abundant organic compound.

Notes from the Chair by Kym Snarr



We have hit the end of 2017 and are rushing into 2018!! During the last year as Chair of COTERC, I have come to see the need for the Board to view ourselves as more of a team. To this end, the Board recently held a one-day retreat in the countryside to discuss the direction of COTERC and the station. Despite a classic ferocious winter day, most Directors were able to attend. Newer members on the Board asked questions about the history of COTERC and how they could be contributing in a more meaningful manner. With his solid organizational skills, our Director of Finance, Andrew Morris, led the meeting, consolidating our brainstorming ideas into coherent charts that enabled the Board to define the goals and actions needed by COTERC. As well, it helped Board members clarify our relationship to the station.

I should also start by recognizing one major accomplishment of recent vintage, which was highlighted during the retreat. With the development of sound research combined with strong leadership at Caño Palma Biological Station, our relationship with the local Ministry of Environment (MINAE) has strengthened. As part of COTERC's mandate to deliver scientific findings upon which sound conservation policy can be built, this strengthened partnership has led MINAE to request our assistance. They have asked us to extend some of our data collection and monitoring programs into the Cerro and the Dr. Archie Carr Wildlife Refuge. Our scientific findings will help them make sounder conservation policy. This increased fieldwork can be challenging for the station, especially when there are fewer interns during this quieter time of year. It puts an increased workload on interns who are already carrying out different projects, conducting work on their undergraduate thesis, or working in multi-taxon positions as well as helping collect routine data in our monitoring projects.

"Our scientific findings will help them make sounder conservation policy."

With the increasing numbers of great green macaws appearing in our area over the last year, we have started a project to understand this endangered and understudied species. One such study is a feature story in this issue (Page 3). We'll be excited to see where our research leads in efforts to save it. As well, we'll continue to develop partnerships with Costa Rican researchers studying the greens. Further funding is needed to continue to keep this project and other projects running!

COTERC would like to thank former Board members, Tom and Fran Mason, for donating space at the Canadian Pet Expo in November. As well, we have to thank Pennie Mason for the wonderful donation of quality pet items for us to sell at the Expo. The monies from this endeavor will go to help fund station projects. This is warm-hearted generosity by the Masons, who have been assisting COTERC/CPBS since its inception. Thanks so much from all of us!

"This is warm-hearted generosity by the Masons."

And speaking of funding, we want to thank all who came out for this year's Fiesta Verde. Tax receipts for those who made donations will be in the mail shortly. With our formal goodbye and honouring of Marilyn Cole, our founder, we now forge ahead to reformulating Fiesta Verde into a different style of event and to pushing our funding efforts in different directions. We are working to define COTERC's future trajectory, and continuing to evaluate our short, medium, and long-term goals. Recently, Steve Gillis, previously a volunteer, has joined us as a Board member. We are excited to work with Steve and his work on funding packages. Currently, there are a couple of Board positions open. If you are interested, or want to assist as a volunteer, please contact me at siteservices@coterc.org or kym.snarr@utoronto.ca

Do volunteer in Canada or at the station, or feel free to make a donation to COTERC at http://www.coterc.com/donate-now.html. All donors receive a tax receipt. I wish all of you a safe and productive 2018, and hope to hear from you personally about what you can do or your views on the path forward for COTERC.

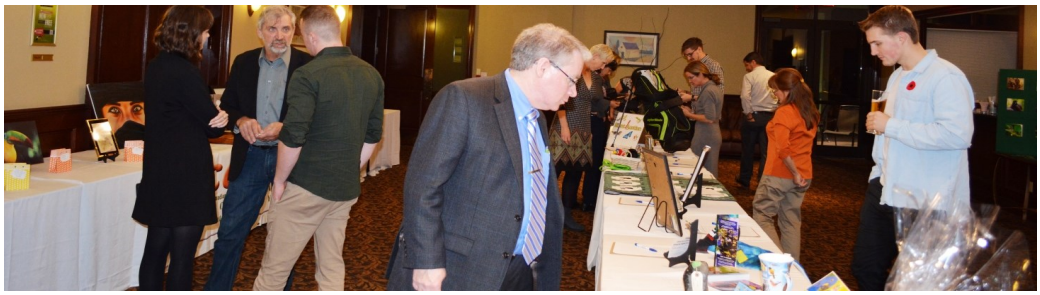
Fiesta Verde 2017 by Megan Joyce, organizer and COTERC Board member

Despite Saturday, November 4th being a brisk fall evening, an enthusiastic group came together for our Fiesta Verde dinner. Attendees came from all over the GTA, southern Ontario, and New York and Pennsylvania!. We even had someone from Switzerland!

While the event brought us together to celebrate the life of COTERC's founder, Marilyn Cole, it also gave us a glimpse into the future of the organization as well as a look into station life and some of the research being conducted at Caño Palma. Molly McCargar, the evening's guest speaker, related her involvement and experiences at Caño Palma, and introduced us to her PhD research in conservation genomics that focuses on nesting sea-turtle populations.

Jamie Reaume played a lively acoustic guitar while we all tried to outbid one another on some great silent-auction items as well as rig the art draws in our favour. A delicious dinner was served by the attentive staff from the venue. Tom Mason and Kymberley Snarr spoke about Marilyn, her achievements and their experiences at the station. Patrick Traynor created a short movie that allowed us to appreciate the beauty of Caño Palma and see how Marilyn's tropical dream had been realized. The evening concluded with Andrew Morris conducting an auction, entertaining us with a comedic talent that had the audience rolling in the aisles – well maybe not rolling but at least slapping their knees.

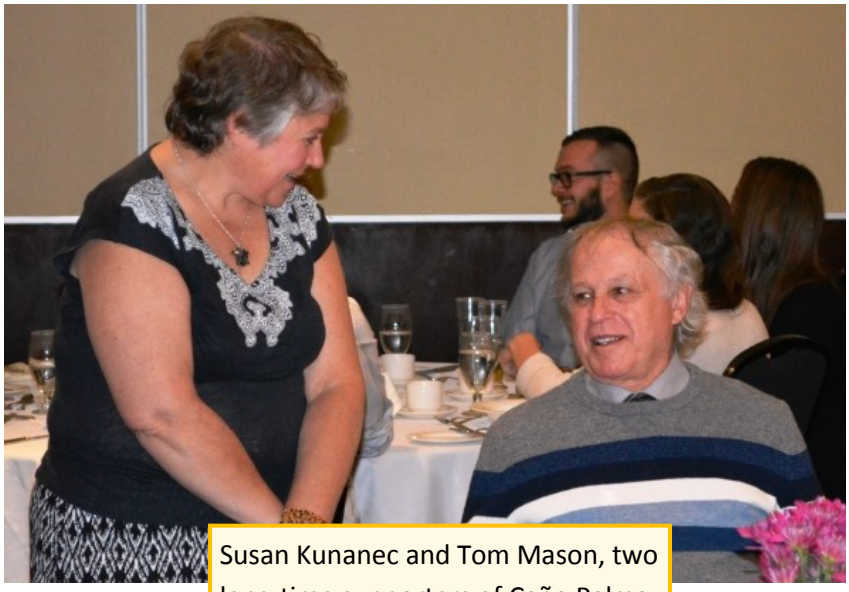
I also have to thank all those whose hard work made the evening possible. Our event committee of Kirstin Silvera, Shenique Turner and Patrick Traynor worked so hard brainstorming, planning and organizing the event. To keep the evening running smoothly, they worked with an energetic group of volunteers that included Emily Lacey, Reiko Peter and Shelley Hutchinson. Finally, our Board would like to thank all the COTERC members and enthusiasts whose generosity and support greatly assist us in keeping Marilyn's mission alive.



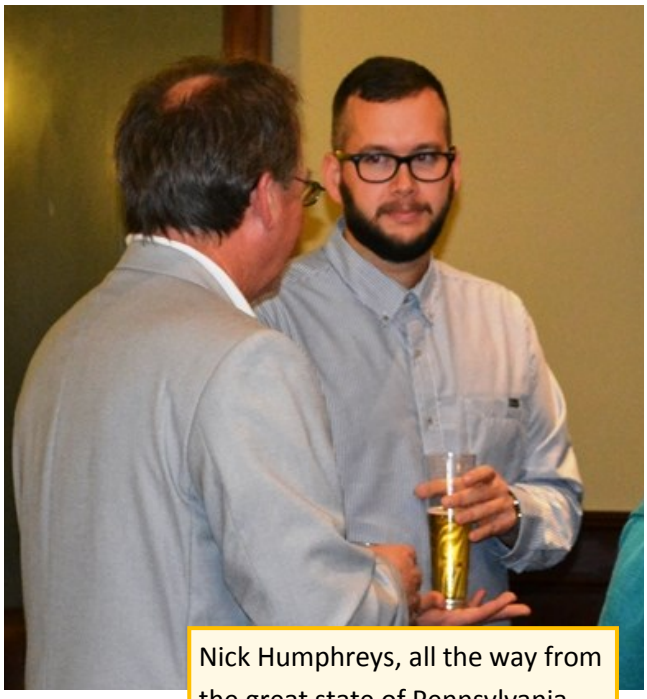
COTERC would like to thank the following for their generous donations that will assist in furthering the research we do at Caño Palma.

Pennie Mason	**Kymberley Snarr**
Jerry Draper	**Patrick Traynor**
Barry Kent Mackay	**The Royal Ontario Museum**
Kathy Parker	**Bird Kingdom Niagara Falls**
Susan Kunanec	**Ripley's Aquarium**
Joanne Smith	**The Toronto Zoo**
Mary & Brian Joyce	**Maple Leaf Sports & Entertainment (MLSE)**
Chad Day	

Fiesta Verde 2017



Susan Kunanec and Tom Mason, two long-time supporters of Caño Palma



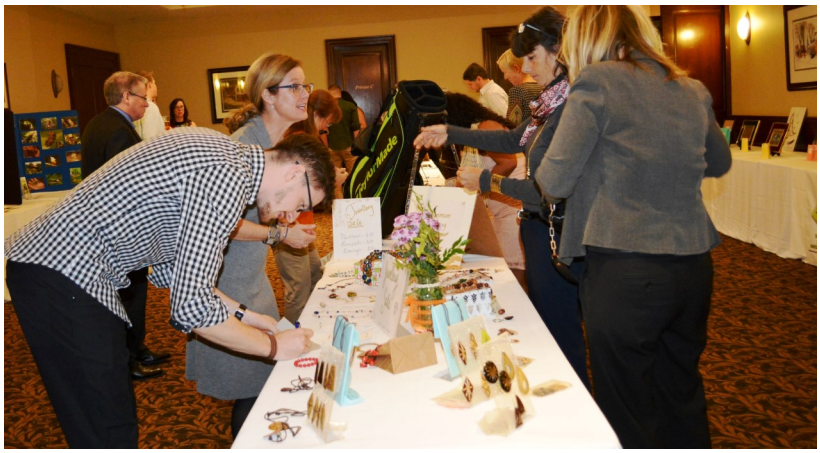
Nick Humphreys, all the way from the great state of Pennsylvania

Molly McCargar, our guest speaker, is a former research coordinator at Caño Palma. She is presently working on her PhD at Fordham in NYC.

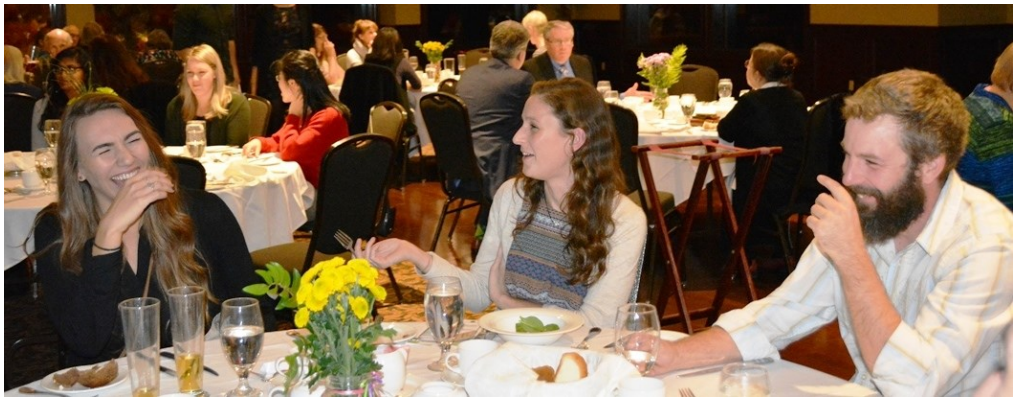
Photos by Joanne Smith

Fiesta Verde 2017

Molly McCargar & Kym Snarr, COTERC president



Auctioneer Andrew Morris showing Megan how to do the macarena

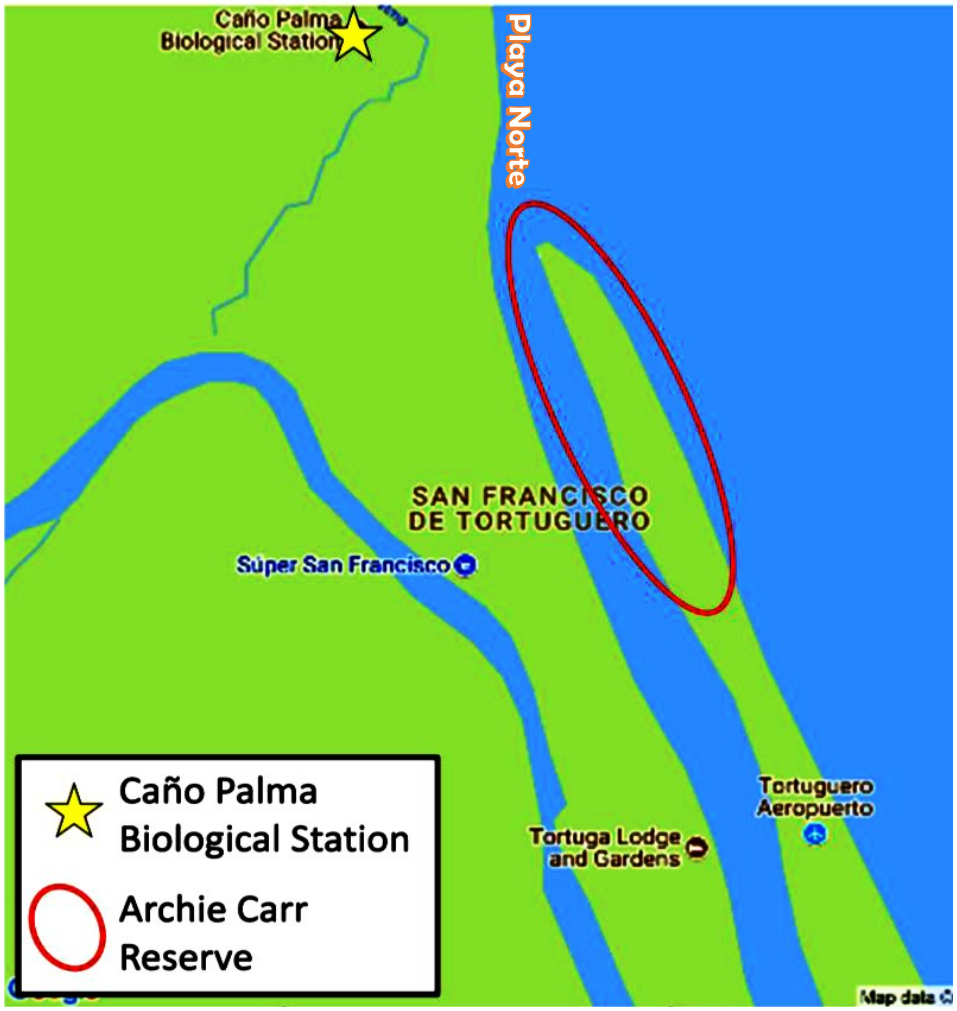


Station Happenings

taken from Research Coordinator Anna Harris's reports

October

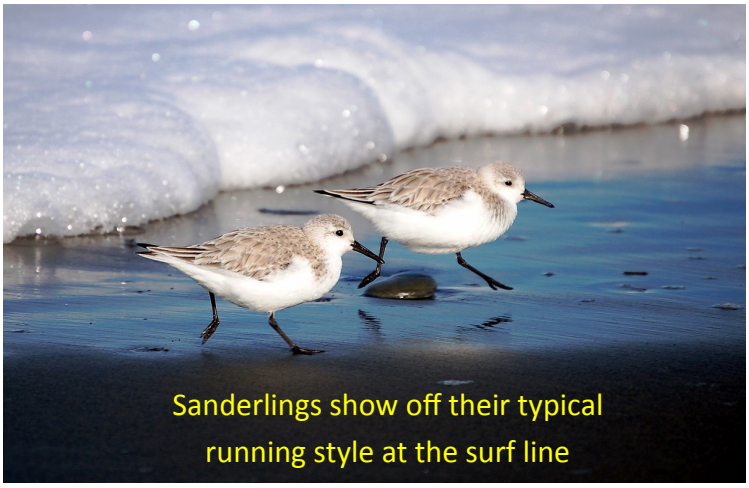
Anna reports: As of September, we've expanded some of our surveys to include the **Archie Carr Wildlife Refuge**. As you can see on the map, the Refuge is located north of the Tortuguero airport, just on the other side of the river that separates Playa Norte and Playa Tortuguero. This will help expand our knowledge of the Tortuguero area. So, being the first to provide this baseline data to the management group of the Refuge is really special and having another area to collect data from is definitely a plus. In October, we finished tagging and measuring all the trees in our tree plots in the Refuge, and now we look forward to going out and identifying them all. Clearing of the mammal transect is nearly complete. And macaw surveys have been successfully running since last month.



Macaw survey - Great green macaw sightings were quite high this month at 661 compared to 465 the previous month. Tortuguero had the highest number per survey - 25. Scarlet macaw sightings were down significantly at 122. The Cerro had the highest

Marine Debris Survey - Following on September's record low of 942 items collected. October saw an even lower number at 731. Of these, 708 were plastics. The width of the beach, determined by the high-tide line, may play a big role in the amount of items collected. This month's width was 77 m., less than half the typical width during marine-debris collection.

Neotropical river otter survey - The purpose of this survey, included in the monthly report for the first time, is to monitor the abundance and distribution of this otter species, which is currently listed as **Near Threatened** by the IUCN. We also aim to gather more information about their preferred habitat conditions. This survey is conducted by kayak and takes place in 4 transects: Caño Palma North, Caño Palma South, Laguna Cuatro and in the Tortuguero NP canal system. Since coming across an otter is rare, we use their scat as an indication of their presence. Otters use scat to mark their territory - so each log with scat on it means an otter is present. At each scat pile, habitat conditions such as water depth, canopy cover, and turbidity are measured, and the age of the scat is noted.



Sanderlings show off their typical running style at the surf line

Shorebird monitoring - Sanderlings were the most observed bird with 81 sightings.

Station Happenings (cont'd)

November

Many long-term volunteers left the station the station this month:

Linda Dahlstrom (Sweden) - Linda has been interviewing residents of San Francisco to get their input for a plan that could help in developing tourism in the area. This project will help Linda in her pursuit of a Master's degree.

Helen Pheasey (United Kingdom) - Helen has had a lot of experience at Caño Palma doing research. She will now be moving to the Pacific side to continue her PhD research. However she will be returning to Caño Palma in early 2018.

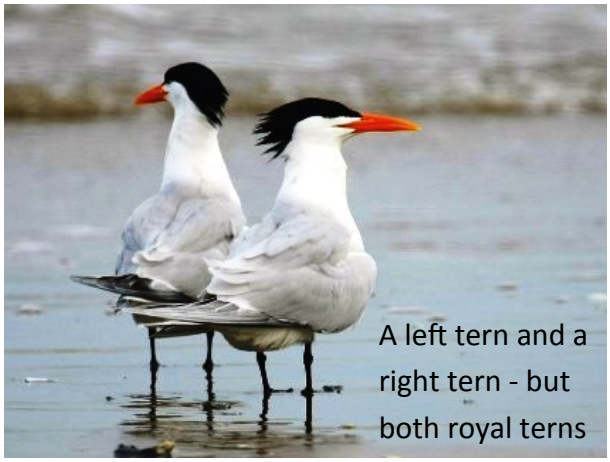
Jimena Gutierrez (Mexico) - After a stint as Caño Palma's turtle project coordinator, Jimena will be moving all the way to Tortuguero to take the position of visitor-center coordinator at the Sea Turtle Conservancy.

Jess Hedgpeth (Colorado, USA) - This was Jess' second time at Caño Palma, this latest spell as the turtle project coordinator assistant. She now plans on gaining more field experience before getting into a graduate program with hopes of being accepted into a lab focusing on sea-turtle research.

Nolan Catholic High School (Ft. Worth, Texas) - For the second consecutive year, Nolan came to the station to learn what happens at a tropical research station such as Caño Palma. After an overview of our monitoring programs, the students broke up into groups and spent their morning learning about the turtle project, finding tent-making bats, identifying aquatic macroinvertebrates under the microscope, and watching the tagging of a coral snake.

Marine-debris survey - After a couple of months in which the amount of debris collected from the transect was quite low - 942 in September and 731 in October - this month's survey jumped back up to 4372 pieces. Plastics accounted for 4190 items, or 96%.

Macaw survey - The number of sightings this month was relatively low at 344. However, this includes one observation of 19 scarlet macaws gathered in one place. This is the largest group ever observed on our surveys. This occurred at Caño Palma.



A left tern and a right tern - but both royal terns

Shorebird Monitoring - This month, the bird with the highest number of sightings was the royal tern.

Snake survey - The Halloween snake (*Pliocercus euryzonus),* pictured below right, led the parade of captures this month with 4. Usually called Cope's false coral snake, it has obviously gotten the name Halloween snake from its colors. And it's a false coral snake because its pattern mimics the venomous coral snake, warning predators that it could be toxic. Though harmless itself, if caught, it readily "drops" its tail much like lizards do. Unlike most lizards, the tail does not regrow.

It occurs from Nicaragua south to Columbia and Ecuador. According to the IUCN, it's absent from the Pacific half of Central America down to near the Panama Canal. In Costa Rica, it prefers moist forests.

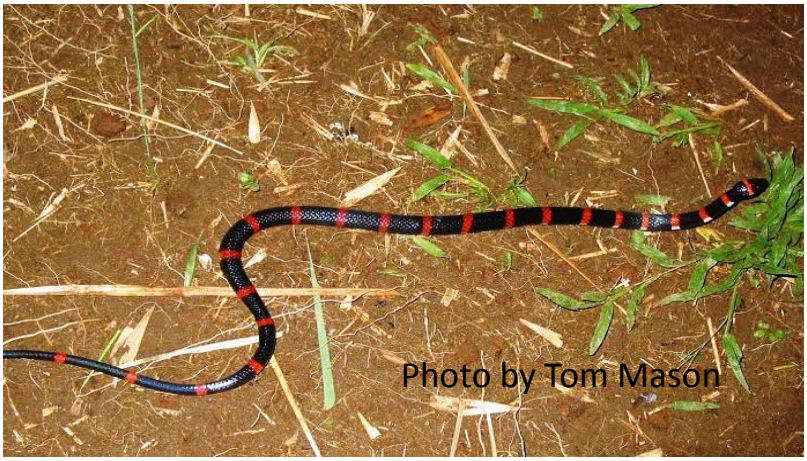


Photo by Tom Mason

Station Happenings (cont'd)

December

Great green macaws - 1024. That's the number of visual sightings of greens this month, and the average number of sightings per survey was much higher than the averages of the previous three months. (Note: 1024 is not the number of individual birds as the same birds could be seen many times.) Maybe the most exciting number was the 44 greens observed in one group on the Cerro. The previous high for a single group was 19 last month. This may indicate that the number of greens is increasing, but another survey similar to Mathieu Jegu's will have to be done first. In the Spring issue, Anna Harris, the research coordinator, will give us a brief rundown on why the number of greens observed has been fluctuating so much in our surveys.

Marine-debris survey - The downward trend continued this month as 2830 items were collected from our transect. Compared to the numbers at the bottom of Page 7, this is one of the lowest counts on record.

Weather - Though it's the rainy season, precipitation was down substantially vs. last year - over a 50% decrease.

Snakes - Of the seven snakes collected and processed this month, one was a fer-de-lance, found on the Cerro.

Jane Mariotti (Canada) - From Windsor in southeastern Ontario, Jane showed great leadership in all our projects, especially otters.

Estelle Grosjean (Switzerland) - Through her 6-week stay, Estelle took part in all things turtle.

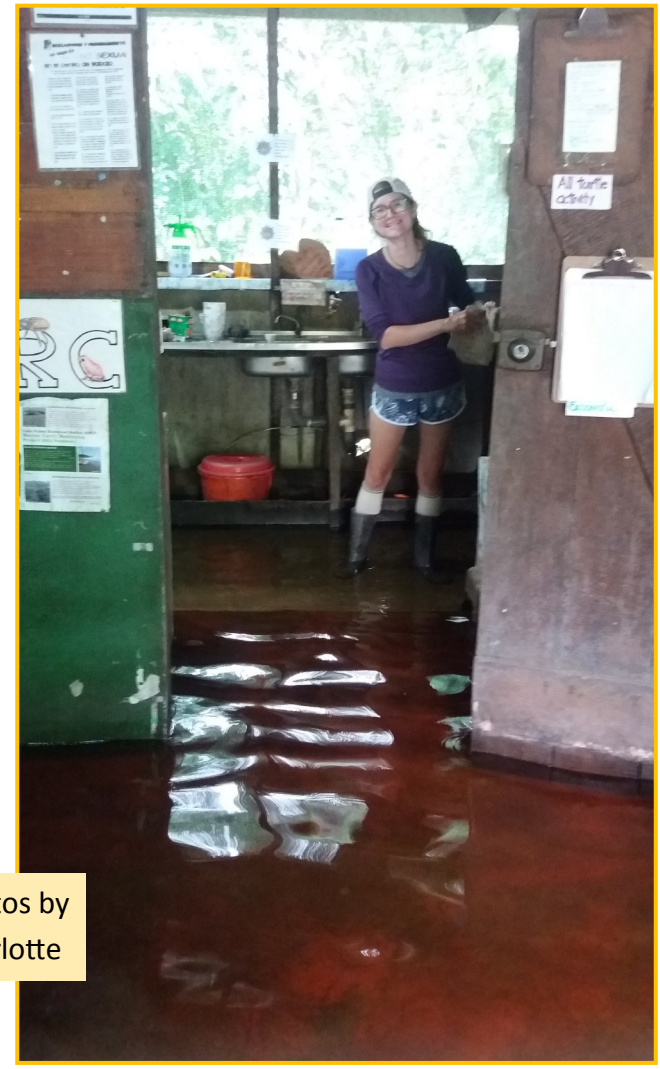
Chantel Dubiel (Canada) - Like Estelle, she came to Caño Palma to volunteer on the turtle project. But, with turtle season winding down, she discovered a passion for snakes, and spent a lot of her 6 weeks doing snake survey and snake processing.

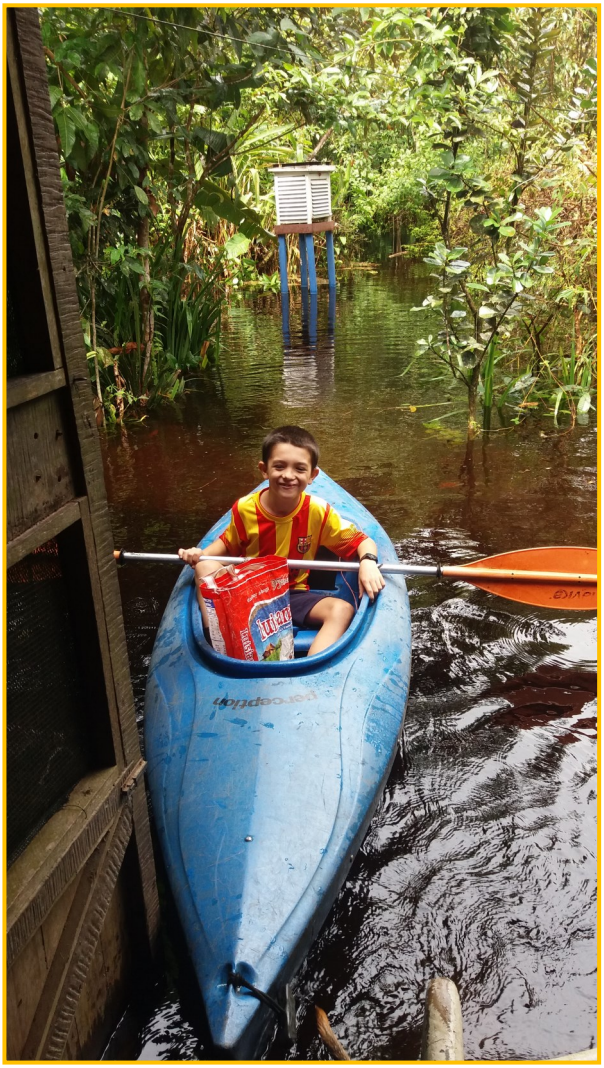
Jeremy & Vincent Dravet (France) - Vincent is making his return to the station after a 6-year absence. However he came back the hard way - riding his bike from Quebec City on his way to Argentina. Accompanied by his brother Jeremy, they are doing this long cycling journey to raise money for heart surgeries for African children. While at Caño Palma, they pitched in and worked on various projects and surveys. If you want to read more about their travels, you can go to their Facebook page https://www.facebook.com/TheBikingBrosHeart/

At the station- Jeremy, Chantel (Canada), Chris (Netherlands), Jane (Canada), Anna (USA) and Vincent.

On the road

January Flooding





Photos by Charlotte

Raphia

Winter 2018

Happy in Costa Rica

How can things appear so bleak in Honduras when, so short a distance away, Costa Ricans are ranked as one of the happiest peoples on the planet? In fact, if you look in the November 2017 National Geographic (pages 38-39), Costa Rica is ranked #1 on their Atlas of Happiness. The next 3 countries are all European – Switzerland, Denmark and the Netherlands. https://www.nationalgeographic.com/magazine/2017/11/worlds-happiest-places/

But, you say, how in the heck can National Geographic tell us what a country's feeling? It's all explained in the Geographic's cover story "The Search for Happiness" by Dan Beuttner, who has previous writings on health, happiness and longevity. To rank countries, he uses data from the Gallup polling organization, which, annually in 140 countries around the world, asks people questions that explore their level of happiness. For this article, he zeroes in on five categories, and when he put those categories together, Costa Ricans came out on top. So what are the ingredients needed to bake the happiness cookie, Dan?

1. Lots of socializing. "The happiest people in the world spend a whopping five to six hours a day socializing face-to-face with people they like and with whom they can have meaningful conversations. By contrast, Americans merely socialize for an average of 41 minutes a day and it's unlikely Canadians socialize much more than that.
2. A sense of purpose. That means living a life with meaning; and doing interesting things.
3. A sense of physical well-being. "Health and happiness are inextricably linked." You're unlikely to be happy if you're clinically depressed or suffer chronic pain.
4. Engagement with your community. Happiness is increased by volunteering and having a group of friends who are committed to supporting each other for the long term.
5. Financial well-being. If you have a feeling of security, you feel less stress. But can money buy happiness? Up to a

(Cont'd on next page)

Hapless in Honduras

No doubt the presidential election held in Honduras on Nov 26th resulted in a fraudulent vote. The election pitted the sitting president **Juan Hernández** against **Salvador Nasralla**. The day after the election, the Supreme Electoral Tribunal (TSE), which is effectively controlled by Hernández's National Party, announced that the challenger Nasralla, with 57% of the votes counted, was leading by 5%. At that point, the TSE suspended counting for 36 hours. And wouldn't you know it, when the TSE resumed updating the count, Hernández started to pull ahead. The final results show Hernández winning by 1.5%.

2009 Referendum – Things started to go funny in 2009 when then-president **Manuel Zelaya**, a leftist, wanted to alter the nation's constitution and proposed that a referendum be held to decide if a constitutional convention should be assembled. The Honduran Congress, members of Zelaya's party, and crucially the Supreme Court said this was unconstitutional. Some saw it as an attempt by Zelaya to change the constitution's permanent ban on presidential reelection so he could run again. Zelaya refused to accept the Supreme Court's finding that what he was doing was illegal and continued plans to go ahead with the referendum. On the day of the referendum, the Supreme Court ordered the military to detain Zelaya. Upon capturing him, they flew him into exile in Costa Rica.

2013 Presidential Election – Hernández became the candidate of the right-wing National Party. Of course, Hernández being Hernández, even the party's nomination was not accomplished without some shenanigans taking place. One of his opponents appealed Hernández's dirty tricks to the Supreme Court. But Hernández had, one month earlier as the president of the legislature, orchestrated the replacement of four Supreme Court justices with people he could rely on to do his bidding. The Supreme Court rejected the appeal. As for the presidential election itself, despite evidence of fraud, the UN and the EU said the voting process had been transparent, free and fair.

2017 Presidential Election – As previously noted, the 2009 referendum was halted because (Cont'd on next page)

Happy in Costa Rica (Cont'd)

point as research shows that beyond a certain level of income, and that level is relatively low, money doesn't buy more happiness, only more stuff - and stuff usually only brings fleeting happiness.

Costa Ricans do so well because they rank high on four of the above five categories. Only on financial well-being do they score low. Yet they make enough to meet their needs. And it all comes together to allow them to enjoy life day to day. This is how Buettner summed Costa Rica up after spending lots of time there:
"People experience life best in Costa Rica. It's green. There's easy access to nature. And there's a feeling of equality as everybody has their basic needs covered. They prioritize social interaction, and they will almost never work extra hours if it means they have to forego a good party. They also prioritize family – Sunday afternoons are spent with family and big long lunches. They are also religious, and research shows that religious/spiritual people are happier."

How about tips to make ourselves happy, Dan. Got any of those? Sure. Volunteer, even if you don't think you have the time. People who find ways to give back are happier. Do your best to sleep 7.5 hours a night. And make friends with people who like to laugh. Or at least people who find you funny.

Hapless in Honduras (Cont'd)

it was thought that then-president Zelaya could possibly change the constitution to allow himself to run again. So how come Juan Hernández was running in 2017's election if he was the sitting president? Well, the Supreme Court ruled that the constitutional articles implementing term limits on a president violated the president's human rights. Apparently the justices wrote this without laughing at the irony of it all.

Protests in Tegucigalpa

Now back to the 2017 election. The EU as well as the Organization of American States are concerned about the level of fraud that took place. Street protests have been ongoing. Many people have been killed and the UN has condemned the excessive use of force.

The TSE, as expected, denied the opposition's appeal to annul the election results and hold a new election. Seven weeks after the election, demonstrations continue across the country.

DD

- In all of Latin America, Honduras has one of the lowest per capita incomes – 66% of its citizens live below the poverty line of US$180. In addition, Honduras has one of the worst income distributions.
- The abuse of human rights in Honduras is formidable: abuse by police and the military including murder; 'harassment' of journalists (I use quotes because over 40 journalists have been killed since 2009); trafficking in drugs and people; excessively long detention without trial; intimidation and abuse of people who stand up against human-rights abuses; child labor; frequent disregard of the rule of law; and corruption.
- Honduras has the highest homicide rate in the world.

COTERC receives no government funding and depends on your generosity to continue our work. Please consider making a donation. You can make a one-time donation or arrange for a monthly withdrawal easily through Canada Helps. Just go to their website

https://www.canadahelps.org/en/donate/

Click on "Find a Charity"

Type in COTERC and then follow the instructions.

Whether the amount is $5 or whatever, your donation is greatly appreciated - and Canada Helps issues a tax receipt directly to you.

COTERC would like to thank the following individuals for their generous donations over the years. that will assist in furthering the research we do at Caño Palma.

Pennie Mason	Michelle Hunwicks
Jim Taylor	Rob Hamilton
Lillian & Larry Hall	Lauren Stewart
Susan Kunanec	Durham Region Aquarium Society
Vanessa Phelan	

We would also like to thank Microsoft for the donation of MS Publisher and Windows 10 software.

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