

RAPHIA

Newsletter of Caño Palma Biological Station



**Our
Interns
Took
This**

**And Turned It Into This
-- Twice** (see pages 6 & 7)



Photos by Sable
Summerfield

**Plus Much More
On Poaching**

Canadian Organization for Tropical
Education & Rainforest Conservation



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Aberdeen Hall, a school in Kelowna, British Columbia, recently sent COTERC a letter from the Grade 1 class taught by Mrs. Pighin, telling us about their fundraising efforts on behalf of rainforest conservation and Caño Palma. This isn't their first such contribution. And we always receive hand-written letters from the students. The letter on Page 3 from Brynn Bertolatti has some questions we'll try to answer. Thanks to all the Grade Oners. You can be assured the money will be put to good use at the station.

Let's move on to older students who've been to Caño Palma recently. For them and anyone else who's been there, poaching is a subject we're all familiar with. It may be the robbing of eggs from a turtle nest for resale. Or it may be the snatching of a live turtle from the beach. We of course try to do all we can to deter poaching. Some of you probably helped Helen Pheasey in her research efforts (see Page 13). Or you've worked with Molly McCargar doing excavations. I certainly have and can attest that it's darn hard work out in that blazing hot sun. All your efforts are greatly appreciated.

Not too long ago, we had two occasions where interns came to the aid of green turtles that were being poached. Those tales appear on Pages 6 and 7. Special thanks go out to Dan Khieninson, Sable Summerfield, Aina Pons, Uli, Savannah Neb and all the others who helped free the greens from their incarceration and direct them back to the sea. Maybe someday they'll return to lay more eggs and we'll have shortened the odds a little bit on the survival of this endangered species.

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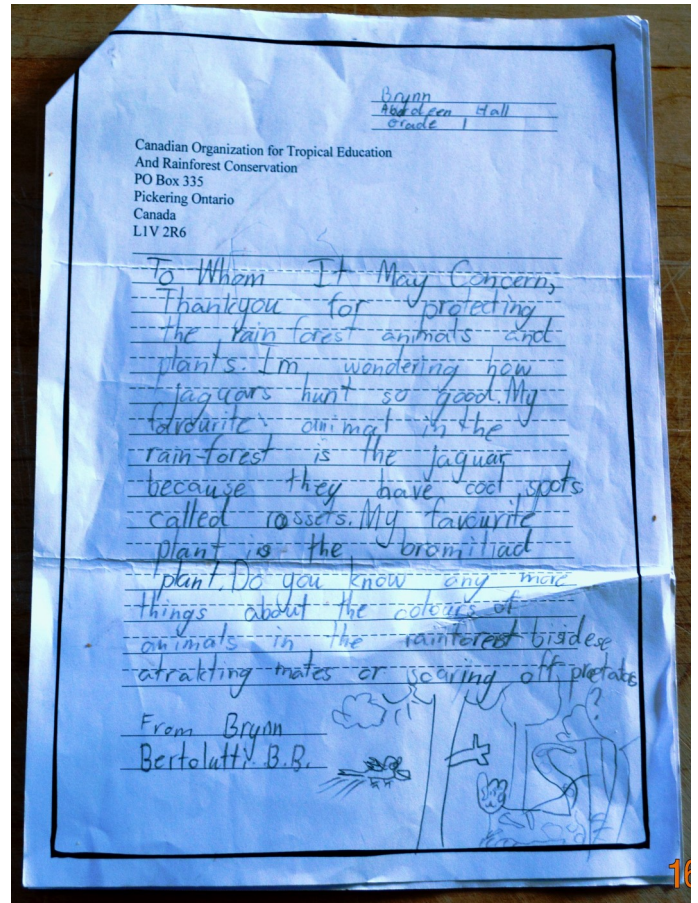
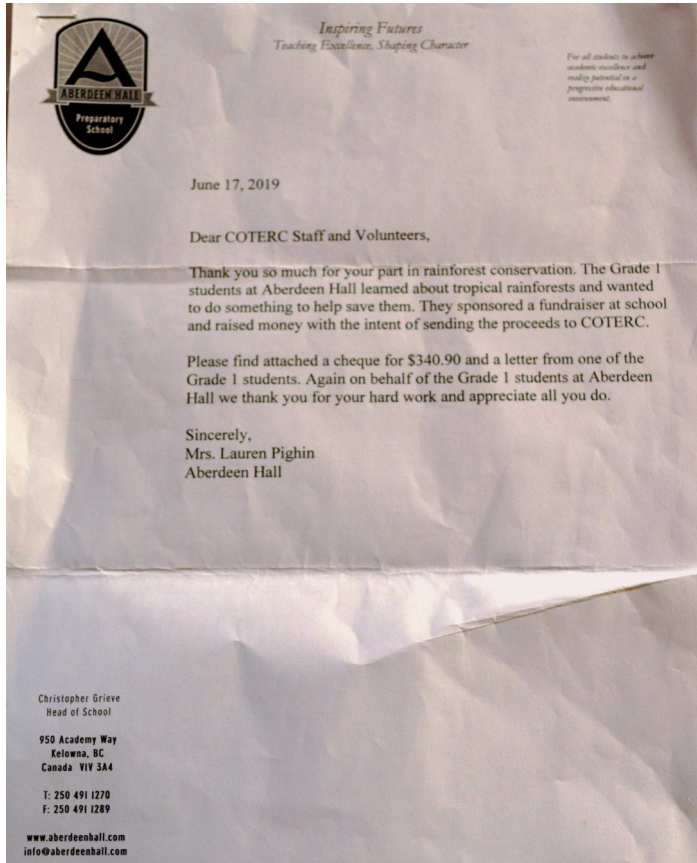
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Saving the Rainforest at Aberdeen Hall



Dear COTERC Staff and Volunteers

Thank you so much for your part in rainforest conservation. The Grade 1 students at Aberdeen Hall learned about tropical rainforests and wanted to do something to help save them. They sponsored a fundraiser and raised money with the intent of sending the proceeds to COTERC.

Please find attached a cheque for \$340.90 and a letter from one of the Grade 1 students. Again on behalf of the Grade 1 students at Aberdeen Hall, we thank you for your hard work and appreciate all you do.

Sincerely
Mrs. Lauren Pighin
Aberdeen Hall

From Brynn Bertolatti
Aberdeen Hall student

To whom it may concern:

Thank you for protecting the rainforest animals and plants. I'm wondering how jaguars hunt so good. My favourite animal in the rainforest is the jaguar because they have cool spots called rosettes. My favourite plant is the bromeliad plant. Do you know any more things about the colours of animals in the rainforest besides attracting mates or scaring off predators?

Raphia Tries to Answer by Doug Durno



**Jaguar on the beach
at Tortuguero**

Let's see if we can answer Brynn's questions from his letter on the previous page:

A. How do jaguars hunt so good?

First of all, jaguars are fast and agile, being able to turn very quickly. They can chase down their prey at speeds up to 100 kilometers per hour. But they can only keep that speed for a short distance. So jaguars have learned to be slow too. That is, they show great patience, slowly sneaking up on unwary prey and attacking from their quarry's blind spot.

For hunting, jaguars are helped by their camouflage, blending in to their surroundings. They also climb trees to ambush prey that walks by. They're good leapers, capable of quick, long jumps.

They hunt any size of animal from a 2-pound armadillo to 1000-pound cow.

They're just as at home in a wetland as a forest. They might hunt from shallow water or even catch fish by swiping them onto the shore with their paw. They're quite good swimmers, even able to swim underwater as this video shows - <https://www.theguardian.com/world/video/2015/may/06/jaguar-swims-underwater-during-feeding-video>

Though jaguars will kill by biting the throat or neck of prey as other big cats like lions and tigers do, jaguars will often go for the skull. This demands enormous crushing power, and jaguar jaws are indeed powerful. We see this around Caño Palma. Local jaguars are known to prey on green sea turtles though most kills are done by biting into the neck rather than cracking open the shell.

B. Animals in the rainforest use colors to attract mates and to scare off predators. But how else do animals use colors?

1. **Camouflage** – The black rosettes that Brynn talks about combine with the jaguar's orangish colour to give excellent camouflage in the blotchy light of a rainforest. Interestingly, some of the jaguar's prey can't tell the difference between red and green. So they see the jaguar as green, an even (cont'd on next page)

Raphia Tries to Answer (cont'd)



better camouflage than orange. So why hasn't the jaguar evolved to have green fur? Well, mammals aren't capable of producing it. Only one mammal has green fur and that's another rainforest dweller - the sloth at left. But sloths don't actually grow green fur. Rather green algae grow on their fur, providing them with camouflage.

Now let's look at a potoo, a rainforest bird that has one of the best tricks to make itself disappear -- it blends right in with a branch. Try to pick the potoo out of the photo at right. Are you stumped?



Potoo

2. **To protect their territory** – Hummingbirds can keep other birds out of their territory by flashing their shiny colours at intruders.

3. **Melanin** – This is a substance (pigment) that produces dark coloring in bird feathers. Feathers that contain melanin are almost 40% more resistant to wear than those that don't have it. The feathers that have to be the most durable are the wing feathers. They can wear out quite quickly because they're always flapping during flight. So, when you see a gull or a tern (like the royal tern at right) on the beach at Caño Palma, it's likely to have dark feathers on the outer part of the wing to give those feathers a longer life before they have to be replaced.



Royal tern

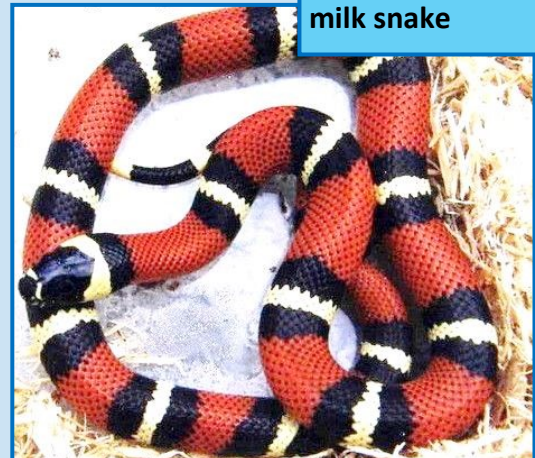
Strawberry poison-dart frog -- also known as the blue-jeans frog



4. **To advertise that they're poisonous** – Predators learn that bright colors usually mean that such prey is poisonous so shouldn't be eaten. Such is the case with the strawberry poison-dart frog at left. But nature is smart. Sometimes a non-poisonous species will evolve to resemble a poisonous species. For example, the coral snake at left below is poisonous. The milk snake below right is not. But predators mistake it for the poisonous coral snake and so they look elsewhere for their meal – and the milk snake lives on.



Allen's coral snake



Central American milk snake

Green Turtle Rescue #1 by Sable Summerfield

Out on night patrol with my fellow volunteer Aina Pons and Uli, a local lad helping us out, we were approached by a guy on a motorbike. He told us about a turtle that poachers had tied to a tree (below) until they could come back to tote it away. Eventually, he led us down a trail, but he wasn't going to take us all the way. He just pointed and took off. I thought that was a bit sketchy, wondering why he didn't stay and help.

We kept walking down the trail, which was by this point barely detectable in the thick brush. Then there she was, a green sea turtle, hanging by ropes from a tree, upside down, her front flippers tied together as the photo shows. It looked so big, maybe 350 or 400 pounds (170 kg) and about 4 feet (1.2 m) long. Poachers had left her there till they could come back with something to help cart her away.



Sable and Aina

Luckily something had told me to bring my knife that day, something I don't usually do. So we cut her down and the three of us were able to get her flipped over. Then I cut the brush away so that she had a path back to the beach. And there she goes in bottom photo.

The most beautiful moment was when she got out to sea. She breached, threw her head up to take a breath, and then disappeared. At last, she was safe again.

Take a look at Sable's video of the rescue: <https://www.youtube.com/watch?v=teKfUGIBqjE>



Green Turtle Rescue #2 by Dan Khieninson

Because the odds are stacked against the turtles, one of my most rewarding moments was getting to rescue a turtle with Savannah Neb, another turtle-project intern. Before going out on morning census, we were alerted by the previous night's patrol to investigate along the beach where poachers may have lifted a nesting female. Along the beach, Savannah spotted faint marks in the sand. We followed them into the vegetation to find the turtle tied up, gasping for air. After cutting her down, we quickly realized that a panicked adult green turtle in the midst of a jungle was not an easy creature to manage. With the help of some great project managers and a considerable amount of shoving, we eventually got her back to the beach where she could make her own way into the ocean. While it was a lot of stress at the time, looking back on this rescue makes me appreciate the teamwork it required. Because the different patrols communicated with each other, and took the extra time to check on their suspicions, we were able to save an amazing creature. She may return in future years to lay hundreds more eggs, perpetuating a species that has existed for more than a hundred million years.

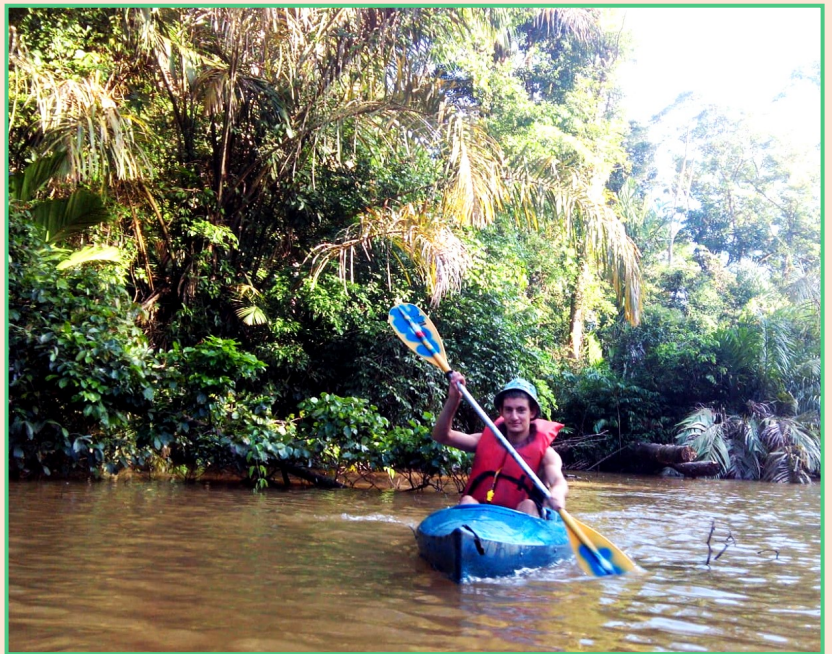
What Sets Caño Palma Apart by Dan Khieninson

Growing up in a rural area an hour north of New York City, Dan's love of hiking and the outdoors eventually brought him into the Bronx to study biology at Fordham. Dan's experience at Caño Palma sparked a passion for tropical ecology. So it's not surprising that Dan wants to pursue a graduate degree in order to learn more about the incredible complexity of tropical ecosystems and how we can protect them. In his spare time, Dan can be found diving deeply into obscure Wikipedia pages, or cooking.

When I first arrived at Caño Palma, I was greeted by the sight of the station emerging from the curtain of vegetation surrounding it. I was struck by the wild beauty of the place, imagining the adventures I would have. Three days later, it was underwater.

Looking back, this is classic Caño Palma, dispelling our preconceived notions in a cloud of raindrops and mosquitos. I originally planned on a six-week trip, but eventually ended up staying over five months because I couldn't get enough of it. What started as a project became more of a lifestyle, one that continually challenged while it taught me.

Life on base consisted of many patrols, each with its own special qualities. Otter survey offered a close-up look at the ecosystem along the canal (5% of earth's biodiversity!) from the trees bursting with epiphytes to the strange-looking birds. Macaw monitoring on the Cerro provided spectacular views, while in the mammal transects we caught signs of rare



(cont'd on next page)

What Sets Caño Palma Apart (cont'd)

charismatic species like jaguar and tapir. The turtle project may have been my personal favorite -- walking the beach at night always provided an experience. While it didn't have the same beauty as some other surveys, night patrol carried an extra sense of urgency. After all, marine turtles face threats at every stage of their lives, from predation in the nest to oceans choked with plastic, not to mention hunting by humans. It's estimated that for every 1000 hatchlings born, only a single one will survive to reproductive age. Because the odds are so stacked against them, that's why the turtle rescue pulled off along with Savannah, and described on the previous page, was one of my most rewarding moments.

After my time at Caño Palma, I went to work on another project in Guanacaste province, observing capuchin monkeys on grueling treks through the rainforest. When I had a few days off, I returned to Caño Palma and it was then that I understood what sets Caño Palma apart from other research facilities. I felt an immediate sense of being welcomed back to the station, both by those I already knew and by the new faces on base. I experienced the sense of community one gets from not only working together, but also dining, living, and even having to evacuate the base with each other. While so much of Costa Rica is beautiful, I was nonetheless struck by how immersed in nature I felt at the station. Finding a place to work may be easy, but an opportunity to join a community and actually live in the system one studies as a biologist is incredibly valuable. Having spent time on both sides of Costa Rica, I learned to appreciate Caño Palma for the unique experience it provides, both professionally and personally.

Seeing the dedication that volunteers from all over the globe bring to the station has inspired me. Maybe I won't be cutting turtles out of trees every day, but Caño Palma taught me to care more about the setting I find myself in, whether it be the tropics or back home in rural New York. This can mean stopping to clean up a local beach or taking time to teach children why the forests matter.



Notes from the Station by Charlotte Foale

As we look ahead to what the New Year will bring, and where our focus needs to be, we naturally look back over the past year for lessons we can learn.

For the last half of 2019 and into 2020, we're working with a new staffing model. As the number of full-time projects has grown, we've moved away from having one Research Coordinator into a split role. This way we can look at how to get the most out of our long-term data, and guide interns toward subprojects that contribute new knowledge to assist with local area management. We welcome Alessandro Franceschini as coordinator of plant and mammal projects, and Charlie Pinson as our coordinator of herps, including turtles. An ornithology coordinator will complete the team, hopefully early in the New Year!

Every year we look at the value of the projects we run, and how they can be improved, or whether they need to be eliminated. One project that always causes great debate is the turtle project. While it's the project in which we have the most immediate and demonstrable conservation impact, it's an emotional roller coaster since we often feel as though our efforts are in vain. New poachers come to the area, and poaching techniques are adapted to work around protection efforts, and everyone's mood slumps.

Then something happens.

A turtle is rescued by a patrol.

A local calls to let us know where active poachers are attempting to take a turtle, and our team changes direction, causing the poachers to abandon their efforts.

MINAE calls to let us know that they've caught a poacher.

And we know, that however many turtles the poachers take, we're saving the lives of those we do work with.

This year we had the privilege of a visit by Matt Scandrett, a criminology lecturer at London Metropolitan University. He was conducting interviews with locals, and our Community Coordinator assisted with translation. On the first day, I was fortunate to sit in on one of the interviews, and while much of the information wasn't new to me, there were some things that surprised this cynic. I heard Matt talk of the impact that environmental education had had personally on him, introducing concepts he'd not previously considered, and convincing him to pursue employment in tourism. While he spoke of people who collect money both from tourism and from poaching, he was enthusiastic to share strategies to help further decrease this. He also spoke of the changing motivations of poachers -- people who are poaching to sustain themselves are decreasing, and being replaced by those sustaining their addictions.

Looking at local stats year by year, you see ups and downs. When we have enough volunteers and interns to host 3 teams a night, poaching goes down. On nights when MINAE, the police or coastguard are on the beach, poachers are absent. We were heartened to hear just before Christmas that a new prosecutor has been assigned to the area with the exclusive assignment of prosecuting environmental crimes. Hopefully this means that consequences for being caught poaching will be more than a slap on the wrist.

How much good we can do on the beach and in the school depends largely on people like you. People who come here to volunteer, walk the beach and help us to cover larger stretches for more hours. People who donate items to the station so that we can divert funds to replace equipment and improve the base infrastructure. As we move into 2020, we continue to be grateful to you all, and continue to need your support. So, THANK YOU, and if you can't come back yourself, please let others know how valued their help will be at Caño Palma.

Notes from the Chair by Kym Snarr



The winter season is upon us here in Canada. Currently, I can see the snow softly falling on the ice-covered trees with so many downed branches that have to be cleaned up after last weekend's record-breaking rainfall, flooding, and dramatic ice storm. The COTERC Board's Annual Retreat was postponed due to this weather event. We don't need to look too hard to see evidence of the changing climate patterns across the globe brought about by anthropogenic causes – devastating fires across Australia, 2019 the 2nd hottest year on record, and melting ice caps and glaciers. As I reflect on the changing patterns, I think about Caño Palma Biological Station and its location at sea level. Yes, there are changing sea levels and the station certainly has experienced rapid flooding over the years. While elders in the area consider this as part of normal patterns, we at the station have to look at weather patterns to assess the changes. Since we have been monitoring weather at the station since 2004, we need to look more closely at that 16-year time period to look for trends.

Looking for trends in the data – that's an emerging theme in the long-term monitoring projects in place at the station. (You can find an overview of these projects at <http://www.coterc.org/long-term-monitoring.html>.) And in fact we are doing trend analysis. For example, there's the 10-year analysis of green sea turtles titled: *Laying on the edge: demography of green sea turtles (Chelonia mydas) nesting on Playa Norte, Tortuguero, Costa Rica*, authored by two marine demographers and two former staff, Helen Pheasey and Luis Fernandez. As well, there's the three-year analysis of spectacled caiman titled: *Analysis of population density and distribution of spectacled caimans (Caiman crocodilus) in Caño Palma, Northeast Costa Rica*, authored by station staff, Luis Fernandez, Manual Arias and Emily Khazan. Over the next few years, more analysis of our long-term monitoring projects will take place to help inform the various audiences of any trends. And by evaluating trends, we can also begin to assess changes in patterns in the flora and fauna of our region.

As well, we continue to enhance the monitoring projects, which allows for improvements in data collection and capturing needed data. One coming development is the ongoing large-mammal monitoring project, which continues to evaluate mammal populations. Since its inception in 2007, the mammal project evolved into a sustained project with multiple transects, and it continues to evolve. To enrich the project, potential changes would involve the evaluation of human presence in the transects and the incorporation of improved methods for evaluating population numbers. Understanding anthropogenic impacts to all monitoring projects is critical and needs to be captured with recognized methods.

Speaking of mammals, this edition of *Raphia* covers the topic of poaching. Thinking of wild meat and hunting in general, I think about the moose roast I marinated and shared during a New Year's celebration with family and close friends. This culturally desired consumption of wild meat was legally obtained by a team of licensed hunters who were successful in a tag lottery run by one of the managed provincial hunting units. This management has allowed legal hunting to occur while sustaining population numbers of wild moose across Ontario. The lottery system allows non-indigenous hunters to continue the sport of hunting and to have a sustainable, managed source of culturally desired wild meat. This desire of wild meat around significant holidays is common across the globe. As I reflect on this, I think about illegal wild-meat (cont'd on next page)

Notes from the Chair (cont'd)

hunting in the region where the station is located. Former Laurentian University students in a field course headed by myself produced a report on poaching of species in the area of the station. Through a combination of basic population evaluations and ethnographic data, we found most poaching in the area to be for household consumption with some commercial sale of wild meat, mainly that of the green sea turtle (*Chelonia mydas*), lowland paca (*Cuniculus paca*), and peccary (*Pecari tajacu*). This commercial sale appears to be associated with changing socioeconomic pressures, a 'fall-back' career during times of job scarcity. While most of Costa Rica has enjoyed steady economic expansion and development into a middle-income country, the area where the station is located continues to experience the 'boom/bust' cycles of economic reliance on natural-resource extraction and tourism. Rates of poaching likely follow these boom/bust cycles as well. The importance of the consumption of wild meat globally is recognized and has been evaluated for its ecological and socioeconomic impacts – see: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>. COTERC will continue to fulfil its mandate of delivering evidence-based information on local biodiversity.

On the Board front, we welcome a potential new member, Luis Fernandez, former assistant Research Director (2014-2015, see <http://www.coterc.org/station-staff---past-and-present.html> and scroll down). I've already mentioned the importance of his work at the station as evidenced by his publication contributions. As he currently resides in Ontario, we welcome his desire and energy and wish to become involved with the Board, contributing his experience and knowledge of the station to Board activities. We continue to welcome former Board members and station volunteers, and anyone who has a desire to help out in Canada, to reach out to us (chair@coterc.org) and discuss how you might become involved.

And now, as we near 30 years since the inception of COTERC and the station, we continue with the business of delivering education and knowledge about biodiversity from one of world's most diverse regions! As the Board grapples with cleaning up its new Mission, Vision, and goals, we continue to champion the station and its ongoing efforts to monitor biodiversity and educate young researchers as well as delivering evidence-based information to locals, the general public, the Ministry of Education, and the scientific community at large. Knowing that you are assisting in supporting the nearly 30 years of continuous efforts in maintaining conservation and the high diversity in the southern tip of Barra del Colorado Wildlife Refuge leaves you feeling like an important piece in the legacy of this organization.

I am heading down to the station this month for two weeks. My husband, Art Shannon, will be joining me. He is now a retired horse logger (www.arbornorth.com), and is beginning to assist with the Forest Plot Monitoring - aka the ACER project (see - <http://www.coterc.org/long-term-monitoring.html> and scroll down to project description). Having us both involved with the station allows for a deeper connection in my own life. COTERC and the station continue to help shape opportunities for those who wish to learn about the Neotropics and its rich diversity. While the station itself was secondary forest at the time of its inception, it has flourished and changed over the past 30 years in response to the lack of harvesting on its land and from changes in the surrounding area.

The Board continues to operate in good faith towards these goals while leading the organization and the station past the three-decade mark!

Poachers -- Where Do We Draw the Line? by Doug Durno

Morality, like art, means drawing a line somewhere – G. K. Chesterton

And we'd all draw the line at the killing of another human.

Or would we? Let's consider a couple of incidents that occurred in Africa recently. First, a poacher in the pursuit of ivory failed to kill his elephant quarry, which chased him down and crushed him to death. Second, a big-game hunter, tracking an elephant for a client to shoot, was trampled to death when the elephant turned and charged him.

Karma. Divine retribution. Justice. Call it what you will. My reaction – and yours maybe? – is that those guys got what they deserved.

Now let's move the line a little so that a poacher caught in the act is killed by another human. And what if that killing were sanctioned by the government – no arrest, no trial, no innocent till proven guilty? Well, that's the stated policy of the government of Botswana. It still surprises me that I had no problem with that 'shoot-to-kill' policy when told about it on arriving there. Others also accepted it.

Of course, I can rationalize the Botswanan government's strategy. If the populations of endangered species like the elephant or rhino are being greatly reduced by poachers, and all other strategies aren't stopping them, maybe allowing government rangers to shoot poachers on sight is acceptable.

Just look at South Africa, Botswana's neighbor. There, most poachers aren't caught. If they are, they're often let go. If they're found guilty, sentences are light.

Even if poachers did receive long sentences, it wouldn't likely prove much of a deterrence. The poor who are attracted to poaching have great motivation to score some ivory or rhino horn that will put enough dollars in their pockets to provide for their families. (For a remarkable interview with a convicted poacher, go to <https://www.thedodo.com/interview-with-an-elephant-poa-390317914.html>. Then go to the bottom of this article to see ** the aftermath for this 'reformed' poacher.)

Well then, if you can't stop the suppliers (the poachers), why not go to where the demand is and persuade those governments to crack down on the criminal gangs who traffic in poached animals? It sounds good. But, when horn sells for thousands of dollars per kilogram, the gangs will be ruthless and innovative, always a step or two ahead of enforcement agencies.

(cont'd on next page)



Chobe National Park, Botswana

Poachers -- Where Do We Draw the Line? (cont'd)

And, even if we shoot the poachers, the gangs don't care. They have an endless supply of poor people willing to try poaching. Morality doesn't come into the equation for the gangs. But are the impoverished poachers morally lacking if they put their families' needs ahead of animals?



But let's return to Botswana and its shoot-to-kill policy. Is

it working? Well, while elephants are declining by 8% a year throughout Africa, the population of elephants in Chobe NP in Botswana is increasing every year. The large number of young elephants is immediately noticeable. The non-profit Rhinos Without Borders, at a cost of \$4.5 million, is translocating 100 rhinos to Botswana from South Africa where over 1,000 rhinos are killed annually by poachers. They say that Botswana's shoot-to-kill policy is the reason for their action.

We applaud when poachers and big-game hunters are killed by their prey. Should we laud the intentional killing of poachers by another human? Of the two moral goods – the duty to protect endangered species and the duty to respect human rights, which prohibits the killing of another human except in exceptional circumstances – where do you stand?

**The outcome - The Kenya Wildlife Service accepted the offer of the reformed poacher to help them fight poaching. Not long after, he was arrested with two tusks in his possession.

References

<http://www.scielo.org.za/pdf/sacq/n60/07.pdf>

<https://news.nationalgeographic.com/2017/07/wildlife-watch-rhino-horn-china/>

https://www.savetherhino.org/rhino_info/thorny_issues/shoot_to_kill

Effectiveness of Concealed Nest-Protection Screens by Helen Pheasey

We continue our look at some of the papers based on research that has taken place at Caño Palma Biological Station.

Effectiveness of Concealed Nest-Protection Screens Against Domestic Predators for Green and Hawksbill Sea Turtles

Many of you have helped this project along by assembling and installing the various versions of nest-protecting screens that have been put to the test along Playa Norte. Then there are the excavations. It ain't easy work as I can personally attest, just about passing out after 3 or 4 hours under the blazing sun. (Thanks Molly for your patience.) In the end though, your work pays off. More nests endure, and more hatchlings emerge to fight the long odds against long-term survival so that they can return to our area to nest. Helen Pheasey (at left), a former turtle project coordinator at Caño Palma, is the corresponding author on the edited version of the paper found below. Her co-authors are Molly McCargar, Andrew Glinsky and a friend of many of us, Nick Humphreys.



This paper was originally published in the December 2018 issue of *Chelonian Conservation and Biology*. You can find the whole article at:

<http://www.coterc.org/all-resources---by-year.html> (Scroll down a bit to '2018')

ABSTRACT – Mammalian depredation of nests is amongst the most significant threats to hatchling success in sea turtles. In 2013, at least 13% of green-turtle and 25% of hawksbill-turtle nests were lost to domestic-dog predation on Playa Norte. In 2014 and 2015, plastic and bamboo protective screens were deployed to protect nests. Screens were deployed at different stages of the incubation period and the success of the nests analyzed. Predation rates increased as the seasons progressed with October and November being the peak depredation months, as well as the peak for hatchling emergences. Eggs remaining in nests that had been partially depredated had a significantly lower percentage of hatching success than eggs in undisturbed nests. There was no significant difference between timing of deployment and likelihood of a screen being breached. The likelihood of a screen being breached was highly dependent on the type of material used; bamboo screens were about 153% more effective than plastic, and successfully prevented the complete depredation of about 48% of nests. Bamboo screening is an inexpensive, environmentally inert, yet labor-intensive method for reducing nest depredation by domestic dogs. This screening method does not impact the hatching or emerging success of the nest. (cont'd on next page)



Molly & Anna Bandyk doing excavation. One of the original wood screens is in the background.

Effectiveness of Concealed Nest-Protection Screens (cont'd)

Discussion

On Playa Norte, we found domestic dogs to be the dominant predator of sea-turtle nests. Vulture and crab presence was also noted.

We found no significant correlation between predator activity on nests with or without screens, suggesting that deploying a screen did not per se increase or decrease its attractiveness to dogs. Through our disguising efforts, it is unlikely any visual cues were left for dogs to identify nests. But it is possible that disruption of sand above the egg chamber may have released odors that alerted the dogs to the nest site. This possibility derives support from the observed increase in frequency of predation attempts during the emergence period (62.04%) and on nests with screens deployed at this time (96.97%).



Molly installing bamboo screen

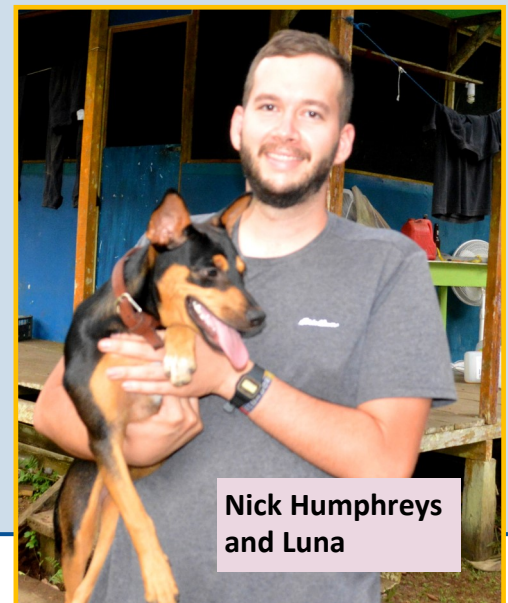
Further analysis would be needed to draw stronger conclusions, but we suggest that, where possible, screens should be deployed at the start of the incubation period to deter predators. That said, we also found no significant difference in the likelihood of a screen being breached regardless of when it was deployed. From a management perspective, knowing screens can be placed at any stage of incubation offers potential for more nests to be protected when the predator shows a preference for nests at the end of the incubation period.

Plastic-mesh screens have long been used in the protection of sea-turtle nests. However, their effectiveness is inconsistent: rates of 75%–100% effectiveness have been reported. Yet in our study, 80% of plastic screens were breached, and thus were largely ineffective at preventing nest predation. Additionally, plastic is increasingly recognized as being harmful to the marine environment. **We found bamboo screens were 152% more effective at preventing predation and did not pose the environmental threat of plastic screens.**

In our study, surviving eggs in depredated nests had a significantly lower hatching, and therefore emerging, success than eggs in undisturbed nests. Developing embryos are vulnerable to changes in moisture, gas exchange, and temperature, all of which are likely during a partial predation event, potentially lowering the viability of the remaining eggs. We hypothesize this exposure to the elements to be a strong factor in the failure of eggs in disturbed nests.

Conclusions

Bamboo screening is an inexpensive, environmentally inert yet labor-intensive method for reducing nest depredation by domestic dogs. This method does not impact the hatching or emerging success, or incubation length of the nest, nor does it lead to cascade effects that may result from predator removal. We recommend it for in-situ nest protection projects where bamboo is available, and there are high mammalian predation rates and a strong labor force.



Nick Humphreys and Luna

Station Happenings by Coordinators Alessandro Franceschini & Charlie Pinson

November - Mammal report by Alessandro Franceschini

Weather – An above-average month for rainfall. Heavier rains near the end of the month raised the mean canal depth to a higher level than last year, portending flooding at the station in December. The large number of days with rainfall prevented plant-phenology surveys from being completed.

White-lipped peccary – Two big herds were located in Tortuguero National Park. Combined, the total number of peccaries in the herds were about 100. Another herd was located near Caño Palma with about 50 individuals.

Herpetology Coordinator – Charlie Pinson was welcomed to the station taking over this position.

Goodbyes – Leaving the station this month were Mary Maximidi from Greece, Morgan Laketa from the USA, and Alison Alvarez from Costa Rica. Departing in December were Suzanne Van der Straat and Tygo de Munck, both from the Netherlands. Thanks to all for your hard work.

November - Herp report by Charlie Pinson

Snake survey – A species found this month was the blunthead tree snake (*Imantodes cenchoa*).

The blunthead tree snake - At a usual length of 80 cm (though they can grow to over a meter), the blunthead's slenderness makes its head appear rather large. Speaking of large, its bulging eyes take up a quarter of its head length. The vertical slits of the pupils make looking down easier, a good adaptation for a tree snake. These nocturnal feeders are carnivorous, dining mostly on small lizards, but they may also eat frogs. During the day, they seek refuge in a shaded bush or tree, usually at least two meters off the ground. Their preferred habitats are cooler, moister areas like wet forest and rainforest. The blunt-head is a rear-fanged snake, which usually means a species is mildly venomous but quite unlikely to bite humans. (More on rear-fanged snakes in the Spring issue.) Another tree snake to look out for in our area is the **plain tree snake** (*Imantodes inornatus*), also pictured. It's sometimes referred to as the inornate tree snake.



Blunthead Tree Snake



Plain Tree Snake

Station Happenings (cont'd)

Excavations – There were 101 in November: 98 greens and 3 hawksbills. This table gives you some idea of the type of data collected at the station. For those unfamiliar with triangulation, it's a simple method of marking and subsequently relocating a specific location by using three known distances from three nearby locations (we use trees). By using this method, nests are unlikely to be found by poachers.

Summary of fate and hatching and emerging success for nests excavated in November (separated by species and triangulation status)

	Total	Natural State	Predated	Partially Predated	Eroded/ Flooded	Not Found	Hatching Success	Emerging Success
Triangulated (Green)	36	29	1	4	0	2	82.9%	82.4%
Triangulated (Hawksbill)	1	1	0	0	0	0	97.6	93.1
Untriangulated (Green)	62	57	0	2	3	0	91.2	88.3
Untriangulated (Hawksbill)	2	2	0	0	0	0	89.6	85.1

- Hatching and emerging success rates shown do not take into consideration nests that were predated, partially predated, eroded, poached, or not found, as we are unable to accurately evaluate the success of such nests.
- Hatching and emerging success of triangulated and non-triangulated nests must be considered separately and not directly compared as untriangulated nests will tend to appear more successful given that we find the majority of them through evidence of emergence (e.g. hatching tracks), and thus only rarely excavate untriangulated nests where most of the eggs or hatchlings have died in the nest.

The Sungrebe -- A Marsupial Bird? by Doug Durno

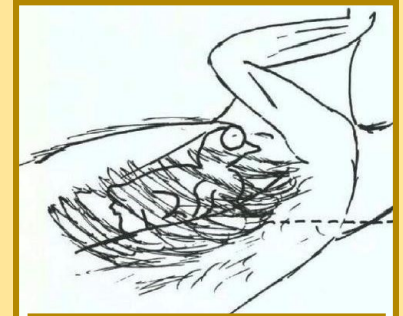
"The sungrebe (*Heliornis fulica*) is an elusive, poorly known aquatic bird inhabiting the Neotropics. The only New World member of the Heliornithidae (finfoots), it is thought that the sungrebe has one of the shortest incubation periods of any non-passerine (10.5–11 days), is the only species in the Gruiformes [including cranes, rails, finfoots] to hatch altricial young, and is the only bird in the world to have 'pockets' (marsupia) underneath the wings to carry newly hatched young. These conclusions, though, are based on an incomplete field study of a single nest from 50 years ago."

This quote refers to the research that Greg Davies will be pursuing when he arrives at Caño Palma this spring – and indicates that the sungrebe is somewhat of a mystery bird. They're reclusive, mostly keeping to themselves, shrouded by overhanging vegetation along the edges of quiet streams and rivers. So, if you hope to see one at Caño Palma or anywhere else for that matter, it may involve a search. When you do spot one paddling along, you'll note how the head and neck move forward and backward in rhythm with the feet.

It's their paddling equipment that got the family the moniker finfoot. Like grebes, coots and rails, sungrebes' feet are lobed rather than webbed like most aquatic birds. Lobes are flaps of skin on the toes that open or close depending on which direction the foot is moving. When a foot moves backwards, the flaps open to give propulsion. When they move forwards to get back into position for another stroke, the flaps fold in on themselves to streamline the toes. The photo at right shows the flaps in the open position while the sungrebe stands on a branch.



The other two unusual features mentioned above - altricial chicks and pockets - are related. The reason the chicks are altricial (unable to look after themselves) could be because they hatch after only 11 days, an unusually short time. Though both parents incubate the eggs, it's basically the male that tends the newborns – and in an unusual way. They literally take them under their wing. They have pockets (sometimes referred to as pouches) there, unique in the bird world. One chick can fit in each. The male carries them around, feeds them, and removes droppings, all the while keeping the chicks out of the way of predators. It's said that the males can even fly with the hatchlings though it's seldom been observed.



The pouch is not much studied. They've been described as "shallow, ovular pockets formed by pleats of well-muscled skin". But photos are rare if existing at all. So the crude drawing above showing a hatchling sheltered inside by the side feathers will have to do.

The male is thought to have some muscular control over the shape of the pocket by restricting or enhancing fluid flow into this tissue to make the pockets more rigid or less rigid. Still, that isn't enough to confine a chick to the pocket. So, in addition, long, curved feathers grow upwards and backwards to form a wall that provides sufficient support.



Photo by Aisling Farrell

Sungrebes don't dive for food, but take it from the surface as they cruise about. Their menu consists of snails, midges, mayflies, frogs, small fish, spiders, and small amounts of seeds and fruit. They may also hunt from a perch just above the water's surface.

References

<http://tetzoo.com/blog/2018/11/29/pouches-of-the-sungrebe>
<https://everything.explained.today/Sungrebe/>

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Contact COTERC at:

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