



FLAAR
MESOAMÉRICA

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Neotropical Flora and Fauna that you can see in 5 days in Peten (in January)

PNYNN and PANAT, RBM, Peten, Guatemala

Field Trip of January 2023; FLAAR Reports February 2023

Nicholas Hellmuth



APPRECIATION FOR ENCOURAGING THE RESEARCH PROJECT



COMMUNICATIONS WITH PANAT DURING MID-2022

- Cristel Pineda, Unidad de Relaciones Comunitarias, PANAT

FOR INITIATION AND COORDINATING THE COOPERACION PROJECT

2021-2025

- Licda. Merle Fernandez - CONAP
- Marla Mercedes Bolvito Jerónimo Unidad de Cooperación Nacional e Internacional de la Secretaría Ejecutiva de CONAP
- Licda. Ana Luisa De León N.
- Directora de Educación para el Desarrollo Sostenible, CONAP
- Lic. Apolinario Córdova - CONAP Petén
- Ing. Jorge Mario Vazquez - CONAP Santa Elena, Peten

DISCUSSION ON ASPECTS OF PANAT THAT CAN ASSIST THE TIKAL PARK ADMINISTRATORS

- Ing. Dimas Pérez Rivera, Sub-Administrador, Parque Nacional Tikal

STORAGE SPACE IN PETEN

- We thank Sergio Balam for providing space to storage our field trip equipment

ASSISTANTS AT YAXHA AND TOPOXTE ISLAND

- Melvin López

ASSISTANCE FOR KNOWLEDGE OF PLANTS, ANIMALS AND ECOSYSTEMS OF PANAT

- Gelber Aldana
- Esdras García
- Luis Lobos

EQUIPMENT PORTERS & GENERAL ASSISTANTS AT PANAT

- Regino Arévalo
- Roberto García
- Hary Salazar
- Melvin López

IDENTIFICATION OF FLORA AND FAUNA AND WHERE TO FIND THEM IN EACH PARK

- Moisés Daniel Pérez Diaz

TITLE PAGE PHOTOGRAPH

Prosthechea cochleata.

Photo by: Edwin Solares, FLAAR
Mesoamerica, Jan. 27, 2023.
Camera: Sony A7R (ILCE-7RM4).

FRONT COVER PHOTOGRAPH

Passiflora coriacea.

Photo by: Edwin Solares, FLAAR
Mesoamerica, Jan. 25, 2023.
Camera: Sony A7R (ILCE-7RM4).

We appreciate a donation during November 2021 and a follow-up donation in June 2022 to help cover the costs of FLAAR research projects of those years (2021-2022) specifically to assist and support the current FLAAR project of exploring remote areas to find and document flora and fauna in the Reserva de la Biosfera Maya (RBM), Peten, Guatemala. This donation is from a family in Chicago in honor of the decades of botanical field work of botanist Dr John D. Dwyer, who worked in many areas of Mesoamerica, including Peten. This donation is also in recognition of the urgency and need for conservation of both wildlife and rare plants in the bio-diverse ecosystems of the Reserva de la Biosfera Maya (RBM) of Guatemala. Parque Nacional Yaxha, Nakum and Naranjo (PNYNN) and Parque Nacional Laguna del Tigre are the first two parts of the over 5 million acres of the RBM where we have

initiated field work in 2021 and 2022. In July 2022 we initiated field work in cooperation and coordination with the biologists of PANAT at Tikal to study epiphytic plants (orchids, bromeliads, cacti, ferns that grow high up in trees) plus other biology topics of mutual interest and importance to document. Photographs are donated to the park administrators. Contact sheets are being prepared to also donate to CONAP. Storage space in Santa Elena/Flores area is essential, because we need to store camping equipment, cooking pots and pans, tripods, lighting equipment, electric generator, etc. To drive all this equipment over 1,000 kilometers back-and-forth to our research office in Guatemala City would damage the equipment (due to all the holes and other broken open areas in the paved highway).



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Introduction

Every month different trees, shrubs, vines and herbs are flowering in Guatemala and surrounding countries of Mesoamerica. In many months there are different migratory birds flying around, to escape the cold in Canada and USA.

So, each month you see and experience different flora and fauna. But we wish to show what we saw during our January 2023 field trip to Yaxha (PNYNN) and Tikal (PANAT). We will have full-length FLAAR Reports on most of the flora and fauna that we found and photographed in January. But the report today is to show one view of each species that we happened to see as we hiked into these two national parks as part of our ongoing 5-year project (2021-2025).



Cochlearius cochlearius.

Photo by: Edwin Solares, FLAAR Mesoamerica, Jan. 26, 2023.
Camera: Sony A7R (ILCE-7RM4).



Sunday: January 22, 2023

It is always easier to travel on the highways on Sunday; significantly less traffic. So we wake up early, eat quick early breakfast; finish packing all the equipment, and do our best to leave the FLAAR office/residence in Guatemala City at 8am (or before if possible).

From km 86 onward (Highway CA14, from the bosque seco around El Rancho towards the mountains) you see white-hair candelabra cactus and Opuntia cactus species everywhere. Intermixed are lots of Palo de Brasil, *Haematoxylum brasiletto*. These remarkable trees were in full bloom all the way up to where the pine-oak habitat begins circa km. 100.

Haematoxylum brasiletto.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jan. 22, 2023.

Camera: iPhone 14 Pro Max.



The bee towards the bottom is 1000% larger than wild native stingless bees of Peten. Obviously lots of bees have escaped into the wild; nonetheless they all still help with pollination. In the future we will compare and contrast these small bright yellow flowers of palo de Brasil (surrounded by cacti in bosque seco habitats) with comparable flowers of palo de Campeche (of wetlands), *Haematoxylum campechianum*. There are millions of *Haematoxylum campechianum* trees in Peten, including at PNYNN.

Photo by Nicholas Hellmuth, Highway CA14, uphill from El Rancho, Jan. 22, 2023, iPhone 14 Pro Max.



In the future we will compare and contrast these small bright yellow flowers of palo de Brasil (surrounded by cacti in bosque seco habitats) with comparable flowers of palo de Campeche (of wetlands), *Haematoxylum campechianum*. There are millions of *Haematoxylum campechianum* trees in Peten, especially at PNYNN.

The tecumasuche shrubs, *Cochlospermum vitifolium*, bloom more months than the Palo de Brasil. We did not photograph the bright yellow *Cochlospermum vitifolium* flowers in January since we have photographed them in many areas of Guatemala and we need to dedicate the day to reaching Sayaxche, Peten, to overnight along the shore of Rio la Pasion, near where Arroyo Petexbatun enters the river. It is notable, as you look out the windows of your vehicle, to see the cacti and Palo de Brasil area change into a pine forest (often pine with oak in many areas). The pine forest is at a higher elevation; the cacti bosque seco is a lower elevation.

After the start of the pine oak forest, as you drive to higher altitudes of the mountains, you enter the Quetzal bird cloud forest national park area. To see the national bird of Guatemala and the sacred bird of the Maya and Aztec that would need a special dedicated field trip. We would recommend going to four different quetzal areas so you can have a better chance of getting awesome photos and videos. On our drive through the cloud forests towards Coban we keep going. Most of the year there are wild yellow sunflowers or trees filled with bright yellow flowers everywhere. We have lunch in Coban, Alta Verapaz. Also, in Coban is one of the largest private orchid gardens in Mesoamerica, of orchidologist Fredy Archila. Archila is the author of *Orchid Genera and Species in Guatemala*.

After lunch we continue through the cloud forest area (mostly coffee plantations now) and then drive down the mountains to Chisec. There is a Q'eqchi' Mayan aldea at km297 on the highway AV9 that has several *Parmentiera aculeata* trees with fruit on the trunk almost every month. The highway continues through the karst limestone area of Peten. In the Candelaria area, hundreds of caves are on the west side of the highway. Caves were the entrance to Xibalba for the ancient Maya. Xibalba is described in the Popol Vuh (available in many translations; in English we recommend by Christenson or by Tedlock. Here is the link to Christenson's Popol Vuh translation: <https://www.mesoweb.com/publications/Christenson/PopolVuh.pdf>

We overnight in Sayaxche in the modest Hotel Guayacan on the shore of Rio la Pasion. We prefer this hotel since we know the owners, the managers, and the hotel is overlooking the river. We walk a few blocks to the restaurant where we have had dinner on field trips for decades. We also like this Café Maya because it has cuajilote tree growing inside the entrance. It has cuajilote fruits all year long. *Parmentiera aculeata* is a califlorous tree, so it flowers and fruits from the main trunk (in addition to flowering and fruiting from the limbs).



We show these fruits for several reasons: most visitors to Guatemala have not seen tree species that flower and fruit from their trunk. Plus the fruits are available almost all year. And the fruits are edible. In other words, if you are a Maya family thousands of years ago and had these trees around your home, you could have fresh fruits to eat almost an entire year for decades. Plus of course you would have ramon trees, zapote trees and other fruit trees in your "kitchen garden."



This tree is, in theory, wild and native, but 90% of the ones we see are alongside Mayan houses in remote villages. But *Parmentiera aculeata* is definitely native (meaning available to the Classic Maya for thousands of years). As you can see it really does flower and fruit from the trunk. The flower is the fresh green bud that will open in a few hours. Vines grow all over most trees of the rain forests; so the leaves you see here are from vines, not the cuajilote tree itself.

Café Maya, Sayaxche, Peten, where we have our dinner every time we drive from Guatemala City to Sayaxche and then towards Lake Peten Itza and then to Yaxha, for several decades of field trips.



Crescentia alata, *Crescentia cujete*, *Theobroma cacao* and *Parmentiera aculeata* are trees best known for flowering and fruiting directly from the trunk. Papaya also flowers and fruits from its trunk. We have found lots of other general, such as several species of *Zygia*. But if you drive to Peten from Guatemala City the easiest place to see the cuajilote fruits are inside the restaurant Café Maya in Sayaxche. The photo here is from the Jardin Botanico, photographed by Camila Morales in 2011. Identical tree (but 10x larger) is in the restaurant; fruits are same size and ridged shape (cacao pods are also ridged so it's easy to make a mistake when someone asks you what fruit is this?).

Monday: January 23.

We wake up circa 5:15am to leave before 6am so we can reach Santa Elena/San Benito/Island of Flores area in time to have breakfast. Then we buy the food we will need on the field trip. We visit the storage facility kindly made available to us so we can pick up equipment for the field trip. Then we drive about an hour or so to the Yaxha area of Parque Nacional Yaxha, Nakum and Naranjo (PNYNN). We check in to the Ecolodge El Sombrero (the only hotel here, owned by eco-friendly and archaeologically knowledgeable Gabriella Moretti).

As we drive towards the aldea La Maquina turnoff to Yaxha there is an aldea, Paxcamán, with several *Parmentiera aculeata* trees whose cuajilote fruits are edible. This is a tree that flowers and fruits directly from the trunk. This *Parmentiera aculeata* tree is a relative of *Crescentia cujete* (that grows in savannas of Peten) and *Crescentia alata* (that grows in savannas in the Costa Sur area of Guatemala).

As we get closer to the entrance to the Yaxha park you can stop to see wild stingless bees at an apiary of a local person. There are two species here: tiny yellow/orange ones and larger black ones. Their honey and their pollen are very good for health. The owner of this apiary of wild native bees knows the FLAAR team so it's a great place to learn about how the Maya raised honey bees.

We arrive at Ecolodge El Sombrero to unpack all the photography equipment, all the food that we bring, and to visit with Gaby, the conservation-focused owner of the hotel. After a tasty almuerzo the team found a turtle that was lost and had fallen into a hole.



Crescentia alata, *Crescentia cujete*, and *Theobroma cacao* in addition to *Parmentiera aculeata*, are trees of Guatemala best known for flowering and fruiting directly from the trunk. Papaya also flowers and fruits from its trunk. We have found lots of other general, such as several species of *Zygia*. But if you drive to Peten from Guatemala City the easiest place to see the cuajilote fruits are

- Along the highway, west side, in an aldea north of Coban (en route to Sayaxche), not far from Chisec.
- Inside the restaurant Café Maya in Sayaxche.
- Paxcaman, north side of the highway from Santa Elena (Flores) towards Yaxha turnoff.

The photo here is what you see while going from Santa Elena/Flores/Lake Peten Itza towards La Maquina (the turnoff to Yaxha). Paxcaman is the name of the aldea that has several of these trees fruiting every month all year.



In addition to fruiting directly from the trunk, on the same identical tree, they also flower and fruit from the end of twigs. If you come with the FLAAR team on a future field trip we will also show you that these fruits hang down from different parts of the tree. Paxcaman, en route east from Flores-Santa-Elena-Lake-Peten-Itza area.

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Vivian Hurtado found this turtle had fallen into a hole and could not climb out. So she rescued it and took it to the shore of Lake Yaxha where the turtle happily waded in to refresh itself. It is extremely rare to be able to photograph these turtles, Tortuga icotea.



We arrived at the apiary at 4:20 pm and photographed stingless bees for over an hour; left at 5:31pm and returned to the hotel Ecolodge El Sombrero for a nice healthy dinner.

Since the apiary has natural sunlight illuminating the bee entry-exit tubes they are easier to photograph. The bees are constantly enlarging, strengthening, or repairing these entry-exit tubes. The hive is below the end of the tube.

Photos by Nicholas Hellmuth with iPhone 14 Pro Max, apiary of Gregorio Rez, road towards Yaxha. January 23, 2023. There is a FLAAR Report in .pdf format on this apiary that you can download on-line.



Tuesday: Jan 24.

FLAAR started field work at Yaxha in 1970 and with the assistance of archaeologist Miguel Orrego and helpful student interns accomplished significantly improving the CIW (Carnegie Institution of Washington) map of earlier decades. FLAAR worked five multi-month seasons at Yaxha, 1970-1974.

From August 2018 through July 2019 we returned to Yaxha for flora, fauna and biodiverse ecosystem field work. We did this in cooperation and coordination with the park administrators and biologist, plus with the knowledge of the park rangers (many who have lived and worked in PNYNN for several decades). So our current year 2021-2025 field work project at Yaxha benefits from our considerable previous work here. Since Nakum is no longer accessible even by 4WD in the wet season we tend to focus on Yaxha, Topoxte Island and Rio Ixtinto. Vehicles with giant tires have left ruts so deep that a normal 4WD pickup tires are down in the ruts and the middle of the dirt road scrapes the bottom of the vehicle. So SUV would get even halfway. So it is best to hire a local 4WD pickup from a local travel agency (plus a driver that knows how to handle these roads) or ask Sebastian de la Hoz to outfit you for an adventure to Nakum. With Sebastian and other travel-savvy individuals in Peten you can also stay overnight at Nakum and hike to Naranjo (where another vehicle can drive you back out). A normal 4x4 pickup truck can reach Naranjo since Vilma Fialko's project and local alcalde kindly brought tons of rocks and gravel to fill in the ruts.

INFORMATION ON THE PHOTO BELOW.

The sun was behind the spider webs; the webs were filled with droplets from the morning mist. A perfect angle and perfect hour. At 9:01am we had the boat turn around to allow us to get closer to this awesome photo opportunity. An hour later most of the droplets of mist were no longer present and the sun was so high that it no longer shined directly through the webs. It helps to have been in these areas for decades to know what is available to photograph, in which month, and which hour.

Photo by Nicholas Hellmuth, Nikon D810 with 200mm tele-macro lens.





Once in the boat heading for Topoxte Island we noticed there was an entire row of trees along the shore that had lost their leaves. This is because 2022 was a very wet year and the Lake Yaxha rose so high that it flooded all the trees along the shore of the lake. After their roots and trunk bases being underwater for several months most of them died and so spiders had available thousands of empty branches as supports to hold their webs. ps: don't worry, the trees along the shore will regenerate as will all the other shore plants that have been underwater during summer/autumn/winter 2022 into January and February 2023.



About 9 am, still lots of misty-clouds. But earlier in a typical morning in the “dry season” there is mist covering everything; you can’t see the sky; this mist tells you that it will be a bright sunny day (when the sun burns the mist away between between 8:45 and 9:30 am). Obviously varies by day.

It was in 1965, while living 12 months at Tikal that I learned, though daily experience; that (usually) a misty morning means a nice sunny day. I learned this as a student intern to assist the Penn Museum Tikal Project with photography and architectural documentation of the North Acropolis, west side of East Plaza, and Str. 5D-73 (facing south side of Temple II). In the 1960’s it was the tradition to “take a year off” from college and explore something totally different in life. So when archaeologist Peter Harrison asked me if I could help the Tikal Project for an entire year, I took a year off from Harvard to work in Guatemala. Then returned to Harvard to write my undergraduate thesis on what I had discovered at Tikal (the Tomb of the Jade Jaguar, Tikal Bu. 196, under Str. 5D-73). It helps to know about climate, flora, fauna and ecosystems when you live and do research in the actual Classic Maya areas of Mesoamerica. Hundreds of archaeologists experience the Peten, Chiapas, Tabasco, Campeche, Yucatan, Quintana Roo, Belize, Honduras and El Salvador when they are doing field work as archaeologists.



The sun was behind the spider webs; the webs were filled with droplets from the morning mist. A perfect angle and perfect hour. At 9:01am we had the boat turn around to allow us to get closer to this awesome photo opportunity.

An hour later most of the droplets of mist were no longer present and the sun was so high that it no longer shined directly through the webs. It helps to have been in these areas for decades to know what is available to photograph, in which month, and which hour.

Photo by Nicholas Hellmuth, Nikon D810 with 200mm tele-macro lens.



At 9:01am to 9:10am we go towards the shore to photograph the masses of spider webs on the shore. Then we continue to the west entrance path for Topoxte Island. When finished photographing there we go up the Rio Ixtinto to accomplish drone photography. Then we go towards the southwestern Cenote to photograph the water level there (this is a cenote that is "out in the lake" (as is the northwestern Cenote that the drone team visited the following morning). GPS is managed by Byron Pacay. Google Earth is terrible (uneven) lighting but is easy to download from the Internet.



Osprey eagle, *Pandion haliaetus*, *Aguila caracolera*, flying over the shore of Lake Yaxha. Obviously this is a fishing bird that is happy to be in the Lake Yaxha area of PNYNN. Photo by Edwin Solares with Sony Alpha 1, 200-600mm telephoto lens, January 24, 2023, 9:36am.

FLAAR will be organizing bird-photography training courses in-person at Yaxha and at Tikal in coming months. These trips will be organized by Carla Molina's eco-tour agency. The FLAAR photographers will show and explain the pros and cons of each brand of camera: Sony, Nikon and Canon (in today's digital era these are the best brands). Hellmuth will also present information to the participants on which birds were featured in Late Classic Maya art. These digital photography flora and fauna field trips will allow you to see 5x macro lenses, all the 1:1 macro lenses (Sony and Nikon especially), and telephoto lenses (FLAAR has 200mm, 300mm, 400mm, 600mm, and 800mm lenses in order to document the flora and fauna of the Reserva de la Biosfera Maya to help biologists, ecologists, botanists, zoologists, students and the interested public).



Laguna Sacnab is in the far left. Lake Yaxha is the larger lake in front. Photo by Haniel Lopez with FLAAR registered drone DJI Mavic 3, morning of January 24, 2023.



On almost every field trip, on the first morning, we wish to document Topoxte Island, Rio Ixtinto, and the entire western end of Lake Yaxha and the inlets at the southwestern end. Here is a view showing the islands at the southwest. We do this in the morning because by afternoon the wind makes it not a good idea to fly a drone plus the choppy waves make it uncomfortable to be in a motorboat.

Photo by Haniel Lopez with FLAAR done, DJI Mavic 3, January 24, 2023.

- Island of Spanish Moss Paradise
- Island of Strangler Fig Aerial Root Paradise

We have a separate FLAAR Report on strangler figs and a separate FLAAR Report on Spanish Moss. Above we show the matapalo (strangler fig). Below we show the Spanish Moss. You can find and download dozens of FLAAR Reports on botany, ethnobotany and ecology on our www.Maya-ethnobotany.org





I consider Yaxha, Nakum and Naranjo and the adjacent areas of the RBM, as gorgeous. Between 1965 and today I have traveled more than 3 million kilometers (on airplanes; 90% on business trips as consultant, around the world). Yet I prefer to live in Guatemala and do flora, fauna and biodiverse ecosystem field work, especially at Parque Nacional Yaxha, Nakum and Naranjo plus adjacent parks and nature reserves to the west (PANAT, PNLT, Cerro Cahui, Bio Itza, etc.). We would also like to explore the Parque Nacional Sierra del Lacandon. This photo shows *Tillandsia usneoides*, barba del viejo, Spanish moss, waiting for you at Topoxte Island.



We have photographed the wild native Spanish moss on so many previous field trips that in January 2023 we took only a few snapshots. Yes, this is the same as the Spanish Moss of Louisiana swamps, *Tillandsia usneoides*. Family Bromeliaceae. Both photos by Nicholas Hellmuth with Nikon 800mm prime lens on a D810 camera, supported by a sturdy reliable Gitzo tripod and Wimberley WH-200 gimbal head for the tripod. We have learned that using cheap low-bid brands is not a wise investment whatsoever. The Gitzo tripods have lasted more decades than I can remember.



Laguna Sacnab is in the far left. Lake Yaxha is the larger lake at the left. Photo by Haniel Lopez with FLAAR registered drone DJI Mavic 3, morning of January 24, 2023.



On our next field trip to Topoxte Island we will fly the drone closer to the Spanish Moss in each tree. But for now we can show you how many of the trees in this upper central/western part of Topoxte Island have Spanish Moss. Lake Petexbatun, upstream Arroyo Petexbatun from Sayaxche, is another area with millions of Spanish Moss plants. Cropped by Hellmuth from aerial photo by Haniel Lopez with FLAAR done, DJI Mavic 3, January 24, 2023.





We find stingless bee entry-exit tubes every time we go to Topoxte Island to look for them. Teco (Moises Daniel Perez Diaz), park ranger at PNYNN for several decades has assisted us on field trips on his days off. He obviously knows the entire park area, plus surrounding areas of the Reserva de la Biosfera Maya (RBM). Photo by Nicholas Hellmuth, Topoxte, iPhone 14 Pro Max.



It helps to have plenty of several different kinds of portable lighting equipment. Since we have been photographing at Yaxha since 1970 (literally) we have tested many different kinds of lighting. For digital photography we need lights that are portable. Here is lead photographer Edwin Solareso and helpful team assisting the photography.



Most stingless bee hives are inside hollow areas of trees (where the inside of the tree is open because of the wood rotting in recent decades). So all you can see is the entrance tube. Most entrance tubes are not far up from the ground (maybe because that's where the most rot is?) Here is Edwin Solares and assistants photographing an entrance tube only a few inches above the ground.



CONAP requested that we document medicinal plants. There are several species of cocolmeca; some are not medicinal; others are very popular. I like this cocolmeca because it is easy to see the roots. You can find this same plant also on the other island about a hundred meters to the west.



Suggested to be *Dioscorea bartlettii* by Victor Mendoza (one of several helpful flora and fauna identifiers of FLAAR Mesoamerica). Photo by Nicholas Hellmuth, January 24, 2023, 11:47am, far side of Topoxte Island (near lake shore). There are several trails from the lake to enter Topoxte Island. If there is a motorboat parked at the east entrance then you can't get your boat in, so you need to circle the island and hike up one of the back trails from the west. iPhone 14 Pro Max.



I like to find and photograph mushrooms even when they are old and dried out. When we went to Tikal several days later I found and photographed enough mushrooms at PANAT to have a complete separate FLAAR Report on those. This report will be ready by late February or early March. Topoxte Island, Lake Yaxha, PNYNN, January 24, 2023, 10:06am, photo by Nicholas Hellmuth, iPhone 14 Pro Max.



It helps to identify mushrooms if you also photograph their underside. Notice a cute long-legged spider in the upper middle. Topoxte Island, Lake Yaxha, PNYNN, January 24, 2023, 10:06am, photo by Nicholas Hellmuth, iPhone 14 Pro Max.

Afternoon, Jan. 24, 2023

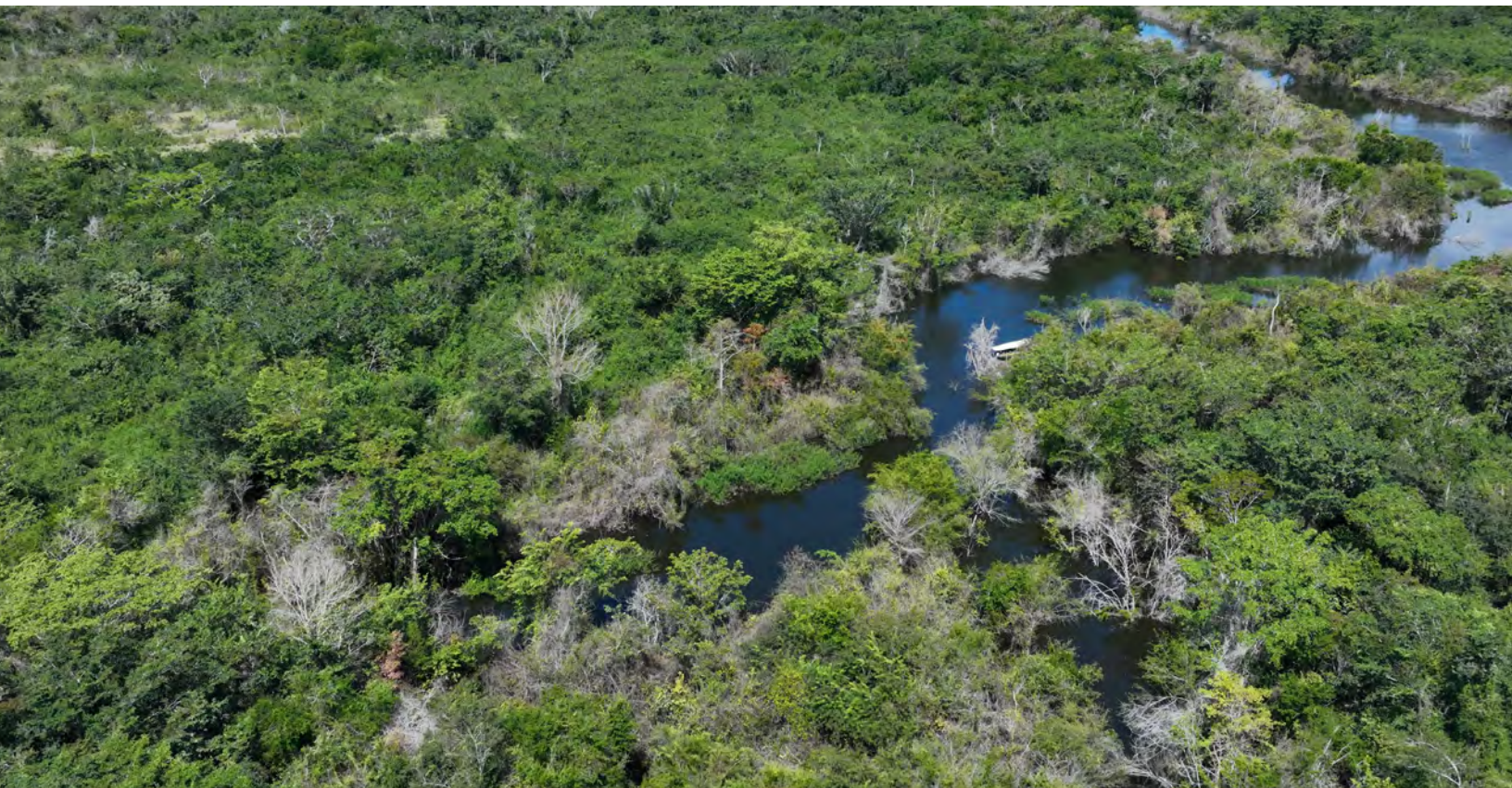
We take the boat from hotel Ecolodge El Sombrero to Topoxte Island and Rio Ixtinto in the morning because you can sometimes see more birds in the morning. Then we return to the Ecolodge El Sombrero for a yummy lunch and a few minutes of R&R. Then we head out to other areas of the park for the afternoon. Prior to leaving in the afternoon, Haniel Lopez devoted patience and expertise to do a video of mommy hummingbird flying back to her nest. For still photos there are only the best view with just beinthe eggs. This was about one meter in front of the porch of one of the nice bungalows in front of the restaurant. Juan Carlo de la Hoz kindly showed us where the nest was. We have found lots of hummingbird nests when we hike through the forests. You can see them because most are at eye level; this nest was even closer to the ground; I don't understand why animals don't climb up and eat the eggs or recently born chicks when the mother puts the nest not even 2-feet above the ground.



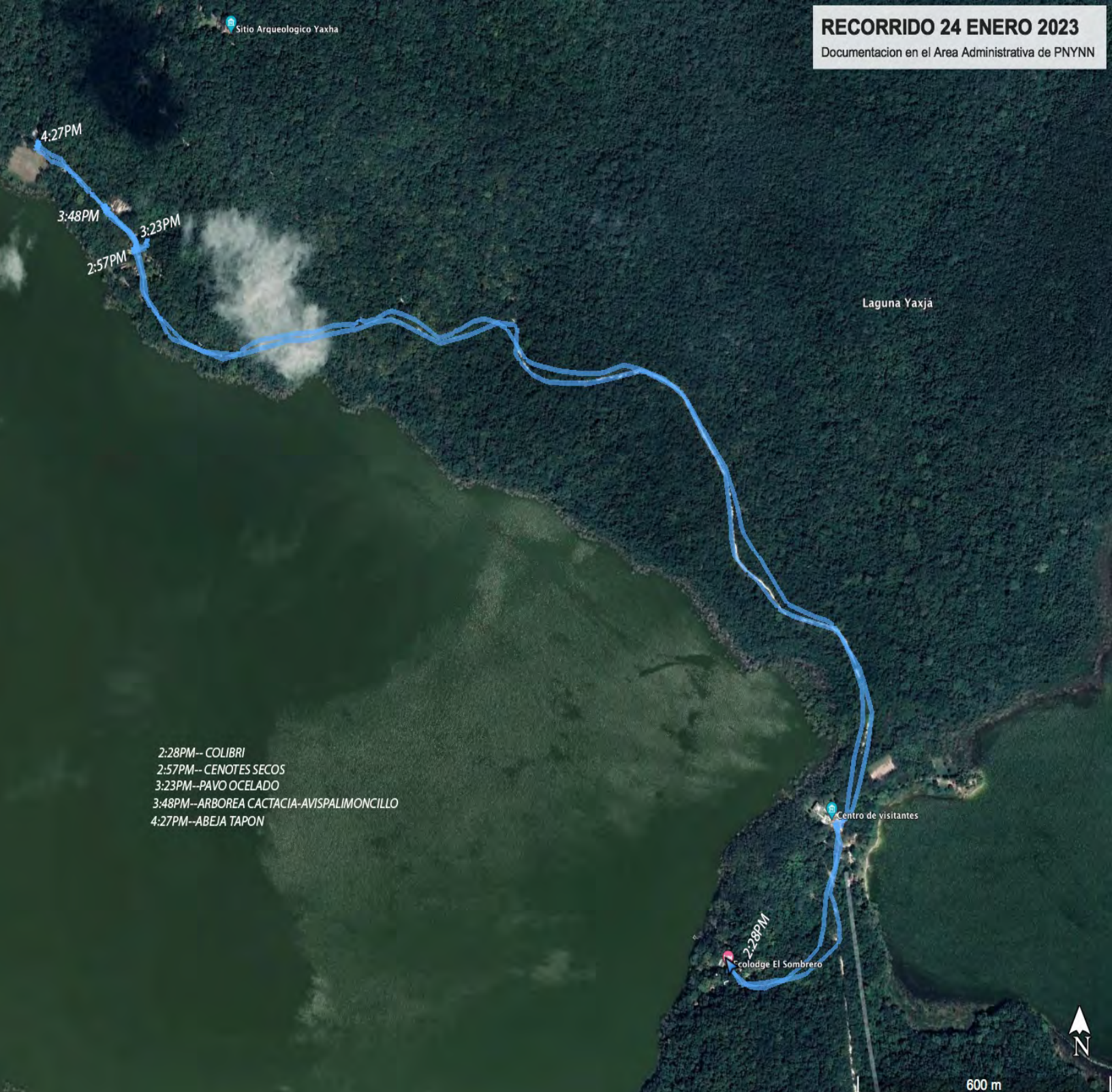
Eggs in nest of hummingbird. This bird is used to people being nearby since it made its nest between the parking area and the hotel, so people pass by the nest all day long. Photo by Haniel Lopez, Sony A7C, 50mm macro lens, January 24, 2023 adjacent to bungalow of hotel Ecolodge El Sombrero.



After we photograph as many stingless bee hive entry-exit tubes on Topoxte Island, we hike downhill back to the boat and proceed up Rio Ixtinto. This view by the aerial camera is to the south/southwest. Photo by Haniel Lopez with FLAAR done, DJI Mavic 3, January 24, 2023, morning. FLAAR Photo Archive.



This is a view you can't get even from high-resolution satellite view because with the FLAAR drone you see the Rio Ixtinto in diagonal angle. Aerial photo by Haniel Lopez with FLAAR drone DJI Mavic 3. FLAAR Photo Archive.



Our goal this afternoon was to get aerial photos of the two dry cenotes. The two wet cenotes are at the far west of the lake. The two dry cenotes are where the IDAEH park facilities are. There are also three conjoined cenotes several kilometers to the far west then north. We explored that area in the project of 2018-2019. Now that we have aerial photos of each cenote we will prepare a FLAAR Report later this year to show all seven of them. Surely more are buried out in this karst area. Now that we have aerial photos of each cenote we will prepare a FLAAR Report later this year to show all seven of them. Surely more are buried out in this karst area.



Wild ocellated turkeys are the easiest to see in PANAT; in past years foxes were easiest to see at Yaxha. But on this January field trip we were pleasantly surprised to see happy wild turkeys hiking around the office area of the park. It is essential to be able to see and study every design, every color of each bird that were of interest to the Classic Maya.

This is why we do high-resolution photographs of as many species as possible so these photos are available to iconographers and epigraphers. Ocellated turkey (*Meleagris-ocellata*) photo by Edwin Solares with Sony A1 200-600mm.



To study the birds in iconography and epigraphy it helps to have a close-up photo of each bird's head. This is because it is often only the head which is used as a hieroglyph. Often the Classic Maya made "composite creatures" which is like Quetzalcoatl is a snake with feathers. So no surprise that there are LOTS of other composite creatures in Classic Maya art.



When an animal is solid black it's a challenge to see it under the treetops. This photo is essential to help conserve these spider monkeys (*Ateles geoffroyi*) because this photo shows precisely what the young monkey enjoys eating: seed pods of a common local palm.

Photo by Haniel Lopez, Sony A7C, 200-600mm lens, January 25, 2023, Yaxha, PNYNN.



Whereas top is solid black; underside is white, so easier to see when sun is shaded by the treetop leaves. Photo by Haniel Lopez, Sony A7C, 200-600mm lens, January 25, 2023, Yaxha, PNYNN.



Some trees have mostly arboreal cactus vines wandering around. Other trees have primarily clumps of bromeliads. These tree branches are primarily arboreal cacti. This is a photo you can accomplish with a prime telephoto lens (prime means it's not a zoom). Nikon D810, Jan 24, 2023, 3:30pm, base of hill north of lake shore at back of park vehicle repair area.



With a RAW format file (DNG) you can see detail if you zoom in on a 32" 4K or 5K monitor. We show the whole scene (not zoomed in). Another alternative is to rappel up and see everything eye to eye. That would be essential for a PhD student. But it can take one or two hours to get the rappel system to catch onto an upper branch, etc. We recommend rappel team but that would need a separate budget.

Whether you are a biologist, botanist, zoologist, or ecologist having a good drone is essential. We started learning about drones about 6 years ago. All the drone pilots had wide-angle cameras on their drones. These were "better than nothing" but their distorted wide-angle made the photos not as scientifically accurate as we would prefer. I call these "drones for hikers and bikers" (in other words, family-friendly drones for vacations and weekend trips).

So gradually the drone pilots improved their drone selection based on our suggestions, but finally we decided to get an even better drone ourselves, the DJI Mavic 2 Pro (about 3 years ago). We registered the drone and have a professional drone pilot (Haniel Lopez on the January field trip or Emanuel (also capable, experienced and professional drone pilot) on other field trips).

With the help of a donation by a family in recognition of the botanical work of botanist Dr. John D. Dwyer (who collected at Yaxha same year FLAAR was mapping the site), we now have the Mavic 3 (all reviews on-line said the the Mavic 3 Cine was so incapable that we did not even try it out; the Mavic 3 is more reliable). Then with this 100MP camera and special software we can achieve even better photos (500% better since the average drone is about 20 megapixels).



When the sun is low (circa 9 to 10am morning and 4 to 5pm afternoon) you can get better photos of the arboreal plants that wander around the upper limbs and branches of the tall trees in the rain forests of Yaxha and Tikal national parks (these parks are adjacent to each other). Yaxha between base of hill and lake; photo by Nicholas Hellmuth, Nikon D810, 800mm lens, January 23, 2023, afternoon.

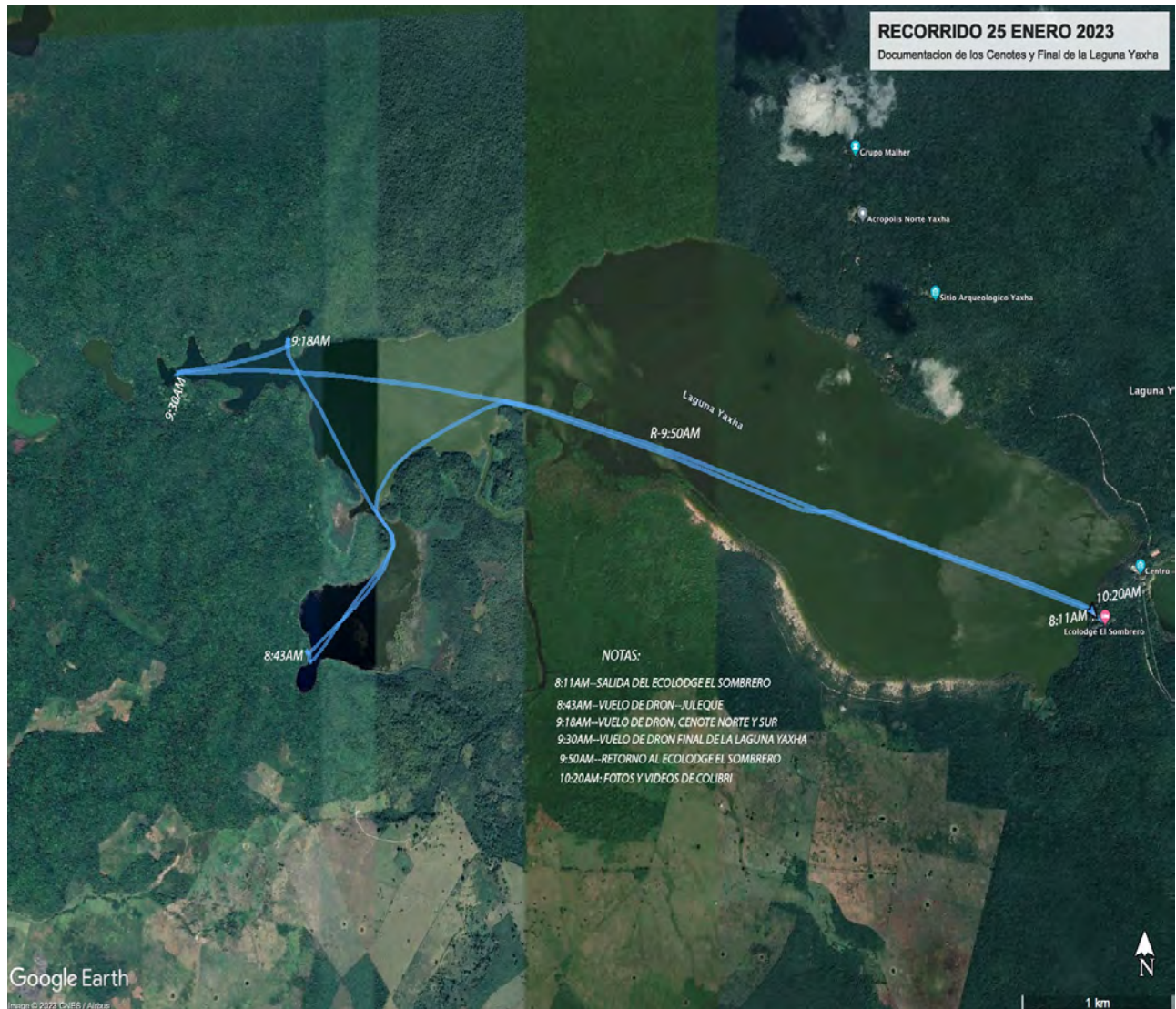


Since not many biologists have prime lenses (they use extreme zoom which is not quite as good quality) we have been requested by local national parks to take crisp photographs of arboreal plants. This is one of several species of arboreal cactus. Yaxha, lower level in park administration area. Photo by Nikon D810, 800mm prime lens and necessary tripod, gimbal head, etc.

As soon as Canon has a high-resolution mirrorless R-series camera that has in-camera stabilization we will move to that because their 800mm telephoto lenses costs only \$890 and has Optical Image Stabilizer inside the lens. Plus the lens is lightweight. The original 800mm lens for the old-fashioned DSLR Canon camera costs \$16,999 and weighs more than I wish to carry while hiking many kilometers every day deep into remote areas (we obviously do not have the original lens due to its cost and weight).

Wednesday, January 25, 2023

The previous morning the wind was too strong so it was best not to launch the drone. So on Wednesday morning the drone team returned to the lake and the rest of the team drive 40 minutes to a marshland area that migratory wading birds love.



Haniel (drone pilot) and Byron (assistant in many aspects of photography) went in the lancha kindly provided by the Ecolodge El Sombrero to return to the west end of the lake early in the morning of January 25. This is because the wind was too strong to risk flying the drone by noon the previous day; so the team had to return earlier to escape the wind.



Paxte Island looking north from edge of much larger Topoxte Island. Google Maps has the wrong name on Paxte (Google maps calls it Topoxte; Paxte is the smallest of the three main islands). As the lake level rises and falls the size and shape of the islands varies. Autumn-Winter 2022 and early 2023 were very high-water levels. That is why everything is surrounded by white trees. When the tree roots and base of the trunks are flooded for several months, the trees die and lose all their leaves. Then a white material forms over them. You can see this remarkable "whiteness" on a boat tour. You can rent a boat with driver at Hotel Ecolodge El Sombrero or at the Visitor's Center at entrance to Yaxha (to the left of the parking lot). Best to reserve in advance. The weather was perfect in January so drone pilot Haniel Lopez got great views with the FLAAR drone, DJI Mavic 3.



Here you can see Cigüeña Americana, *Mycteria americana*, and lots of Great White Herons with lots of *Nymphaea ampla*, white water lilies. Notable that the water is not very deep but these water lilies love the pure direct sun all day long. All these bird species are here because they are wading birds; not swimming and not diving waterbirds.

Photograph by Nicholas Hellmuth with 800mm prime telephoto lens on Nikon D810. We use Gitzo tripod and Wimberley gimbal tripod head. Next time we visit here we need to contact the property owner in advance to get permission to enter the area so we can get much closer. These photos were from the edge of the highway which is about 3 to 4 meters above the level of the marsh. 9:12 am, January 25, 2023



We like to photograph all waterbirds (and all raptors) because when the Classic Maya artists show bird deities the wings of the bird are open and there is a serpent face or other design in the feathers of the open wing. When I began to look at the actual wings of actual birds I noticed that the wing bones, muscles and feather color do actually form a design that inspired Maya artists. To see the details you have to “freeze the wing movement” so there is no blur. Plus it is essential to have strong sun (to light the different details of the wings when open for flight). To get the best details obviously it helps to be as close as possible. At La Polvera we need to return in December 2023 and/or early January 2024 and climb down from the highway to the marsh and then get closer to the birds. During this quick inspection on January 25, 2023, the idea was to take notes to prepare plants for eco-tours for bird watchers in the future. We met with the Alcalde of La Polvera (he came to meet the team when invited by our guides; definitely helps to have guides who know local people).

Another obvious aspect of our interest are all the *Nymphaea ampla* white water lilies that are growing in this marsh. So although “part of a river” this area is really a marsh of non-moving water. Yet it has more water lilies than Laguna Sacnab (Sac Nab means White Waterlily...) And this marsh has 1000x more water lilies than the entire Lake Yaxha and Rio Ixtinto (which curiously have zero, literally, no water lilies in the river nor anywhere in Lake Yaxha).



Great White Herons are the most common bird on this day, but there were also other species that you can see here such as the two *Ardea herodias*, Great Blue Heron in the middle and one *Mycteria americana*, wood stork at the right. In the caption of the following photo we list the five birds that we saw within the 20 minutes that we had available (since our goal today was to continue exploring Yaxha, about 50 kilometers away).



The antiquated Nikon D810 does not have bird-eye focus. This camera also is not as good as the heavier Nikon D5 for photographing birds-in-flight. Nonetheless I was able to crop and get a viable view of the bird taking off. This image is cropped from the center of the image above. We take all photos simultaneously in JPG and RAW (NEF format for a Nikon).



Here you can see one pink flamingo, several wood storks, Cigüeña Americana, *Mycteria americana*, and lots of Great White Herons with lots of *Nymphaea ampla*, white water lilies. Notable that the water is not very deep but these water lilies love the pure direct sun all day long. All these bird species are here because they are wading birds; not swimming and not diving waterbirds. The birds are identified by Victor Mendoza, FLAAR Mesoamerica.

- *Ardea herodias*, Great Blue Heron (two are in the previous photo above).
- *Ardea alba*, Great egret, also called great white heron.
- *Egretta thula*, snowy egret is the smaller of the white herons.
- *Mycteria americana*, wood stork is the large bird with gray head to the right of the pink
- *Platalea ajaja*, Roseate spoonbill is quite rare here ("zillions" of them are in the Yucatan Peninsula).

Photograph by Nicholas Hellmuth with 800mm prime telephoto lens on Nikon D810. We use Gitzo tripod and Wimberley gimbal tripod head. Next time we visit here we need to contact the property owner in advance to get permission to enter the area so we can get much closer. These photos were from the edge of the highway which is about 3 to 4 meters above the level of the marsh. 9:12 am, January 25, 2023. If you like birding and waterbirds in particular, you can join the FLAAR team on our December 2023 and/or January 2024 field trip to the same area but staying several days and doing photography from close-up. Plus going to another wading waterbird area about 40 kilometers away (so not far).

When back from the birds we went with the drone team and hiked into other areas of the park. While we were preparing the 4x4 double-cabin pickup truck, Edwin Solares photographed the teeny tiny gold-colored stingless bees not far above the floor, in a crack in the wooden post at the northeast corner of the Ecolodge El Sombrero restaurant.



Brown pelican at the edge of the forest overlooking Lake Yaxha. *Pelecanus occidentalis* is the most common pelican here and in Rio Dulce. We see the white pelican more often in the Pacific Ocean area, inland in the swamps, rivers, and lakes near Monterrico. Photo by Haniel Lopez, Morning of January 25, 2023, Sony Alpha 7C, 200-600mm telephoto.



Brown pelican, *Pelecanus occidentalis*, near the shore of Topoxte Island, Lake Yaxha. Photo by Haniel Lopez, Morning of January 25, 2023, Sony Alpha 7C, 200-600mm telephoto.



Cenote at southwest corner of Lake Yaxha. Aerial photo by Haniel Lopez with registered FLAAR DJI Mavic 3 drone. January 25, 2023.



This is the Northwest Cenote of the Lake Yaxha area. Aerial photo by Haniel Lopez, January 25, 2023. The most remarkable of all cenotes in this park is the "triple conjoined cenote" laguna to the west and then north. We have hiked there several times and published it "Three Conjoined Cenotes."



Every hundred meters you see symphonies of different colors and different species high up in the tree tops. When the sun is low (morning or afternoon) the epiphytes on the tree limbs are easier to see and photograph. This remarkable mass of arboreal trees is behind the vehicle maintenance facility of the IDAEH area of the park administration. There are two dry cenotes to the east and north.

Most of the really tall trees of Guatemala and adjacent countries of Mesoamerica (Mexico down to Costa Rica) are filled with wild orchids, bromeliads, Aroids, mosses, ferns, and lichen. There is 3-dimensional lichen on small twigs up in these trees. So one single tree is a veritable botanical garden by itself. Our goal is to document the hundreds of species that result in thousands of plants that grow on a single tree to make the point: "if you cut down one single tree you exterminate over a thousand plants."



We of FLAAR know this is a cenote (even though “you can’t see it” because we had to hike around it every day for several months each year during the early years (1970-1971) when the camp was up on the hill. After the then President of Guatemala visited, he kindly had FYDEP open a trail into a new area closer to the lake (so we could more easily get cooking water and a place to shower). But in the first two years I lived in a treehouse over the edge of this cenote. There was not enough flat land and so after the main dormitory and the kitchen/dining room occupied the only flat area available, I had horizontal poles put out to tie onto tree trunks on the cenote cliff. Then put poles on all four sides (each corner of the “treehouse” was a living tree; we did not cut down trees). Then a thatch roof was placed overhead. No walls whatsoever (obviously had a mosquito net to sleep under). Was quite an experience to literally “live in the jungle” in the 1970’s.

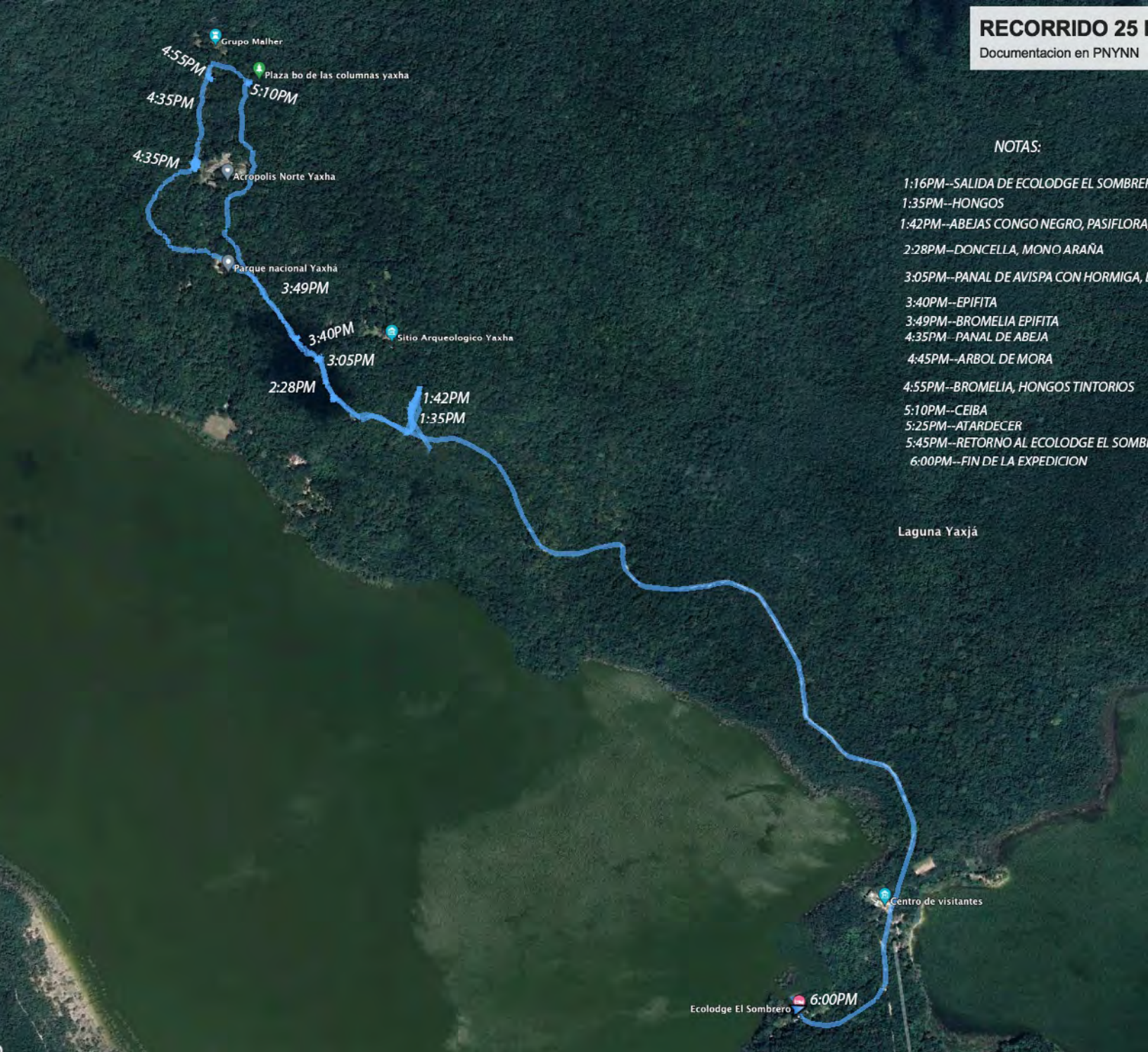
Then a kind soul made a donation that allowed FLAAR to construct a research center and I slept on the second floor at the upper end. This building was so well built in the 1970’s that it still stands today as a bodega for INAH. If you are a geologist or a geology focused archaeologist, it would be great to figure out how the two “dry cenotes” were used by the Classic Maya two thousand years ago.



Lower dry cenote, north (behind) the IDAEH camp shower area. Both cenote aerial photos with registered DJI Mavic 3 drone; piloted and with photographs by Haniel Lopez, January 24, 2023.



View down into one of the dry cenotes at Yaxha. This is the one behind the Centro de Informacion. You can enter down into the cenote but our job is to find them and indicate where they are so that geologists and archaeologists can know where to plan their own separate field work. Since both these cenotes are in front of the ancient city of Yaxha surely they were used by the Classic Maya. This photo was taken on August 10, 2021, 12:34pm, with iPhone 12 Pro Max, by Nicholas Hellmuth.



This afternoon we all hiked from the parking lot to the far northwest (to Grupo Maler). We photographed a lot of stingless bee entry-exit tubes en route.

The 1:35 and 1:42 time points are on the turnoff towards Nakum. Since the road has been totally destroyed by high-tire sports 4x4 weekend mud-spinning people, we had no way to get even near, but we know that the first hundred meters always has surprises: in this case mushrooms and a gorgeous Passiflora flower.

At 5:10pm we reached a young very colorful *Ceiba pentandra* tree that we know from many previous field trips. We show that below. We then hiked to Temple 216 to photograph the sunset, and were back at the hotel Ecolodge El Sombrero at 6pm.



During our 2018-2019 field trips in PNYNN, park ranger Teco (Moises Daniel Perez Diaz) showed us ant nests (suspected from tree branches) that had bee hives inside the ant nests. So a bee tube sticks out the ant nest. These ant nests are dirty-white color and are on lower branches of the trees. The black ant nests are a different species and are so high up in trees we don't know whether they have bee tubes sticking out of them or not. Termite nests also frequently have a wax bee tube sticking out. We show those in separate pictures.

In the future we need to use a 1.4x tele-extender so we can get an even closer view of the teeny tiny stingless bee tube (less than 1 cm in diameter). Photo by Nicholas Hellmuth at Yaxha, 800mm prime telephoto lens on Nikon D810 on a Wimberley WH-200 Gimbal Tripod Head II atop a sturdy Gitzo tripod. All the ant nests that have bee tubes sticking out have been found by park ranger Teco (Moises Daniel Perez Diaz). He has assisted us on field trips 2018-through-today with his decades of local knowledge.

We do not yet have funding for a digiscope to attach to our cameras with adapter from Novoflex (Made in Germany quality). With a

- Swarovski spotting scope X-series (digiscope)
- Novoflex or Swarovski camera and viewing accessories
- Digiscoping adapter (to connect the digiscope to your camera)
- Carrying case

Then we could have captured a view of the stingless bee area of this termite best HIGH up in the trees at Tikal. The bee entry-exit tube is not even 1 cm in diameter.



We also found an amazing *Passiflora coriacea* flowering in the road to Yaxha. Photo by Edwin Solares with Sony 90mm macro lens on a Sony A1 camera.



The wing of these black bees is almost the size of an entire yellow bee (in other words, most wild native black bees are larger in size than many species of yellow/gold colored bees). The entry-exit tubes of black bees are often oval rather than round (yellow/gold bees have round entrance shape).

I have learned that it is best that a bee specialist identify the bees. So, I now focus on finding and photographing the bees. Within a few months we will have a permit to collect bees to make these available to bee specialists in Guatemala so the macro photos of these samples can be shared with bee specialists in Mexico and USA to reach an identification as to genus, species and local name.

Congo negro is the local name. We estimate this may be a *Scaptotrigona mexicana*. As soon as a collection permit is available we can provide specimens to entomologists who can put the specimen under a microscope to identify them for sure. Photo by Edwin Solares with Sony A1 90mm road to Nakum.



Any and every time we see an entry-exit tube of a stingless bee hive we stop to photograph the bees and their engineering capability (with wax, resin and other materials that can be “glued together”. In late 2022 bee researchers noticed that we were able to hike to remote areas and document bees and that FLAAR also had a team that takes botany, zoology and ecology documentation to prepare books for children on the flora, fauna, and ecosystems of Guatemala. So now in 2023 we are dedicating even more time to find bee entry-exit tubes (the actual hive is deep inside a fissure in the trunk of a tree or other cavity). What we show here is the first “dual tube” shape. These wild native stingless bees are tiny (the entrance tube diameter is less than 2cm wide; often 1 cm wide).

Photo by Nicholas Hellmuth, Yaxha part of PNYNN, Jan 25, 2023, afternoon, Nikon D810 with 60mm macro lens with ring lights to provide digital illumination.

At Tikal we work together with the PANAT biologists. They have been working in this area for years so know which flora which fauna can be found in which areas. Plus they have a helpful list of what parts and what aspects of the park can benefit from the macro photography, telephoto photography and aerial drone photography coverage of the FLAAR team.





Most of these entry-exit bee tubes have a curled end at the top. And most have holes all over the tube. Yaxha, January 25, 2023, 3:12 to 3:21pm, photos by Nicholas Hellmuth, Nikon D810, 600 macro lens.



This spider monkey is telling all of us what it obviously likes to eat. Photograph by Edwin Solares, Sony A1, 200-600 telephoto lens, January 25, 2023, 3pm, Yaxha area of PNYNN, RBM, Peten.

Conical spines of the trunks of *Ceiba pentandra* trees are pictured on Maya ceramic incense burners and urns and occasionally other ceramic offering vessels. The Ceiba tree is the National Tree of Guatemala and was the sacred tree of the Maya, Mixtec, Aztec and other people of Mesoamerica.

Since anyone and everyone who works in Guatemala knows that the tree has these spines, it is understandable assumed that this *Ceiba pentandra* tree is the source of the conical spines on ceramic incensarios. Spines of the relative *Ceiba aesculifolia* are occasionally twice as long and this tree grows primarily in seasonally dry bosque seco areas surrounded with cacti. But we at FLAAR have dedicated lots of field trips to find, photograph, and document all the other trees that also have spines of the identical size and shape as those on Classic Maya ceramics... but the other trees that we find and identify are neither Ceiba nor in the same Malvaceae family whatsoever (originally family was named Bombacaceae but that has changed over time).

We have been photographing the conical spines (botanists call them prickles) on trunks of Ceiba trees for half a century. In the recent two decades we have searched forests throughout Guatemala for all the other genera of wild native trees with conical spines. One of these trees produces a latex that is the most deliciously sweet milk that I have ever tasted. A relative of some of the leche-miel trees are used to make cheese elsewhere in Latin America. As soon as a foundation or family or kind soul can provide a realistic donation we would like to put our years of study of tree spines in Maya culture into a coffee table book.

Each Ceiba tree and each of the other trees have their own individual pattern of spines. The tree we show here we found during our August 2018-July 2019 project of coordination and cooperation with the park administrators of Yaxha. So now that we know where this tree is, we often return with different kinds of portable lighting equipment to capture good views of the size, shape, position, quantity of these spines on this particular tree. About 60 meters from one corner of Grupo Maler, Yaxha, PNYNN, RBM, Peten. Photo by Nicholas Hellmuth, iPhone 14 Pro Max, with four hand-held ring lights (held by the team of photography assistants). January 25, 2023, after 5 pm. From here I hiked at high speed to reach Temple 216 to photograph the remarkable sunset.





Rhinella marina, "Bufo toad".

Bufo toads in Classic Maya art have a round circle near the eye or near the end of the mouth.
Photo by Haniel Lopez, Sony Apha7C, 50mm close-up lens; late night, January 25, 2023.

Thursday afternoon, January 26, 2023, Tikal (PANAT)



We estimate this aguada was bulldozed to create a water source during the 1960's construction of the airport landing field at Tikal. Obviously today no more planes are allowed to land anywhere near the temples and palaces of Tikal so the old airfield has been reforested. But the waterhole still holds water for happy local crocodiles and water birds such as the Boat-billed Heron.

Panorama mode of iPhone Pro Max by Nicholas Hellmuth, January 26, 2023, 1:34pm.



This is an aerial view of the crocodile aguada where we had a totally absolutely wonderful two visits (two different days), each day finding lots to photograph.

Please do not hike here alone by yourself; always stay with a local licensed guide.

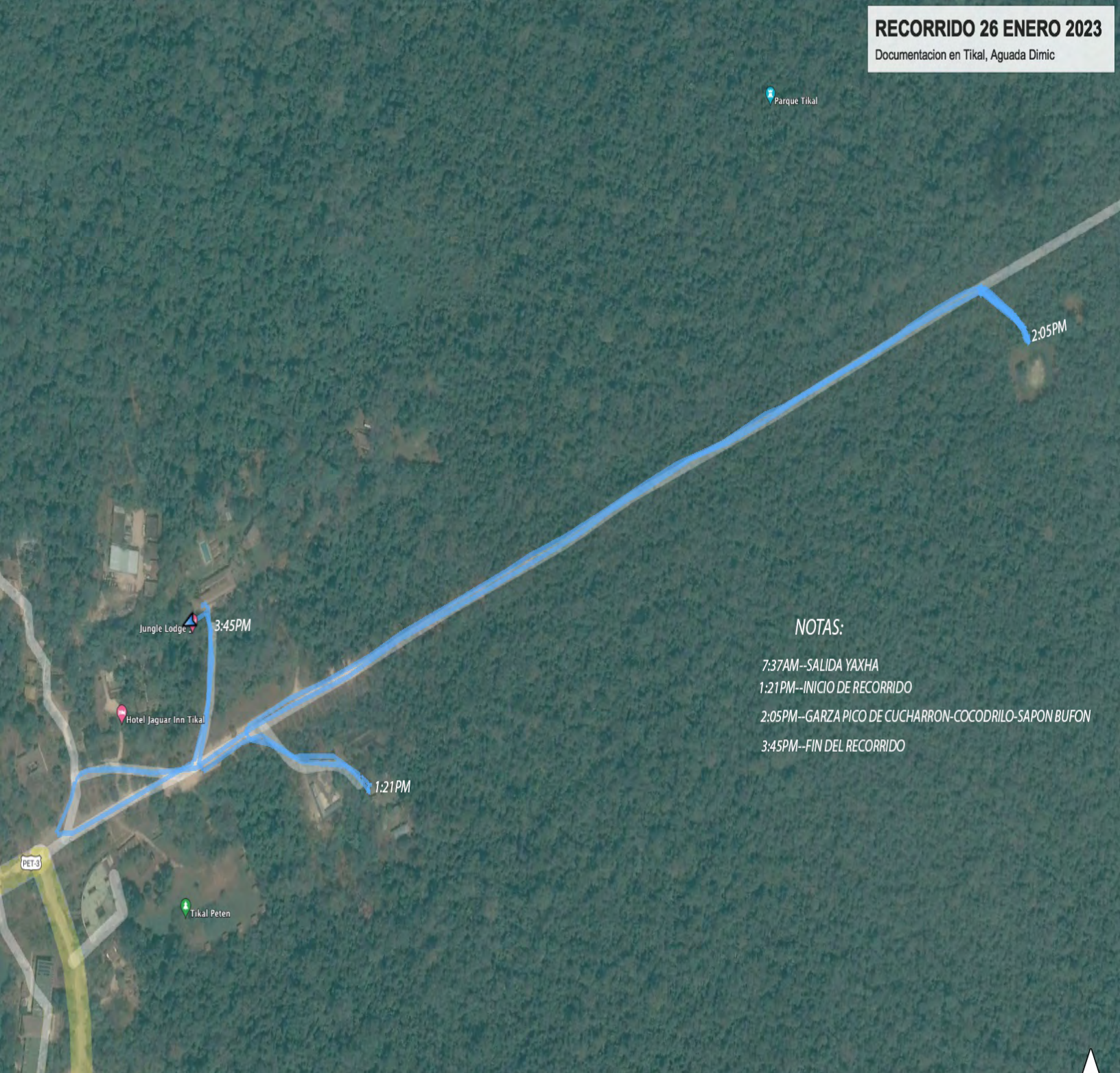
Aerial photo from the FLAAR drone, DJI Mavic 3, piloted by Haniel Lopez, January, 2023, PANAT.

The trail to this aguada has several signs warning tourists not to get anywhere near this small lagoon. But since our job is to find and photograph every reptile, every waterbird, we were very happy to arrive at crocodile heaven. No alligators in Peten.



Here you can see the healthy sized crocodile floating on the surface of the water. For obvious reasons we do not wade into this water area to get closer to the birds on the other side.

Photo by Haniel Lopez, afternoon of January 26, 2023, Sony Alpha 7C with 200-600mm lens.



NOTAS:

7:37AM--SALIDA YAXHA

1:21PM--INICIO DE RECORRIDO

2:05PM--GARZA PICO DE CUCHARRON-COCODRILO-SAPON BUFON

3:45PM--FIN DEL RECORRIDO

Today we drove from Yaxha to Remate to have breakfast at Hotel Casa de Don David. I like the moringa in freshly squeezed orange juice (I have 2 large glasses of this healthy drink each meal there). Then we drove to hotel Tikal Inn. We like this hotel, the owner, manager, cook and restaurant staff.

After lunch the Tikal park biologists showed us the crocodile aguada/swamp at the far west end of the former 1960's airport landing strip. We were super pleasantly surprised by the presence of boat-billed herons, during the day, not hidden behind branches and leaves. I also found a "Bufo toad" about a hundred meters away from the swamp area.



If you come to Guatemala you can see actual live parrots, wild, and native to Tikal National Park. Photo by Haniel Lopez, January 26, 2023, Sony Alpha 7C with 200-600mm lens. The oblong brown shape is a seed pod. I estimate this is a caoba tree, *Swietenia macrophylla*. This is the endangered mahogany tree of Central America.

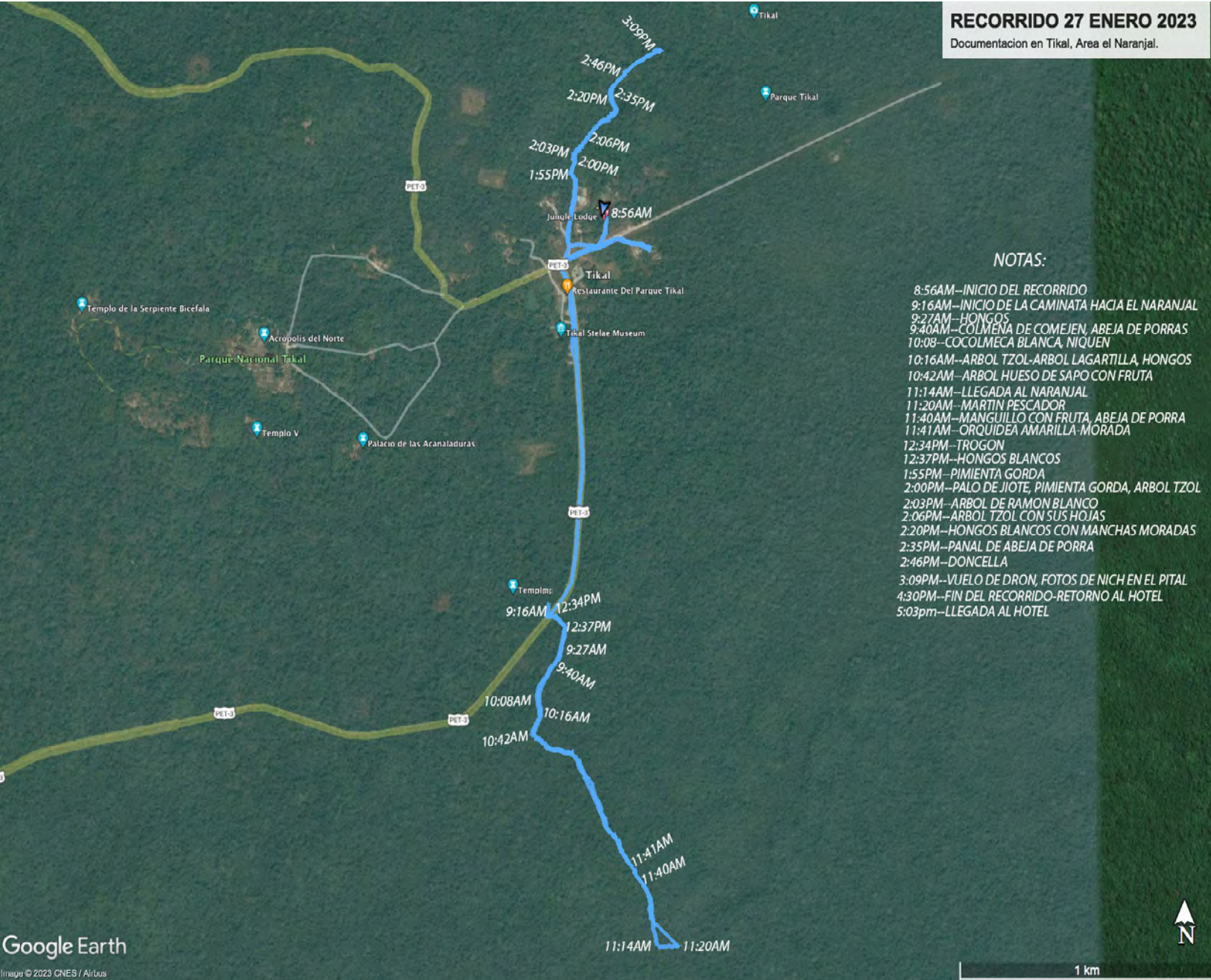


The boat-billed heron can be found in branches over most aguadas of Tikal. We have also found this bird along the shore of Rio Ixtinto, Lake Yaxha area.

The crocodile aguada is over a kilometer away; the bird here is on the edge of the aguada behind the stela museum/Visitor's Center at the entrance to the park area.

Photo by Haniel Lopez, January 26, 2023, Sony Alpha 7C with 200-600mm lens.

January 27, 2023 hiking south into the forests to Arroyo Negro and then north to Pital area



The route today (January 27, 2023) was selected by the park biology team. In the morning we hiked to "Arroyo Negro" and after lunch hiked north to the pital (area that has bromeliads, *Aechmea magdalenae*, whose leaves produce the best pita (string) of all Guatemala).



More mushrooms during the rainy season and for a month or so after. So in January there are still a lot of mushrooms. We found so many mushrooms at Tikal that we will have a separate FLAAR Report on these fungi. We use primarily ring lights but on future field trips will be also rectangular portable lights (obviously battery operated). Since most of these mushrooms are in areas with trees all over the place, there is no direct sunlight. To show the profile, and constantly undulating shape, it is essential to have portable lighting (and a place to recharge all the batteries every night). Thus we appreciate the facilities kindly donated by Hotel Tikal Inn plus the space in the restaurant to charge everything and then work at the table to type up our field notes.



I love to find miniature plants that I have no idea what they are. So, I took snapshots of little fern-like plants that local people said were lichen; I first thought they were miniature ferns; but Victor Mendoza suggested they were mosses, possibly Neckeraceae. Samuel Herrera Duarte also agreed that these were moss not ferns.



The tree that I noticed most often while hiking along trails at PANAT were Tzol, *Blomia prisca*. Surely they exist at nearby adjacent PNYNN but they were “everywhere” along the trails we were hiking today at PANAT. The indentations and other irregular aspect of the trunks were on almost every Tzil tree. Also notice the diagonally-upright stems sticking out of parts of the trunk. Plus this tree has peeling bark (to help keep vines and other things from growing on the trunk).

Photograph by Nicholas Hellmuth, iPhone 14 Pro Max, January 27, 2023, 10:17am, FLAAR Photo Archive.



"Pulpito" Orchid (*Prosthechea cochleata*) flowering. Photography by Edwin Solares with Sony 90mmmacro lens on a Sony Alpha 1 camera.



I am keen to find and photograph every tree in Guatemala that is named Palo Lagarto, "Crocodile tree" because actual crocodiles shown as trees are common on Proto-Maya stelae at Izapa (Chiapas, Mexico) and in painted and incised ceramics of Peten. As typical with generic Spanish names for trees in Mayan ecosystems, lots of different genera and species get the same name, Palo de Lagarto. Local guides told us this is *ruda silvestri*.

Photo by Nicholas Hellmuth, iPhone 14 Pro Max, trail at Tikal to Arroyo Negro, Jan 27, 2023, 10:24 am.



This bird, Woodpecker (*Celeus castaneus*) has well developed ability to hold on to the side of a tree. PANAT, January 27, 2023. Photo by Edwin Solares with Sony Alpha A1 with Sony 200-600mm lens. We do not recommend using 3rd-party low-bid telephoto lenses. If you are hiking for miles into remote areas and you see a bird it helps to have a good camera and comparable lens.



A pital is a place where there are many hundreds of spiny *Aechmea magdalenae* bromeliad plants, en masse. There is no way to hike into this area because of the thorns on both sides of every bromeliad leaf. So we do our photography from the edge. It is important to find these pital areas and show them on a map so that archaeologists know where they are. Most of the pital areas that we found and documented in nearby PNYNN were around a seasonally filled aguada; the biologists at PANAT said that aguadas are not always visible near a pital in the Tikal park areas. So will be helpful in the future to find, study, and photograph every pital at PANAT and tabulate which have an aguada and which not. Then soil scientists can undertake their own separate project, assisted by the FLAAR GPS maps that show the location.

The seeds with surrounding pulp of *Aechmea magdalenae* are edible; the fiber from the leaves is considered one of the best fibers of Guatemala. When conservatists are reforesting cattle ranches, we would suggest they consider planting *Aechmea magdalenae* around the aguadas to reforest these areas. Photo by Nicholas Hellmuth, iPhone 14 Pro Max, January 27, 2023, 3pm.



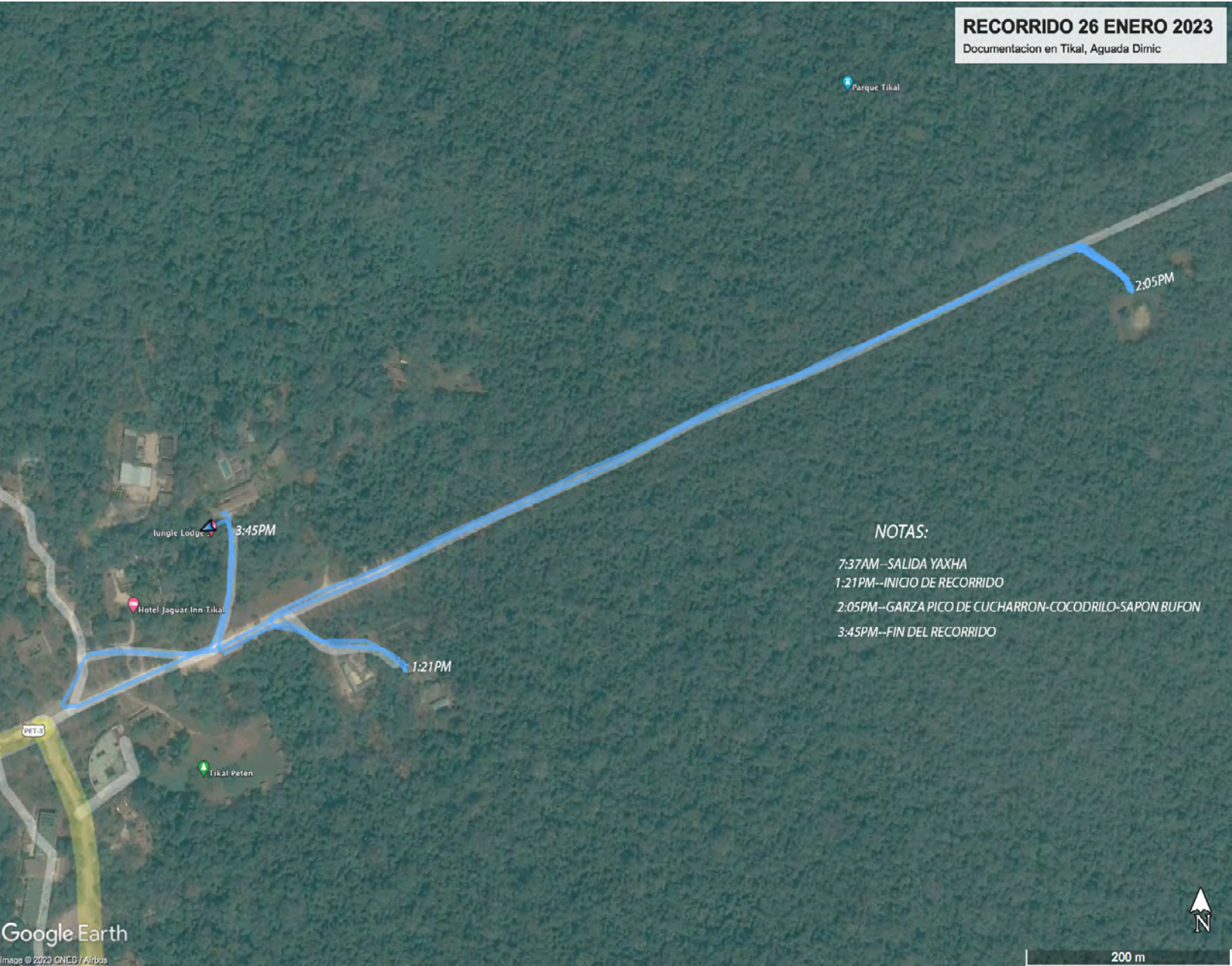
You can see the light-orange wax tube sticking out the upper center of this former termite nest. We saw no termites although the nest looks in relatively good condition. This is about the fourth stingless bee entry-exit tube that we have found in termite nests. The ones we see are at eye level; the termite nests high in trees would require a digiscope to find and photograph the exit tube.



Join our adventures in the Reserva de la Biosfera Maya (RBM) in Peten, Guatemala. Lots of pyramids, temples, palaces, acropolises, and ballcourts but our focus is tropical flowers, animals and biodiverse ecosystems related to Classic Maya culture.

As you can see here we especially enjoy exploring areas filled with vines. The pital (area of masses of terrestrial bromeliad *Aechmea magdalenae*) is to the left and behind.

Sunday morning, January 28, lots of Birds to Study



This morning we drove back to the crocodile aguada/swamp to see if there were more boat-billed herons than we saw two days before. There were not only 300% more of these birds, they were all out in the open (not hidden in thickets). So we had a chance to photograph them endlessly (with telephoto lenses since there is no way to wade into a crocodile-filled swamp). Haniel got great photos of the crocodiles.



Every day the waterbirds may be on different tree branches. And some branches may have so many other trees in front that you can't photograph the boat-billed herons. (*Cochlearius cochlearius*) If you are in a crocodile aguada or crocodile swamp you can't wade into the water to get a better view. So for any swamp you have to return another day and hope the next day the birds are easier to photograph. Today we saw and photographed more boat-billed herons than I have seen in the previous half century.

We estimate these are juveniles and have not yet learned from their parents that during the day they are supposed to be asleep and are supposed to perch hidden behind many layers of branches. These young birds are out in the sun on the other



I have no idea why the crocodile does not eat these birds that are right on the surface of the water. Plus these young birds need to learn that they are supposed to fish at night, not during the day. We thank these young boat-billed herons for posing for us for hours this morning. And we really appreciate the two park biologists who showed us how to get to this aguada two days before.

Photo by Nicholas Hellmuth, January 28, 2023, Nikon D810 camera with 800mm prime Nikkor lens on Wimberley Gimbal tripod head on Gitzo tripod. It helps not to use low-bid wobbly tripods.



Experienced linguists and epigraphers are experts at reading and translating Mayan hieroglyphs. Scores of hieroglyphs show the faces or complete bodies of toads, snakes, turtles, vultures, waterbirds, raptors (eagles, owls, etc.), felines and other animals. But, to improve the accuracy of identification of fauna in Maya art and hieroglyphs it helps to be out in the Maya area in-person, seeing the wild animals up close.

Over 50% of captions for Olmec and Teotihuacan representations of the boat-billed heron call it a duck (obvious, the wide beak looks like a duck). But these are not ducks; they do not swim all day long; these are wading birds, usually at night. The birds here at Tikal are out in full sun and are on a fallen tree that has no branches and no leaves whatsoever.

If you are a biologist, ecologist, botanist, or zoologist, if your natural history museum, university, or donor can cover the costs of one entire full-week field trip, you and colleagues or you and students are welcome to join our team for a week. Our goal is to share scientific knowledge (in other words, not to hog everything for ourselves). Please be realistic about venomous snakes, crocodiles, insects, tropical diseases, etc. Dr Hellmuth has survived the rain forests since age 16 when he explored the rain forests of Tabasco, Mexico, in 1961. But all the medics and nurses in the emergency room know him from his frequent appearances. So be sure you have medical evacuation insurance and international health insurance.

During the field trip Nicholas will be glad to entertain you with his experiences with every tropical disease you can imagine plus injuries from hiking through seasonally inundated bajo swamps, wading into marshes, and climbing down through karst geological faults where you can't even see the bottom of the fissure on the hill you need to descend.

If you are an individual, a family, or wish to join Dr Nicholas on these adventures, we appreciate funding to cover each field trip. You will learn about tropical rain forests and see things you have not even seen on the Discovery channel nor BBC-TV. Field trips vary from 7 days to 10 days (it is two days driving up and two days driving back; we can take you up through the cloud forests and back on a totally different route). To be realistic, full cost of a field trip is: pre-trip preparation; actual field trip; post-trip days of processing the literally thousands of photos, GPS data, and notes.



I have been wanting to see a potoo bird (*Nyctibius jamaicensis*) for years. They camouflage themselves so only local people know where they are (since a potoo usually sleeps on the same trunk or branch every day). Like an owl, a potoo wakes up at night to eat its meals. This particular potoo is *Nyctibius jamaicensis*, the Northern Potoo. We wish to also find the other species during a future field trip: *Nyctibius griseus*, Common Potoo

Local people told the park biologist where this bird was, and as we were leaving Tikal he kindly suggested we pull the 4X4 over and stop to take photos, which we immediately did. Photo by Edwin Solares with Sony Alpha 1, 200-600 zoom lens, noon, January 28, 2023. That afternoon we drove far south (hundreds of kilometers) to find and photograph scarlet macaws in an area we did not previously know those rare endangered birds could be found.



We recommend you bring binoculars, and an 800mm lens, if you wish to capture an image of these birds. This image is zoomed in from the center of a 600mm lens. Photo of female *Trogon massena* by Edwin Solares, Jan. 27, 2023, 12:39pm, across from the Visitor's Center (stelae museum).



If you know the Quetzal bird of Guatemala you can estimate that this male Trogon at Tikal is a close relative. Lots of trogons in the Reserva de la Biosfera Maya, but no quetzals whatsoever. A Quetzal prefers a cloud forest. I am not an ornithologist but I estimate this is a *Trogon massena*, male Slaty-tailed Trogon.

Photo by Edwin Solares with Sony Alpha 1 camera, Sony 200-600mm lens, January 27, 2023, at 12:30pm, at entrance to El Naranjal area. FLAAR Photo Archive (we have over 30 TERAbites of digital photos of flora, fauna and biodiverse ecosystems from the recent several years of field trips).

Summary on Yaxha area of PNYNN

There are hundreds of places in Peten and thousands elsewhere in Guatemala that we have accomplished flora, fauna, ecosystem fieldwork during recent decades. But the benefit of field work research at PNYNN is the availability of helpful local people and the comfortable hotel Ecolodge El Sombrero where we can recuperate each night (charge our camera batteries, computer batteries, batteries for cellphones, portable lighting, etc.). Plus, you can watch the sunset from the lakeshore area in front of the restaurant. You can see the infamous Bufo toads hopping around the floor of the restaurant. Stingless bees flying in-and-out of their resin-wax entry-exit tube at one corner of the restaurant. And a hummingbird nest on the other side of the hotel parking area. We stay an average of three nights so we can see Topoxte Island, Rio Ixtinto, Lake Yaxha, the famous sunset, and hike many of the trails through the site of Yaxha.



If you look at the full-resolution of this FLAAR Photo Archive aerial photograph of the west end of Lake Yaxha, you will want to fly down to Guatemala and experience this yourself. Aerial photo by drone pilot Haniel Lopez with FLAAR drone, DJI Mavic 3, January 2023, west end of Lake Yaxha (Topoxte Island is along the bottom). The view is looking northwest. Join the FLAAR team and experience what you have never had the chance to see, and learn, before.



Juan Carlo de la Hoz kindly told us about this colibri nest. Then Haniel sat patiently until the momma bird returned to sit on her eggs. I have no idea why in the world a bird of this size has such a narrow-diameter nest. As you can see here the mother bird has to have her entire tail diagonally almost straight up and same for her throat, head and beak. I hope a hummingbird ornithologist can utilize this photo to document how evolution taught this bird to make this size and shape of nest.

Note that the nest is camouflaged with leaves, moss, etc. Usually the hummingbirds put lichen on the side of the nest also (that may be visible here as well). Photo by Haniel Lopez, January 25, 2023, Sony Alpha 7C, 200-600mm lens.



This photograph shows the holes that remain in almost all stingless bee entry-exit tubes of these golden-colored bees of Guatemala and surrounding areas of Mesoamerica. The bees work on these entry-exit tubes “all year” to strengthen them and to extend them.

Photo by Edwin Solares, Sony Alpha 1, 50mm macro Sony lens, 11:44am, January 25, 2023, hotel Ecolodge El Sombrero, near entrance to Yaxha park.

Summary on Tikal, PANAT January field trips to find and photograph at high resolution flora and fauna

I first went to Tikal in 1963 as a backpacker, to learn about the monumental architecture of temples, pyramids, palaces, ballcourts, and of course the Maya art. I learned a lot about flora and fauna during 12-straight months in 1965. I returned a following year for another month to excavate the palace that abutted the west side of Str. 5D-73. Then in the 1970's several-months-each-year 1970-1974 living and working at Yaxha and occasional field trips to Nakum and the three islands in Lake Yaxha. We did not work at Naranjo since that site was far away, but fortunately other conservation-minded individuals added the Naranjo area to the Lake Yaxha-Laguna Sacnab-Nakum area that I had encouraged FYDEP and the then president of Guatemala to initiate making this a Parque Nacional. Now, half a century later, I still return to Tikal but to document the flora, fauna and biodiverse ecosystems in remote parts of the park.



The FLAAR Mesoamerica field project team with the helpful PANAT biologists, helpful flora-fauna-ecology guide (Teco, Moises Daniel Perez Diaz) and at the left the local team that help carrying all the cameras and necessary equipment. Photo by Haniel Lopez. The El Naranjal area is more a bajo type vegetation (so not a high forest atop a karst hill or hillside).



The toucan is the logo bird of more companies and countries than I can list. But to see the actual bird, it helps to spend several days at PANAT. Lots of toucans here. Photo by Haniel Lopez, Sony Alpha 7C, 200-600mm lens, January 26, 2023. We appreciate the large lonas (tarps) from Lonas Segovia, kindly donated by Juan Manuel Segovia. These lonas are helpful when we camp in remote areas on the field trips and to cover the equipment on the back of our pickup truck.

Ecolodge El Sombrero, Parque Nacional Yaxha, Nakum y Naranjo

We thank Gabriella Moretti, owner of Ecolodge El Sombrero, for providing hotel room and meals while we have been doing field work at Parque Nacional Yaxha, Nakum and Naranjo. We also appreciate the hospitality of her sons Sebastian de la Hoz and Juan Carlo de la Hoz. Every workday is exhausting because we are carrying and then using heavy cameras, super-telephoto lenses, sturdy tripods, large gimbals or ball tripod heads. Thus it is crucial for my health to be able to rest and totally recuperate every night in order to be ready for the following day of botanical and zoological adventures in Parque Nacional Yaxha, Nakum and Naranjo.

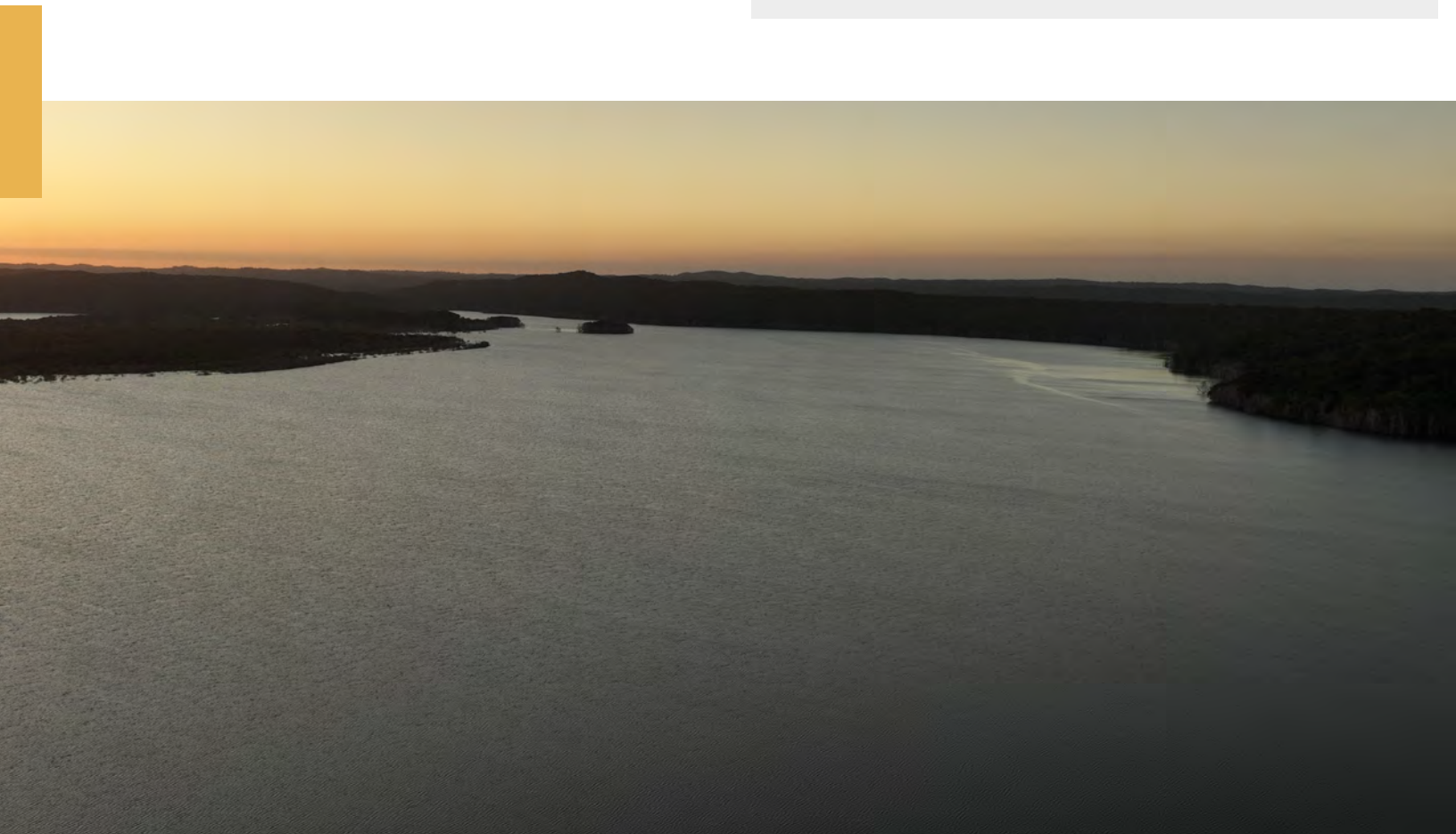
Equally crucial is having a place to charge the batteries of the computers, plus all the cameras, and recharge cell phones. Solar power is great, but it lasts only an hour, or less, if you plug in multiple computers and cameras and flash batteries to charge. So a place with enough electricity to charge the entire mass of crucial field work equipment is essential and thus very much appreciated. cameras, and recharge cell phones. So a place with enough electricity to charge the entire mass of essential field work equipment is essential and thus very much appreciated.

In order to post photographs on botanical and zoological websites, you can't do this if there is either no Internet or weak Internet. Thus it is very helpful that when we are provided rooms and meals, that Internet is also provided by the Ecolodge El Sombrero. We also sincerely appreciate the storage space for our camping equipment: tents, camping mattresses, cooking equipment, etc. There is no way to drive this volume of equipment back-and-forth from Guatemala City to where we may be camping in a remote area of the Reserva de la Biosfera Maya during a following month.

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ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is in charge of the financial administration of the institution and supports the supervision of daily activities.

Vivian Hurtado is the current project manager of the FLAAR divisions: Flora & Fauna and MayanToons. She is also an environmental engineer and a passionate researcher.

Victor Mendoza environmental engineer in charge of the photographic database and its taxonomic identification. He also helps with the coordination of research activities.

Sergio Jerez agronomy engineering student involved in the identification of plants and support in research topics.

Belén Chacón biology student who organizes, tabulates and updates our ethnobotanical list.

Diana Sandoval agricultural engineer who compiles scientific information that is added to our flora and fauna reports.

María José Toralla biology student collects information and bibliographic references to feed our electronic library of flora and fauna and support research for reports and websites.

Samuel Herrera is in charge of processing maps of our field trips and helping with the identification and investigation of species.

Pedro Pablo Marroquín is part of the editing team, review and add information to our photographic reports

Alejandra Valenzuela is a biology student and part of the photographic reports editing team. She also supports the realization and analysis of web statistics.

Maria José Rabanales is part of the photographic reports editing team

Byron Pacay is our assistant during field trips to handle GPS data. He also assists in the main office with different tasks.

Norma Cho is a helpful photography assistant during field trips. She also assists in the main office with different tasks.

Roxana Leal degree in communication, manages all our social networks and digital community.

Isabel Rodríguez Paiz is in charge of fundraising and partnership development.

Edwin Solares is a photographer and videographer during our expeditions. Later, he edits this content to be used in our different materials.

Pedro Pablo Ranero with a degree in communication is responsible for editing videos of flora and fauna to create content on our sites.

Andrea Sánchez graphic designer who helps prepare the graphic line of our publications. She is our editorial art director.

Jaqueline González graphic designer who combines text layout and photo editing to create our reports.

Heidy Galindo graphic designer who combines text layout and photo editing to create our reports.

Alexander Gudiel graphic designer who combines text layout and photo editing to create our reports.

Cristina Ríos graphic designer who combines text layout and photo editing to create our reports.

David Arrivillaga is an experienced photographer and graphic designer. Sometimes he is a photographer during our expeditions, but he also designs our flora and fauna reports.

María Alejandra Gutiérrez is an experienced photographer who is now in charge of the preparation of photographic catalogs. She was also coordinator of the field trips for the research project in Livingston, Izabal.

Paulo Núñez is an engineer and our webmaster. He is the person in charge of the maintenance and programming of the entire network of FLAAR websites.

Juan Carlos Hernández is a graphic designer and part of the web team. Receive the material we produce to place on our sites.

María José García is a graphic designer and part of the web team. Receive the material we produce to place on our sites.

Andrés Fernández is a graphic designer and in charge of keeping our websites updated and more efficient for the user.

Valeria Áviles is a graphic designer and illustrator. She is in charge of coordinating the activities of MayanToons, as well as making illustrations for the different materials that we prepare.

Laura Morales is a digital content engineer, She is in charge of directing the animation area of our MayanToons project.

Paula García is part of our MayanToons animation team. Her job is to bring our favorite characters to life.

Niza Franco is part of our MayanToons animation team. Her job is to bring our favorite characters to life.

Isabel Trejo is a graphic designer and illustrator for MayanToons and for social media posts.

Andrea Bracamonte is a graphic designer and illustrator for MayanToons and for social media posts.

Josefina Sequén is an illustrator for MayanToons.

Rosa Sequén is an illustrator for MayanToons.

Back Cover photograph:

Arboreal cactus, Spanish moss, and flowering bromeliad, all happily clinging to the trunk of a tree in Yaxha area of PNYNN. None of these are parasites; they are merely hanging out on the tree as a helpful place to grow (they do not suck nutrients from the tree itself). That said, when there are thousands of epiphytes on a tree limb and it rains, the weight of the water caught in the arboreal plants often causes the limb or branch to fall off the tree (but once on the ground this provides mulch and gradually rots to provide enriched soil—the life cycle goes on).

Here you see three totally different epiphytes growing on top of each other:

- Bromeliad
- Arboreal cactus vine
- Spanish moss.

All of these plants are wild and native to PANAT and PNYNN. Photo by Nicholas Hellmuth, Yaxha, 800mm prime telephoto lens on Nikon D810 on a Wimberley WH-200 Gimbal Tripod Head II atop a sturdy Gitzo tripod.

Photograph by Nicholas Hellmuth with Nikon D810 with AF-S NIKKOR 800mm f/5.6E FL ED VR prime telephoto lens, January 25, 2023, 5:02 pm, Parque Nacional Yaxha, Nakum and Naranjo (PNYNN).

To get a crisp photo with a lens this heavy it is essential to have a sturdy tripod. Gitzo is the best brand (based on our experience with tripods for over sixty years). Also with a lens this large and heavy weight it is necessary to have a gimbal head (so not a regular tripod head for normal photography). The head that we have used for recent years is the Wimberley WH-200 Version II.

We sincerely appreciate the donations to the non-profit wildlife and ecosystem research institute FLAAR that makes it possible to have high quality photography equipment so we can document and show the world the natural beauty of the rain forests of Guatemala.



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