Corozera, Guanal, Escobal Biodiverse Palm Ecosystems

Corozo Palm, *Sabal mauritiiformis*, Guano Palm, *Sabal mexicana* and Escoba Palm, *Cryosophila stauracantha*

And unexpected Savanna Ecosystems Between Maya Ruins of Naranjo-Sa'al and Nakum, PNYNN, RBM

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Drone pilot and aerial photographer: Carlos Elgueta

FLAAR Reports, FLAAR (USA) and FLAAR Mesoamerica (Guatemala)

June 2025

Schedule for April 30, 2025 (caption for the map on the following page)

We left Naranjo-Sa'al at 8:30am and drove northwest towards the Rio Holmul. In a past year we had driven there and then the helpful local guide went with the team to document a pital ecosystem hiking several kilometers to the west. We wanted to return and do more photography of this pital but the river water was much higher and there was no more open trail. So we turned around and drove towards Nakum. Although the Rio Holmul has over a meter of water (and probably almost a meter of mud under that), in the dry season the river no longer flows—instead the water remains in long pools in the riverbed and other areas have no water whatsoever and no mud (until the next rainy season hits). So when you "cross the river" (en route to Nakum from Naranjo-Sa'al) you don't even notice a riverbed unless you have been exploring Peten for many years.

In that recent year that we had driven to the water-pool part of Rio Holmul, I then hiked back to Naranjo most of the route on foot because there were so many interesting "armored, military grasshoppers" and other flora and fauna that I wanted to see in-person. You can see more when you walk than when inside a pickup truck.

On April 30, 2025, this was my first field trip to go by road from Naranjo to Nakum—I had no idea this road existed. I knew only of a road from the Yaxha-Nakum road that turns east a few kilometers north of Yaxha. But in the recent six years this route to Naranjo was not open (hundreds of trees fallen across the road). Now the first several kilometers are open. Since this part of PNYNN has never been explored by botanists or ecologists it would be a great opportunity to drive this route in 2026 (it's too far to hike on foot). And, while going this route, documenting flora and fauna for CONAP and for PNYNN. This could be a potential trekking trail from Yaxha to Naranjo-Sa'al and then from there to the Savanna East of Nakum and from there to Nakum.

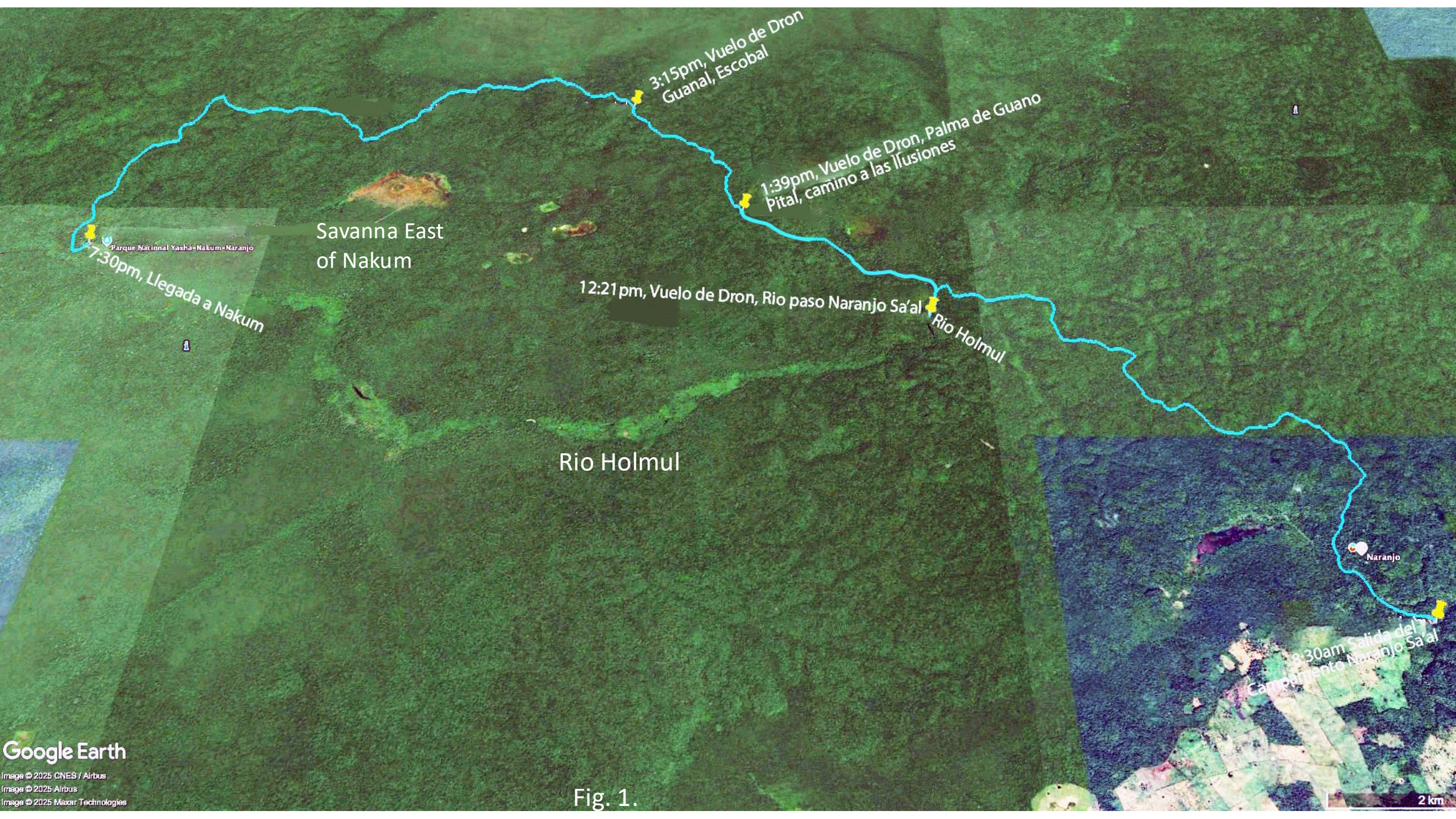

3:15pm, Vuelo de Dron
Guanal, Escobal
1:39pm, Vuelo de Dron, Palma de Guano
Pital, camino a las Ilusiones
Savanna East
of Nakum
Parque Nacional Yaxhá-Nakum-Naranjo
7:30pm, Llegada a Nakum
12:21pm, Vuelo de Dron, Rio paso Naranjo Sa'al
Rio Holmul
Rio Holmul
Naranjo
8:30am Salida del
Campamento Naranjo Sa'al
Google Earth
Image © 2025 CNES / Airbus
Image © 2025 Airbus
Image © 2025 Maxar Technologies
2 km

Fig. 1.

The original schedule was to study the corozo palm areas around the Maya ruins of Naranjo-Sa'al, and also to accomplish additional photography of the grassland, cibal, and jimbal ecosystems alongside the western part of the ruins. And then to return to Melchor de Mencos, drive to Yaxha and from there to Nakum—and then from Nakum to El Tigre to El Caoba to Tikal to Uaxactun. But Teco has been a park ranger for over 23 years, so he told us that there was a road from Naranjo-Sa'al to Nakum that did not need returning to Melchor de Mencos and looping all the way around through Yaxha to get to Nakum. So, especially since I like adventures to see new parts of PNYNN that no botanist or ecologist has studied, plus because the "road" from Naranjo-Sa'al back to Melchor had ruts so deep that it shredded the underside of one of our 4x4 pickup trucks—so I accepted the idea of Teco to try the other road.

The result is that we had the opportunity to take aerial photos of parts of PNYNN that we had never previously reached with a drone. But—the road from Naranjo-Sa'al to Nakum was often worse than the road back to Melchor de Menchos, so another of the 4x4 pickup trucks had its underside shredded and had to be abandoned until it could be towed out several days later!

Until a super helpful individual can donate the cost of a Toyota pickup truck that we then have "lifted" (to raise up the underside), we are stuck renting the only local vehicles available. A Ford F-150 Raptor R raised up would be another helpful option instead of the Toyota, but 90% of the "lifted" pickups in remote areas are all Toyota.

Our long-range goal is to find and photograph all corozera areas of the RBM, but also to find, document, study, and publish every other individual species of palms of Peten—because many have edible parts and many have parts usable to make baskets, hats and other products. So lots of different palms were used by the Classic Maya for thousands of years—more than just for roof thatch.

Rio Holmul in the dry season.

In the rainy season the river is so high that you need a boat to cross the river to reach Nakum (when going from Yaxha to Nakum). Plus, at the height of the rainy season, much of the bajo between Yaxha and Nakum is under water. So no 4x4 vehicle can get even close.

Fig. 2.

Fig. 3. Bayal palm vine at far left and upper left.

Rio Holmul, northwest of Naranjo-Sa'al.

Further down river is a fan palm, that we also see in a closer view in the following photo.

There are crocodiles in the river and tapirs also visit wetlands.

All aerial photos are by Carlos Elgueta.

Lots of palms in many areas of the forests of the Reserva de la Biosfera Maya (RBM). even when they are not areas of solid-palms.

Fig. 4.

I estimate these are bayal palms vines, and then a fan palm. Bayal is the local name for a species of genus *Desmoncus*.

So far we have not yet found an area of “solid bayal vines” to name any area a ”bayalal”. But there are dozens of bayal vines on the left side of the road as you drive towards the El Sombrero Ecolodge of Yaxha. Plus you can find other areas in Guatemala where there are dozens of these vines all over the place. Hellmuth. 2017 shows a rare view of the flowers.

You can eat parts of bayal palm, the spines are used for fish hooks, and the stem for weaving baskets.

Fig. 7.

Fig. 8. Welcome to the Parque Nacional Yaxha, Nakum and Naranjo, PNYNN, Reserva de la Biosfera Maya, RBM, Peten, Guatemala. Hellmuth and FLAAR initiated the process to have the Yaxha-Nakum area turned into a national park starting in the 1970's. Other conservationists added the Naranjo area. It took over a decade to have the entire area formally turned into today was is PNYNN.

Fig. 9. There are various kinds of savannas in PNYNN: open grassland savannas and savannas filled with shrubs, vines and tall grasses. We show these open areas on Google Earth Pro in later pages.

Fig. 10. As soon as a kind individual or company can donate to non-profit FLAAR in the USA, we can obtain a Mavic 4 Pro with Fly More Combo option, plus five extra batteries (since the tropical sun roasts the batteries while the drone is accomplishing aerial photographs). We need to accomplish aerial photos of every biodiverse savanna in PNYNN. Plus to aerial documentation of every corozera, guanal, and escobal, plus every pital (an area with pita, relatives of the pineapple en-masse). Google pita, pital, Yaxha, Hellmuth, FLAAR and you will see what the edible pita plant is and what a pital is.

Fig. 11. The gray area is shadow from clouds. Much of PNYNN is flat—bajo vegetation—but there are also hills all over the horizon. Most Maya cities are built on hills—Nakum is a slight exception—it is alongside the nearby Rio Holmul. Has hills, but low.

Fig. 12. Another of our research goals for 2026 is to find, photograph, document, and publish, all the species of wasps that make edible honey. If you Google wasps, edible honey, Hellmuth, FLAAR you can find our FLAAR Reports. You can even eat the wasp nest itself.

Lots of happy palms aiming themselves up to catch sunlight so they can prosper.

Fig. 14.

Fig. 15. Rain forest hills at the right and left. Seasonally inundated bajos across the middle, edging into the edges of the savanna. Hills have Maya sites so these areas have been studied for centuries. Bajos are popular research areas as archaeologists want to find Maya sites associated with them—and want to learn whether 2000 years ago these bajos were lakes? But savannas of PNYNN have almost never been studied whatsoever until the FLAAR teams initiated field work at the Savanna East of Nakum, the Savanna of 3 Fern Species (northwest of the west end of Lake Yaxha) and the Savanna at North End of Bajo La Pita, alongside the west side of Naranjo-Sa'al.

During 2026 we would like to accomplish even more studies of flora, fauna and biodiverse ecosystems of these savannas (but the Mavic 4 Pro drone is needed). We can improve our photography with the improved iPhone 17 Pro Max and the improved Pixel 10 Pro XL (since we have two to three photographers on each field trip).

The savanna you see here has water in it—this is true for lots of savannas, albeit mainly in the rainy season. But even in the dry season, most savannas in PNYNN and PNLT have a literal "ring of water" around them. This savanna in the drone photo also has different ground color in many parts—I estimate that's because the ancient Maya utilized each part of each savanna for different purposes. LiDAR would help show what the Classic Maya may have initiated in these savannas.

Fig. 16. Every month, every year each savanna looks different and has more, or less, water or wet soil. Google Earth Pro.

Fig. 17. This is the Savanna East of Nakum, the largest savanna of the entire PNYNN. This has north facing up. Our drone flew from the north to the south, so our aerial photo is looking southwest. In the RBM, the savannas of PNLT are larger (that we visited and studied about 2 years ago). You can see the same green area surrounded by square area of soil and then a rectangular green area around that—so clearly that was modified by Classic Maya use of this savanna over a thousand years ago.

Fig. 18. Here is a savanna filled with bushes, vines, and high grasses. What defines many of the savannas of PNYNN is the presence of at least a few tasiste palms, nance trees, and *Crescentia cujete* calabash trees. But to document these in the open area you see here, we need the Mavic 4 Pro drone—and we need to have funding so our team can hike to these areas that no botanist, no ecologist, and no archaeologists has ever set foot into. We have found all these savannas on satellite views, and we have visited all the ones that you can hike to, study, and then hike back to a base camp. But the really remote savannas will require camping nearby, because they are too far from the Nakum or Naranjo-Sa'al base camps.

Fig. 19. The obvious question of interest is, how did the Classic Maya use these areas. And, why are some savannas grasslands and others, like this, have scrub vegetation?

Five more different biodiverse “savannas” east of the Savanna East of Nakum, PNYNN.

Cropped and processed by Hellmuth from Google Earth Pro (which is slightly better than Google Earth).

We would appreciate a professor providing us with access to a much better satellite quality so we can show these biodiverse ecosystems with more details.

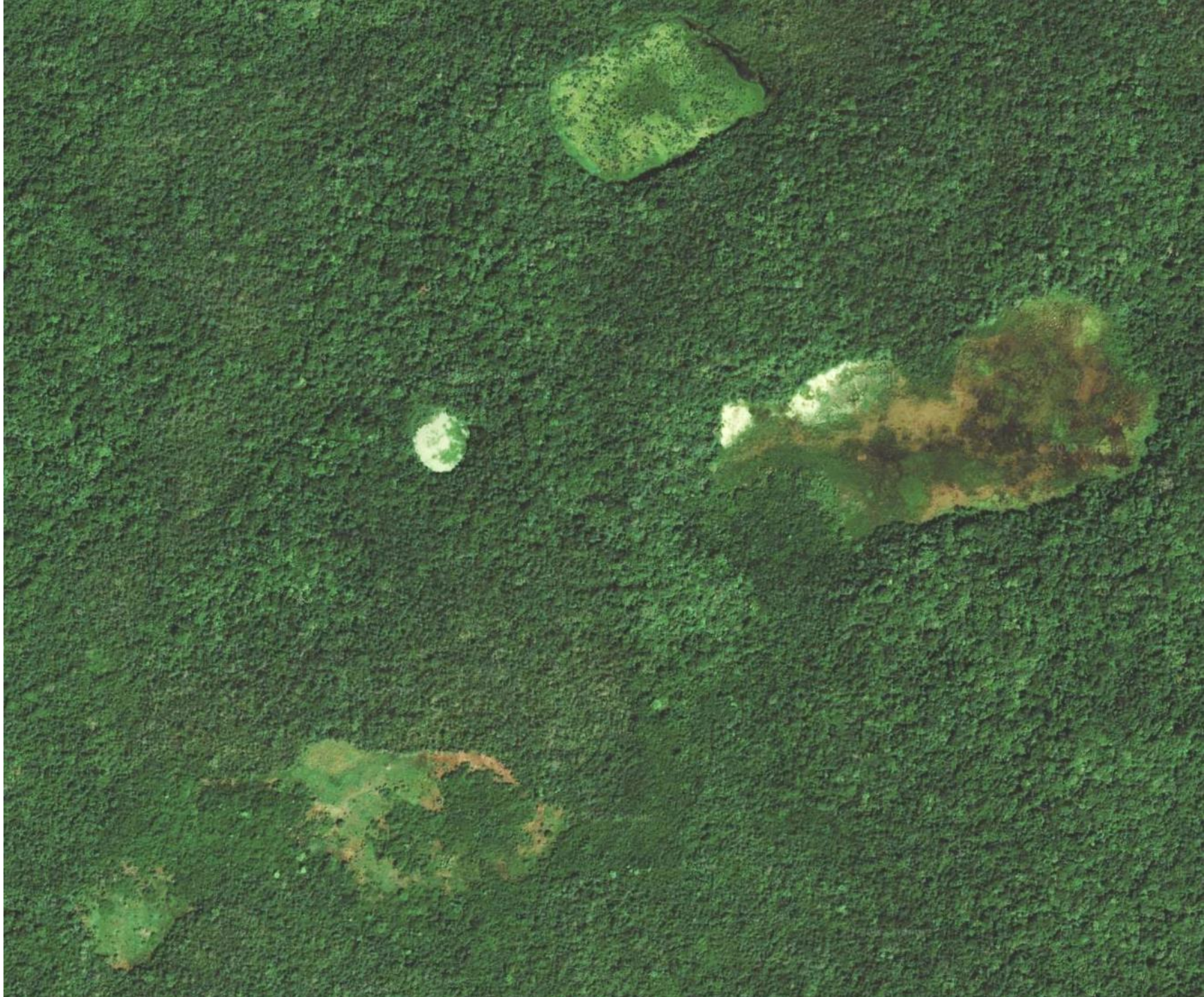


Fig. 20.

2:10pm we are back inside palm areas.

But no corozo palms here.

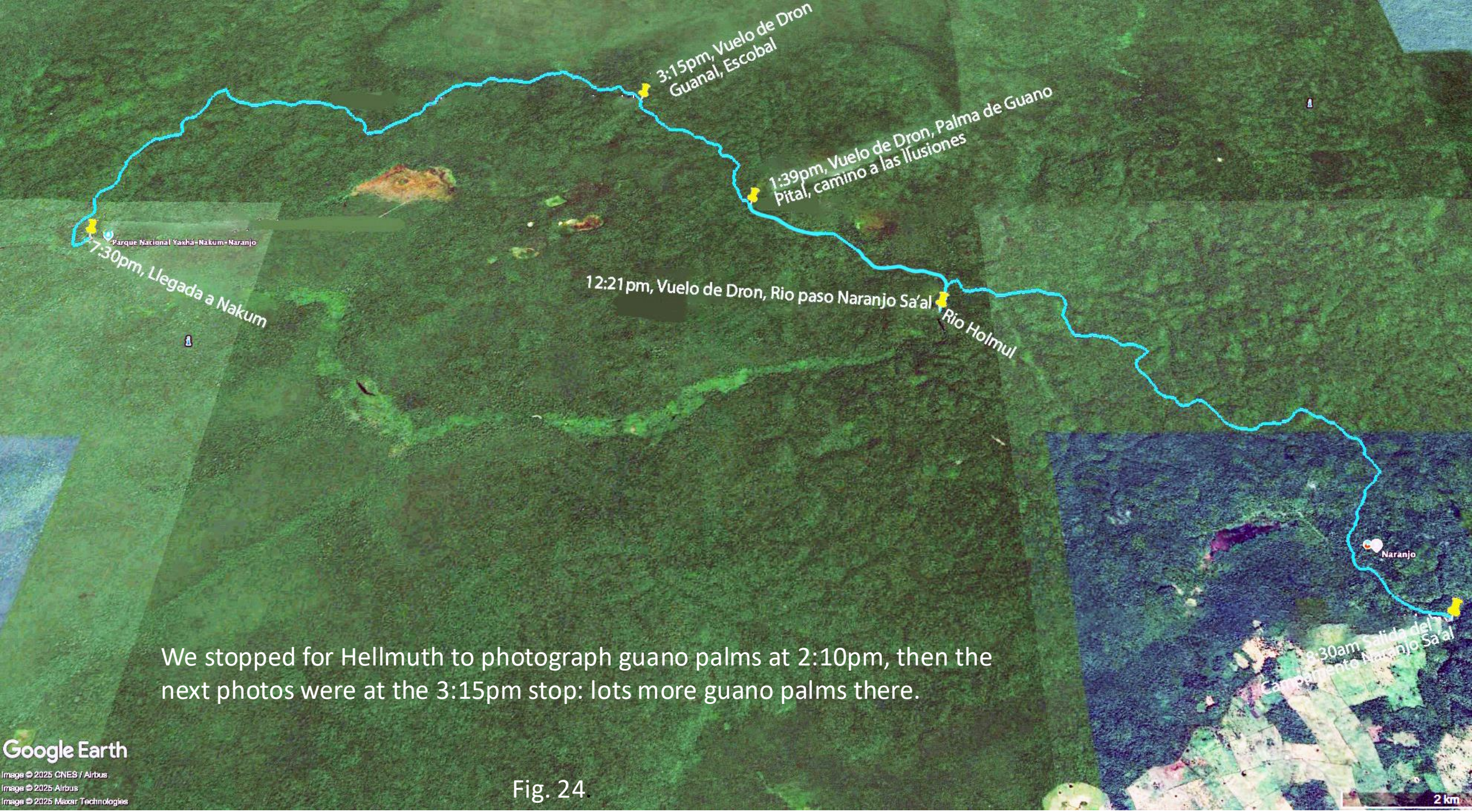
Fig. 21.

Fig. 22. 2:10pm. When you know what time a photo was taken, you can see on our map where this palm area is.

2:11pm.

Areas with lots of fan palm species are very different than corozera areas.

Fig. 23.



We stopped for Hellmuth to photograph guano palms at 2:10pm, then the next photos were at the 3:15pm stop: lots more guano palms there.

Fig. 24.

3:16pm

Fig. 25.

Fig. 26. We have all gotten out of the 4x4 vehicles since we can see and experience more when we are hiking by foot in these areas.

Both corozo and guano palms are used to thach roofs (guano lasts a few years longer than corozo).

But escoba palms are used mainly for brooms—not to thatch roofs.

Fig. 27.

Even though not a corozera (so no corozo palms) these other palm areas deserve to be studied.

Fig. 28.

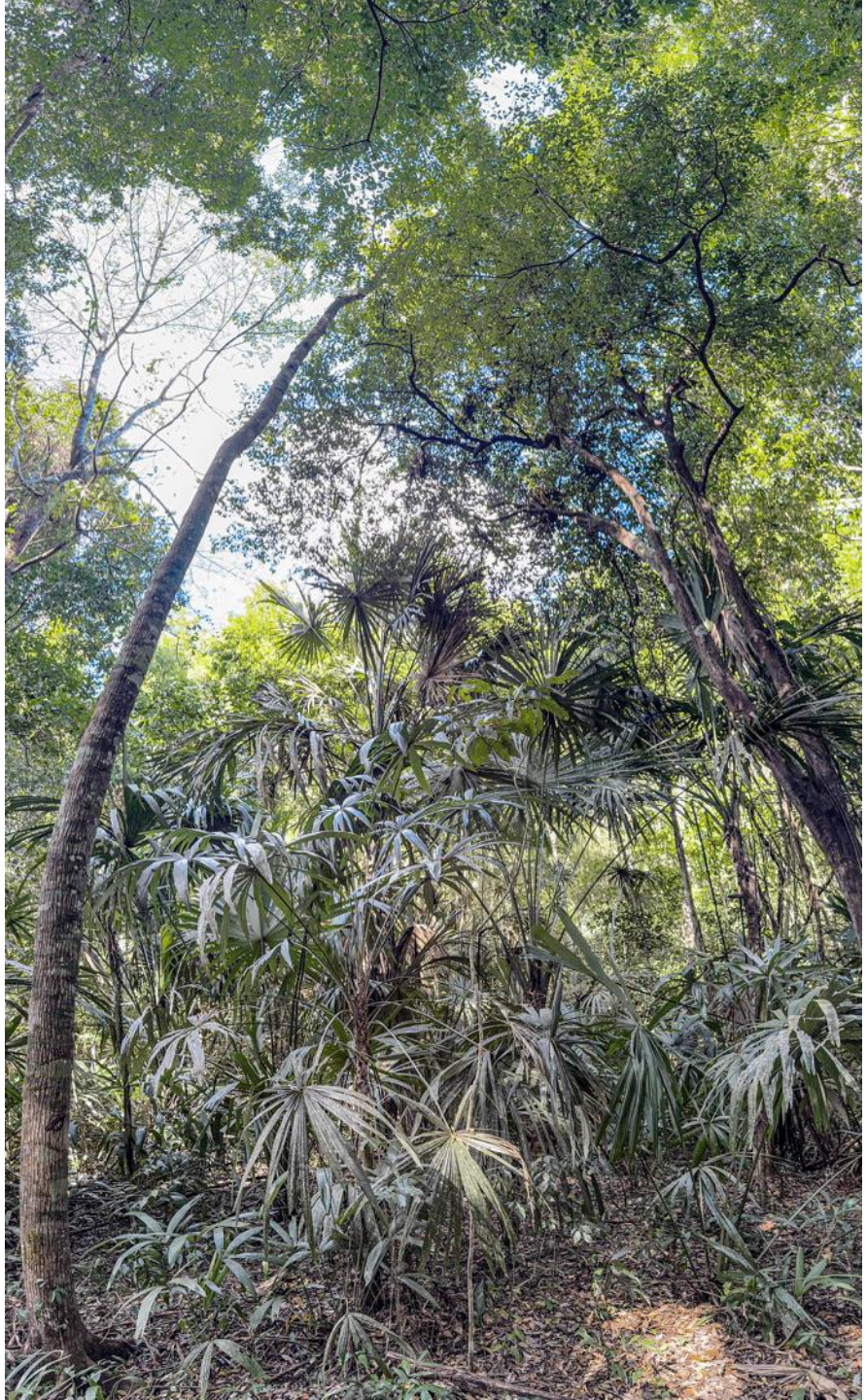


Fig. 29, aand b.

Fig. 30.

Fig. 31.

Having been a specialist in fine art giclee photography and fine art giclee printing for over two decades, I can’t resist taking photos at diverse angles.

This area also is a great location for eco-tourists. Eco-tourists help to encourage conservation and eco-tourists provide jobs for local people—so shows them that it is beneficial to not chop down the forests or burn the grassland savannas.

Fig. 32.

Every part of every palm species is beautiful. Our interest is to document what the Classic Maya had available —how many of these palms have edible parts? How many of these palms are helpful for thatching the roof of Maya houses?

Fig. 33.

Fig. 34. Although corozeras filled with hundreds of corozo palms are an obvious goal, we also like to find and photograph escobal areas (lots of escoba, broom palms) and guanal areas (lots of guano palms).

I like to show Palm Paradise Peten from all angles: aerial photos from our drone camera, panorama photos from the iPhone 15 Pro Max, and also diagonal views such as we show here.

Lots of palms, but also many many other species of trees mixed in.

Fig. 35.

Comments on the ecosystems found on the Field Trip between Naranjo-Sa'al and Nakum

The road from the Maya ruins of Naranjo-Sa'al, northwest to Rio Holmul took several hours due to the eroded condition of this seldom traveled dirt/mud road. Since we have already photographed along this route a few years ago, thus we did not stop during the April 30, 2025 drive until we reached the river. Then we drove another hour where we stopped at a place Teco called Camino a las Ilusiones. There was the remains of a pital but I did not see any aguada. Lots of Guano. Then we drive another hour, stopped to take a few snapshots of guano palm with the iPhone 15 Pro Max. Then about another hour to the final stop of the day, where there was lots more guano palm. Not much corozo and so no corozera directly visible from this road. But instead of corozeras, we found amazing biodiverse ecosystems that no botanist, ecologist, soil scientist or archaeologist had probably ever noticed or documented. I had see these from satellite views in recent years and we actually hiked to two of them several years ago, but no drone pilot with us in that year. And, these are so far from the Nakum base camp that we literally had only a few minutes to peek through the forest on the hill down into the open spaces. If I remember correctly, Vivian Diaz and Sergio Alejandro Balan (CONAP) accompanied us on that very long hike.

Now that we have a Mavic 3 drone, it is possible to see much more of what's around you. The new Mavic 4 Pro offers 100MP resolution—FIVE TIMES what the Mavic 3 offers. The Mavic 4 Pro provides 51 minutes flight time. And, most importantly, you can fly the Mavic 4 Pro much further away from you, so you can see a significant amount of the biodiverse ecosystems far from where you are piloting the drone. As soon as a kind soul donates the funds, we will be able to accomplish so much more during the rest of 2025 and all of year 2026 research in remote areas.

Fig. 36. East end of the Savanna East of Nakum is at upper far right. We show all the savannas and other grasslands that deserve to be studied in 2026 and 2027. The dirt road from Naranjo-Sa'al to Nakum is so narrow and so covered with trees that it is rarely visible from satellite view (and also it is about a kilometer north of the top of this area).

When an area has tasiste palm, and/or *Crescentia cujete* (morro, jicaro), or nance trees, we name it a savanna. When we have seen an area only from a low-res satellite view (Google Maps) we can't identify individual plants, so we call them "Open Areas". Surely a biologist will have technical academic terms—but these scholarly terms are usually developed based on areas in other countries and often in other parts of the world. So I prefer a simple general term "Open Areas" or in Spanish "terrano-abierto", TA. The long-name would be PNYNN-TA-1, etc.

Cropped by Hellmuth from GoogleMaps, satellite view.

This is a crop from a huge panorama drone photo. Here you can see what seems to be water, even in the dry season of April. No tasiste palm, and not any noticeable *Crescentia cujete* (called both morro and jicaro), and thus unlikely any nance trees. So this open area is very different than the Savanna East of Nakum and the Savanna West of Naranjo-Sa'al (both of which have tasiste palms). The back 40% has solid bushes (and probably vines), just like many smaller areas of the Savanna West of Naranjo-Sa'al. Would be great to have a Mavic 4 Pro drone and have the permission to have a trail to reach this area to document it in detail in 2026. When we eventually have higher-resolution aerial photos and high-res satellite views we can name each of these savannas in our provisional TA system.

We show this non-forested in larger size in the previous page.

Fig. 37, a, b and c.

I estimate that this may be TA-1, but need to double check

Helpful aerial views with FLAAR done, Mavic 3, by experienced drone pilot Carlos Elgueta. Three very different open ecosystems.

Fig. 38, Google Earth Pro..

Savanna TA-2, Second Savanna East of Nakum, PNYNN. No professor from anywhere in the world has studied this remarkable area.

Fig. 39. This is the kind of view of a never-before-studied (before the FLAAR team visited it in past years), NEVER before visited biodiverse ecosystem in Parque Nacional Yaxha, Nakum and Naranjo (PNYNN) a key part of the Reserva de la Biosfera Maya (RBM) managed by CONAP and national park administrators, IDAEH and CONAP. Two years ago we hiked here with the family from Chicago that kindly donated to cover all the research equipment and the costs of the field trip. We hiked here from the base camp at Nakum. So if you would like to join a FLAAR research field trip adventure it will be literally a trip of a lifetime for you, family, and friends.

Our goal is to provide IDAEH and CONAP with documentation for future Plan Maestro reports. Our goal is to show these incredible ecosystems to botanists, ecologists, soil scientists and archaeologists, to inspire them to prepare their own future projects in cooperation and coordination with IDAEH and CONAP. It will help all future projects to have the aerial photos of FLAAR Digital Photo Archive of Flora, Fauna and Biodiverse Ecosystems of Guatemala. Plus students can now see areas for their PhD dissertation.

You can see lots of water still in the middle of this savanna. Most savannas of PNYNN are seasonally inundated, similar to surrounding Bajo La Justa and Bajo La Pita and other bajos near Tikal. In this view archaeologists can see that there is a possible

Fig. 40. In all the years and decades (over half a century) that I have been interested in the Yaxha-Nakum area of Peten, I have never ever never in my life seen a view of this seasonally inundated savanna far east of Nakum when it had this much water in it. And I have never seen such helpful detail from a long-distance drone photo. This was taken by Carlos Elgueta with our Mavic 3—the newer Mavic 4 Pro "Fly More Combo" and with five extra batteries (since no electricity anywhere nearby) then we can fly further and take higher resolution photos. So if a considerate person or family or institution can provide our team with this improved Mavic Pro aerial camera system, we can fly closer and photograph all the trees close enough so we can identify their species. It is crucial todocument whether, or not, there are any tasiste palm, calabash tree, nance tree or other plants that are indicators of a savanna in the PNYNN. Would be great to have an extended project of coordination and cooperation with CONAP and the park administrators and for our team to hike into this incredible NEVER BEFORE STUDIED biodiverse ecosystem in year 2026 and have this documentation available to CONAP, IDAEH and all the great universities in Guatemala that have biology and ecology programs--USAC, UVG, Universidad Mariano Gálvez plus for botanists and biologists and archaeologists around the world.

The savannas in southern Peten and around La Libertad, and in Belize, are often different since many include pine trees. Notonly single pine in PNYNN and only one pine area in the RBM: outside PANAT, the El Pinal area, an island of pines (but interspersed withtasiste palm that we documented about two years ago, hiking 10 km in then 10 km back to the vehicle (south of Uaxactun). Hiking 20 kilometers is good exercise for a then 78 year old person. In our 2025 field trip we hiked 10 km one day—more exercise for now being age 80.

There are dozens of books on palms and hundreds of articles

If you Google palm, Hellmuth, FLAAR you will find enough to keep you busy reading for a long time.

If you Google bayal palm Hellmuth you will find photos of the gorgeous colored fruits.

HELLMUTH, Nicholas

2017 How to Photograph Tropical Plants which are over 100 meters away. FLAAR Mesoamerica.

We have also found tasistal ecosystems, one with literally an estimated one MILLION tasiste palms in a single area, near Arroyo Petexbatun, upstream from Rio la Pasion, Sayaxche, Peten. We then found a second tasistal on Arroyo Faisan. Google tasiste, tasistal, Arroyo, Hellmuth, FLAAR and you will find four incredible photo albums and documentation. Not even ethnobotanist Cyrus Lundell had visited or reported on tasistal ecosystems in this area. We also found tasiste palm along the edges of rivers, creeks, and lagoons in Izabal, during our 18-month flora, fauna and biodiverse ecosystem research project there in 2018-2019-2020. In those Caribbean ecosystems the tasiste palms are in clumps of several to a dozen—not thousands (ten to thirteen palm stems rise from a single root, which is why there can be almost a million in a tasistal savanna of about 3 km by 1 km. Nance and other trees are obviously in the same area—but it's tasiste palms so solid that you can't walk into the area unless a trail has already been cut.

We also found lots of tasiste palms in savannas of PNYNN and PNLT (Parque Nacional Laguna de Tigre). Lots of FLAAR Reports show tasiste of grassland savannas—where they grow in clusters but not solid like the areas upstream from Sayaxche.

There are lots of books on palms, but even the best one(s) did most of their field work on palms of South America. And all the helpful articles on "trees of Tikal" or "plants of ---" list only the most obvious palms—none are complete. So our goal is to continue to accomplish field trips to show the palms of Guatemala. We have already published on the many palms of the Municipio de Livingston, Izabal, inland from the Caribbean area of Guatemala. Now (June 2025) we are publishing several FLAAR Reports on palm ecosystems of PNYNN. During 2026 we will show lists of all the different genera and species of palms that our team will find in PNYNN and adjacent areas—and show a list of what other palms should be findable if a Palm Paradise Peten project can be co-funded by other organizations or palm enthusiasts.

I would add sawgrass areas, areas of native bamboo (in the moist "circle of water" around many savannas, such as the jimbal around west and north area of the Savanna West of Naranjo Sa'al (at the north end of Bajo La Pita), pital and more. Surely Cyrus Lundell has found and documented other plant communities for the Peten areas where he did botanical and ethnobotanical research for many years.

But for palms of PNYNN the most common plant communities are Corozal (corozera), botonal (guanal), and escobal.

LUNDELL, Cyrus

1937 The Vegetation of Petén. With an appendix: Studies of Mexican and Central American plants. CIW Publication No. 478. Available on-line.

En la PY existen comunidades vegetales que incluyen especies dominantes pertenecientes a varias familias , e.g. corchal (*Anona glabra*), carrizal (*Thalia geniculata*), pucteal (*Terminalia buceras*), ramonal (*Brosimum alicastrum*), tintal (*Haematoxylum campechianum*), chechenal (*Metopium brownei*), tular (*Typha angustifolia*) y zapotal (*Manilkara zapata*) (Sánchez e lslebe, 2002; Flores y Espejel, 1994; Miranda, 1958). También se reconocen al menos tres comunidades monodominantes de palmas (palmares, Fig. 2): tasistales (*Acoelorrhaphe wrightii*), botanales (*Sabal mauritiiformis*) y corozales (*Attalea cohune*) (Quera y Flores, 2004; Miranda, 1958). Adicionalmente, se han observado manchones de palmares de *Sabal mexicana*, *Pseudophoenix sargentii*, *Sabal gretherae* y los ch'itales de *Thrinax radiata* (Quero, 1992; Miranda y Hernández-X, 1963).

- corchal (*Anona glabra*),
- carrizal (*Thalia geniculata*),
- pucteal (*Terminalia buceras*),
- ramonal (*Brosimum alicastrum*),
- tintal (*Haematoxylum campechianum*),
- chechenal (*Metopium brownei*),
- tular (*Typha angustifolia*)
- zapotal (*Manilkara zapata*) (Sánchez e lslebe, 2002; Flores y Espejel, 1994; Miranda, 1958).
- comunidades monodominantes de palmas (palmares, Fig. 2):
- tasistales (*Acoelorrhaphe wrightii*),
- botanales (*Sabal mauritiiformis*)
- corozales (*Attalea cohune*) (Quera y Flores, 2004; Miranda, 1958).
- manchones de palmares de *Sabal mexicana, Pseudophoenix sargentii*, *Sabal gretherae*
- ch'itales de *Thrinax radiata* (Quero, 1992; Miranda y Hernández-X, 1963).
- (Alvarado 2013: 90). Put in list by Hellmuth, citations you can find in his PhD dissertation.

ALVARADO Segura, Arturo Antonio
2013 Patrones de Diversidad en Comunidades de palmas (Arecaceae) en Selvas Medianas de La Península de Yucatán: Determinantes Ambientales y Espaciales. PhD dissertation, Merida, Yucatan, Mexico. 97 pages.

Considering that the Peninsula of Yucatan (Yucatan, Campeche, and Quintana Roo) has areas with much less rain than Peten, it’s amazing that Alvarado documented this many vegetal communities.

Credits and Acknowledgements

We visited with Mario Vásquez (CONAP for PNYNN area) while passing through San Benito/Santa Elena en route to the corozera and savanna areas.

The field trip concept and initial itinerary was initiated by Nicholas Hellmuth. He also does pano photography and other photography from the ground with an iPhone 15 Pro Max.

Norma Estefany Cho and Byron Pacay, FLAAR Mesoamerica, prepare all the photography, drone, and camping equipment, plus assist every day the entire week of the field trip. Byron prepares the hour-by-hour maps, and also drives the VW Amarok—he knows all the roads from years of experience.

Edwin Solares did video and ground photography. He is also very experienced in video editing.

Carlos Elgueta is a professional drone pilot, aerial photographer, and photographer with his Sony camera. He was recommended by Haniel Lopez when Haniel himself had other projects so was not available the first week of May.

Vivian Hurtado prepares the daily menu and oversees the organization of all field work and research projects. Since there is not space in the pickup trucks she works from her home office.

Teco, the nickname for Moises Daniel Perez Diaz, park ranger at PNYNN for 23 years so has impressive experience on flora, fauna and ecosystems of this part and also of surrounding areas. He uses software on his cell phone to map where we have been each day.

Franklin Baudilio Perez Mendez helped as general assistant setting up camp at each base camp and helped as porter carrying needed things during each day's hike. He is the son of Teco.

Rubelsin Ariel Recinos Orellan, driver of the decades old Toyota 22r that survived all the ruts and gullies washed out across the roads because this Toyota was "raised" so the underside of the motor did not get scraped.

Perfecto Matus driver who transported our equipment to the camp of Naranjo Sa´al, in his Toyota 22r.

Daniel Ramirez Mendez, driver of the Ford Ranger.

Daniel Alexander Recinos Corrales, driver of the Izusu DMA.

Maria Isabel Jacome Franco has assisted as a cook on several FLAAR field trips. There are obviously no hotels or restaurants at Nakum or Naranjo, but there are cooking areas that the local park personnel make available to research teams who have permission from the park administrators to camp in those areas.