# Nasua narica Coatimundi

Parque Nacional Tikal (PANAT) Reserva de la Biosfera Maya (RBM) Peten, Guatemala

Nicholas Hellmuth





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Parque Nacional Tikal (PANAT) Reserva de la Biosfera Maya (RBM) Peten, Guatemala. Oct, 2022.

**Nicholas Hellmuth** 

## Appreciation

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

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For providing space to store our field trip equipment.

#### ASSISTANCE FOR KNOWLEDGE OF PLANTS AND ANIMALS OF PANAT

Gelbert Aldana Esdras García

#### GUIDES AND EQUIPMENT PORTERS FROM EL REMATE AND UAXACTÚN

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#### **HOTEL TIKAL INN**

We thank Roxana Ortiz for offering to provide lodging for our research team at the Tikal Inn for our field trips starting in October 2022. Since we are not receiving payments for our field work, our budget appreciates complimentary lodging.

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 functional Internet is available at the Hotel Tikal Inn.

Contact info:

- Book by Phone: (502) 7861 2444 or (502) 7861 2445
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- Website: https://www.tikalinn.com

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The helpful individuals listed below are part of the FLAAR Mesoamérica research and field work team together with the report preparation team.

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## Introduction to Nasua narica of Tikal

When you come to Tikal you may want to see jaguars but that would require a special guide and lots of time to hike to remote areas.

When you come to Tikal you may want to see birds but that would require a bird-watching guide and lots of time to hike. Trogans, hawks, falcons and eagles are all visible if you select a guide specialized in leading bird-watchers. We saw lots of birds during October because we went to many different parts of the park. Plus we had several experienced biologists who know the Tikal park.

The most common fauna to see at Tikal are coatimundi and the ocellated turkey. You can see both around the parking area and both in many other open areas of the park. Both the coatimundi and the ocellated turkeys know that tourists will not harm them, so you can get relatively close to get a good photograph. Be sure not to give food (even if they beg).

Coati, or Coatimundi, or Pizote is an omnivorous mammal native to Central America. They have a long, slender, non-prehensile tail which is equal in length to the head and body, also have a long snout. The former are the characteristics that differentiated from raccoons and ringtail.



Nasua narica. Tikal, Mar. 28, 2012. Photo by Sofía Monzón.



Nasua narica. Tikal, Mar. 28, 2012. Photo by Sofía Monzón.

## My Personal Experience with Nasua narica

I first saw coati when visiting Tikal for one week in 1963 and another week in 1964. I then spent 12 months at Tikal in 1965 (and one month a following year) as a student intern in archaeology and architectural documentation. I see lots of coati every time I return to Tikal.



*Nasua narica* herd at PANAT. Jul. 22, 2022. Photo by Edwin Solares. FLAAR Mesoamerica.

## Full Zoological Name

Zoological information on Nasua narica is available in Gompper's 1995 report:

https://academic.oup.com/crawlprevention/governor?content=%2fmspecies%2farticle%2fdoi%2f10.2307%2f3504195%2f2600711

## Local names for Nasua narica

In English: white-nosed coatimundi; in local Spanish: coatimundi, coati, pizote or tejón.

## Mayan names for Nasua narica

One Mayan name is chi'ik or ch'we (Pech-Canché *et al* 2009). Keep in mind there are dozens of different Mayan languages.

## Coatimundi is a relative of the Raccoon

There are several relatives of the raccoon which live in the Mayan speaking areas of Guatemala. The Coatimundi is one of these raccoon relatives. Mammal Species of the World, 3rd edition, lists the species of the Family Procyonidae. I mention here the genus list:

- Raccoons (*Procyon*)
- Coatis, Coatimundis (Nasua)
- Kinkajous (Potos)
- Cacomistles (Bassariscus)

Other genera of this family Procyonidae are not animals that we are studying in the Maya area of Guatemala.

You can identify the coatimundi because they have a long tail which they usually hold erect when walking and feeding. Their small body is covered with dark brown to red hair; sometimes they present light brown hair. They have a long snout with a black nose. The front and rear legs are black, with long claws. These claws allow them to dig the soil and the tree bark in search of food.



**Coatimundi feeding on fallen fruit**, near the entrance of Tikal. Jun. 23, 2021. Photo by David Arrivillaga, FLAAR Mesoamerica. The White-nosed coati is a species with social behavior. They have been observed in bands of more than 100 individuals, formed by females and young males. The adult male leaves the band and wanders around by himself. But we usually see 20 to 30 coatis when hiking around Tikal. You can also see peccary in large social groups but these can attack in masse. Plus, peccary avoid people.

During the day the coati walk long distances with the band in search for food, which consist mainly on little arthropods, such as spiders, grasshoppers, or larvae of coleopters. They have been reported to eat seasonal fruist such as breadnut (*Brosimum alicastrum*), Poshte (*Anona scleroderma*), allspice (*Pimienta dioica*), "zapotillo" (*Pouteria dunlandii*), sapodilla (*Manilkara zapota*) and guava (*Talisa olivae*) among others. They also eat eggs of diverse animals, frogs and little snakes.

According to the National Park of Tikal rangers' there have been some adult males hunting squirrels and wild turkeys.

They are excellent tree climbers since their feet morphology and long tail gives them the

grip and balance, so they have been observed resting, hunting and playing in the tree tops. As a tourist visiting Tikal you will see the coatis always on the ground, so it may be a surprise to learn that they sleep in trees.

During the night they tend to rest, though the adult males tend to remain in activity.

They have their reproductive season from January to February. During that season you can see the males getting together with the band. Since the strongest male gets the chance to keep the females, there are fights among the adult males. They also fight for territory. Sometimes the fights tend to be so intense that one of the males can lose their life during the competition.

The pregnant females keep the offspring away from the male. They live in a nest in the tree cups, and are protected by the band members. However, a lot of the offspring do not survive the first years of life, because they are prey of depredators such as hawks, eagles, snakes, felines and other carnivores. Sometimes the offspring gets lost among the bush during long walks.



Photo A: Coati at Tikal, Mar. 28, 2012. Photo by Sofía Monzón.

Photo B: Coati wandering at Yaxha Nakum and Naranjo park. Photo by Norma Cho, with a Nikon D810. During the day you see isolated males and small herds of females with their young cubs. Whereas many tree-dwelling mammals are nocturnal, the Coatimundi is always visible at Tikal and elsewhere in El Peten, Guatemala, walking around during the day. These coatimundis are almost always in groups.

Agoutis also roam during the day in Tikal National Park, but do not climb or live in trees. Agoutis also do not stay in large groups like coatis.

Coatis sleep in trees at night. Their long tails help them navigate through tree branches. They have very elastic ankles, which makes it easy to move up to the treetops and back to the ground. They can run from the tree to the ground with their heads in front of their legs. Flexible ankles are a specific adaptation to life in trees. Also, their noses are extremely flexible and can bend almost 90 degrees in any direction.

# Sometimes you can hear the coati communicating with each other

Members of the group communicate using different sounds. The type of the sound depends on the "message" they want to send; regular communication consists of whining sounds. In the case of danger, they produce loud woofs and clicks. You can read about the calls of the White-Nosed Coati in the report by Maurello, Clarke and Ackley (2000).

#### Where to find coatis?

According to Gompper (1995) its distribution range extends from Central America to the Southwestern United States. They can be generally found in deciduous and evergreen forests of South Eastern of the United States to Panama and the Northern Part of Colombia. At heights not bigger than 3000 meters over sea level. In Arizona coati live at high altitudes and even can handle snow! And in Guatemala coati can occasionally be found in the high altitude cloud forests of the volcanoes overlooking Lake Atitlan. But if you are visiting Guatemala, the place you will see groups of coatimundi is Tikal.

The distribution of Coati in Mexico is covered by Espinoza and Martínez (2014).



**Coatimundi long tails** help them navigate through tree branches. Tikal, Mar. 28, 2012. Photo by Sofía Monzón.



Nasua narica herd at PANAT. (Photos C, D, E) Photos by Edwin Solares. FLAAR Mesoamérica. Jul. 22, 2022. Sony Al. with Sony FE 200-600mm f/5.6-6.3 G OSS Lens.





*Nasua narica, at the Aurora Zoo*, Guatemala City. Jan. 18, 2016. Photo by Nicholas Hellmuth.

#### **Coatimundi live in Social Groups**

This is the most abundant carnivore in neotropical forests and one of the few that lives in large social groups. Gompper et al. 1997 and Valenzuela 1998 seem to focus on the uniqueness of coatis living in social groups, but especially the white-lipped peccary do also, as do species of monkeys (especially the howler monkey). Plus many species of bats, though the most carnivorous of the bats, the False Vampire, tends to be more solitary (Hellmuth, based on decades of research on the False Vampire).

Even though coatis live in groups, the males are usually hiking around by themselves. This is discussed by Hirsch (2011).

Mating behavior of coatis in the Tikal National Park is discussed by Booth at al. (2004) and by Binczik (2006).

# For thousands of Years the Classic Maya ate the White-nosed Coati

Coatimundi are still eaten in Peten today. But please do not kill or capture any inside the park.

## Coati is used as a Reference to the Female Creator Goddess of the Quiche Maya

Coati is mentioned several times in the epic of the Popol Vuh. There are many editions of the sacred Popol Vuh; the ones I use the most are by Christenson, Tedlock, Colop.



Nasua narica, at PANAT. Taken by Edwin Solares, FLAAR Mesoamerica. Jul. 22, 2022.



**Nasua narica.** PANAT, Mar. 28, 2012. Photos by Sofía Monzón.

#### The Coatimundi may be a pollinator!

A study made in Costa Rica by Mora (*et al* 1999) indicates that the White-nosed Coati acts as a pollinating agent of the Balsa tree (*Ochroma pyramidale*). Apparently the coati also feeds upon the nectar of the flowers of the Balsa tree. During the visitation there was no damage to the floral structures and the pollen uptakes on facial fur (Mora *et al* 1999). The pollen then is dispersed by the coati.

### Coati eat Beetles (in addition to reptiles, etc.)

Coati eat a lot of scarab beetles, *Enema endymion*, both larvae and adults. They also eat fruit, such as ramon, chico zapote, and pimienta gorda. Coati also eat rodents, eggs of birds and occasionally lizards and non-venomous snakes. Large snakes (boas) and other snakes eat the coati. Pumas and jaguars eat coati (Novack et al. 2005). Pumas eating coati is also discussed by Monroy et al. (2009).

Obviously what the coati eat depends on whether they are in the Maya Highlands or Maya Lowlands (of Guatemala) or whether they are in a seasonally wet forest (PANAT, PNYNN and the rest of the Reserva de la Biosfera Maya (RBM, Peten)) or whether they are in a tropical dry forest (where coati are described by Valenzuela and Ceballos (2000).

To learn more about what coatis eat, read Hirsch 2007a.

#### Coati can reverse their back feet

Coati can reverse their back feet so they can descend from a tree head first. But a completely arboreal Potos flavus can do all this even better.

**Back cover photo:** 

Nasua narica, at PANAT. Taken by Edwin Solares, FLAAR Mesoamerica. Jul. 22, 2022.



#### Nasua narica at PANAT.

Photo by Edwin Solares. FLAAR Mesoamerica. Sony A1. with Sony FE 200-600mm f/5.6-6.3 G OSS Lens.





**Arboreal** means associated with trees; an arboreal animal is one that either spends much or most of its time in the trees; or, for the coati, means it is capable of climbing into trees easily. The coati, however, spends most of its day wandering around on the ground. The coati mainly climb trees to spend the night.

**Neotropical** is the area from southern Mexico down through South America. The definitions get complex so best to look in a dictionary or Wikipedia. The difference and similarity of topical and Neotropical sometimes depends on whether you read a scientific description or a popular description, and whether a book or article on botany and plants, or on geographic and political geography.

**Nocturnal**, meaning being active at night; as opposed to diurnal, which means active during the day.

**Popol Vuh** is the sacred book of the Maya people. The earliest images of the deities and characters of the Popol Vuh can be found on carved stone stelae (monuments) at Izapa (Chiapas, Mexico), San Bartolo murals (Peten, Guatemala), and stucco decoration of pyramid terraces (also Peten). The PhD dissertation of Dr Nicholas included discussion of the Hero Twins and other aspects of the Popol Vuh.

**Quiche** (also spelled **Kiche**), one of cultures and 21 Mayan languages of Guatemala. The best known town of the Quiche is Chichicastenango, but the Quiche people occupy many other areas of the Highlands. The physical book of the Popol Vuh was found in the Quiche region, but every Maya area would have had its own version of the Popol Vuh.

**Seasonal rain forest** means that some months it is so dry that most trees lose their leaves. Tikal, Yaxha, and other places have lots of rain in the rainy season, but it can be quite dry in April and May (and often other months also).

**Tikal** is very well preserved and many buildings have been nicely repaired and reconstructed. Tikalisthemostfamousancient Maya ruined city in Guatemala. Nicholas Hellmuth, was a student archaeology intern at Tikal in 1965, and discovered the Tomb of the Jade Jaguar there. You can see samples of the treasure in the National Museum of Archaeology in Guatemala City and in the ceramics museum in Parque Nacional Tikal.

Yaxha, PNYNN is one of the ten largest national parks in Guatemala. The part of the park on the north side of Lake Yaxha and adjacent Lake Sacnab (Peten, Guatemala) was where Nicholas Hellmuth lived and worked to preserve the forests for several years in the 1970's. He encouraged local politicians as well as international park people to create a national park to protect the entire north side (the south side was already chopped down for cattle ranches).

## **Appendix A** Tikal National Park, Mirtha Cano's experience with Coatimundi

During 2011, during the Biology Laboratory construction and the material donation for the building of a temporary shelter for animals in an emergency, it was possible to learn more about the breeding of two coatis, According to Mirtha Cano the white-nosed coatis where found by Mrs. Roxana Ortiz, of the Hotel Tikal Inn. She brought the abandoned young to the Biology Laboratory, so they can help the coatis.

The white-nosed coatis were two females only a couple of weeks old. Apparently the females fell from the nest and the mother could not rescue them.

In the rescue center, they fed the coatis with soy milk or lactose-free milk, three times a day during the first month. This was a recommendation made by the Director of ARCAS Rescue Center, the Veterinary Fernando Martinez.

Mirtha Cano named the coatis "Lupe" and "Canche". She, along with Mrs. Roxi Ortiz, did long walks through the Tikal forest in order to get the coatis familiarized with the food they could find available. Gradually the coati youngsters started to feed by themselves.

During this period they could watch how the coatis learned to recognize the harmful insects. Some of the millipedes (Miriapod) cause them irritation in their stomach when they were eaten. Also some of the death worms provoked them stomach ache and vomiting. Some insects also have defense mechanisms that were used against depredators, so they also expel an irritant substance.

According to Mirtha there was a time when the coatis could identify a "Central American Lancehead " snake (*Bothros asper*) with their sensitive sense of smell. The coatis made loud cries when they identified it.

The coatis were getting bigger and bigger with time. And while that was happening, they were becoming faster to caught toads, snakes and tarantulas, using their claws to kill their prey.

The wild fruits were a delicacy for their palate. The bread nut (*Brosimum alicastrum*, ramón) is very abundant during the months of July and August. The tropical forest offers a big fruit diversity all year long, making the place a feast for the coatis, the birds and other mammals.

The main objective was to raise the coatis during the first months of life, show them their natural habitat, and teach them to locate water and food sources. This way they could incorporate to the female band when they are released.

The coatis were released after five months of care, in areas near the old airstrip and Tikal Inn Hotel in order to monitor them easily. Mirtha observed that the coatis preferred the territory inside the Tikal Inn Hotel. Probably because this is an area with diverse kinds of trees, which provides a god source of food. Since the coatis, Lupe and Canche didn't want to join the band, Mirtha and the Park Staff walked along with the wild band so Lupe and Canche could feel comfortable with them and join them.

At the beginning it was hard, though with time both coatis felt comfortable with the band and eventually joined them. Even though Lupe had a fight with one of the band members, she is now recovering and ready to join the band again.

Although they might not have the chance to walk with them in later years, they are very pleased to know that they helped to rescue and raise two coatis successfully.

## Arboreal Mammals in Parque Nacional Tikal and the rest of the Reserva de la Biosfera Maya (RBM), Peten

Jaguars and other felines climb easily into trees (but not all felines; just a few species). Other animals live most of their life in trees: obviously monkeys. kinkajous and cacomistles are completely arboreal, day and night. However, they don't do much during the day (other than sleep) since these are nocturnal animals.

Other animals wander around the ground all day but return to trees to sleep (gray fox and lots of other animals). Here is an introductory list of mammals that either life in trees most of the time (monkeys) or at least sleep in trees or eat things in trees so are often up in the trees.

- Squirrel, Sciurus negligens
- Gray squirrel, Sciurus aureogaster
- Collared anteater, Tamandua tetradactyla
- · Porcupine, Coendu mexicanas
- Kinkajou, Potos flavus
- Opossum, Didelphis marsupialis
- Raccoon, Procyon lotor
- Cacomistle Bassariscus sumichrasti (relative of the Ring-tailed cat)
- Spider monkey Ateles geoffroyi
- Howler monkey Alouatta palliata
- Gray fox, Urocyon cinereoargenteus (yes, these foxes are also arboreal at PANAT and PNYNN)

# References Cited and additional suggested **Bibliography on coatimundi**, *Nasua narica*

#### ARANDA Sánchez, Jaime Marcelo

2012 Manual para el rastreo de mamíferos silvestres de México. CONABIO. 260 pages.

Available online: https://doi.org/10.5962/bhl.title.113211

#### AZA SAMLL CARNIVORE TAXON ADVISORY GROUP

2010 Procyonid (Procyonidae) Care Manual. Association of Zoos and Aquariums (AZA), Silver Spring. 117 pages.

Download online: https://assets.speakcdn.com/assets/2332/procyonidcaremanual2010r.pdf

#### BINCZIK, Gerald

2006 Reproductive biology of a tropical Procyonid, the White-nosed Coati. University of Florida Dissertation. 129 pages.

Download online: https://ia902707.us.archive.org/23/items/reproductivebiol00binc/ reproductivebiol00binc.pdf

#### **BOOTH-Binczik, Susan**

2001 Ecology of Coati. Social behavior in Tikal National Park, Guatemala. University of Florida Dissertation. 93 pages.

Download online:

http://www.carnivoreconservation.org/files/thesis/booth\_binczik\_2001\_phd.pdf

#### BOOTH-Binczik, S. D., BINCZIK, G. A. and R. F. LABISKY

2004 Lek-like mating in white-nosed coatis (*Nasua narica*): socio-ecological correlates of intraspecific variability in mating systems. *Journal of Zoology*. Vol. 262. No. 2. Pages: 179–185.

Available online:

https://zslpublications.onlinelibrary.wiley.com/doi/abs/10.1017/S0952836903004527

#### CANALES Pacheco, Libia María

2021 Patrones de actividad y abundancia de mamíferos en el bosque de Las Comunas Dos Mangas y Loma Alta, Ecuador 2020-2021. Licenciatura thesis. Universidad Estatal Península de Santa Elena. 88 pages.

Available online: https://repositorio.upse.edu.ec/handle/46000/6655

#### CEBALLOS, Gerardo and Grisselle OLIVA

2006 Tejón, Coatí. In, Los Mamíferos Silvestres de México. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México. Pages: 411-413.

Available online:

https://itvolivre.wordpress.com/2019/10/13/los-mamiferos-silvestres-de-mexicoceballos-g-y-oliva-g-cord-2005/

#### COMISIÓN CENTROAMERICANA DE AMBIENTE Y DESARROLLO (CCAD)

2010 Listados Actualizados de las Especies de Fauna y Flora. Incluidas en los apéndices de la CITES, distribuidas en Centroamérica y República Dominicana. 61 pages.

Download online:

https://www.caftadr-environment.org/spanish/outreach/publications/CITES%20 Updated%20Fauna%20and%20Flora%20Species%20(Spanish).pdf

#### CUPUL, Fabio and Joseph MONTJOY

2022 Mamíferos en petroglifos del valle de Mascota, México. Mammalogy Notes. Vol. 8. No. 1. 14 pages.

Available online:

https://mammalogynotes.org/ojs/index.php/mn/article/view/308

#### DE LA GARZA Camino, Mercedes

2000 El legado artístico. 2 pages.

Not available online.

#### ESCOBAR Anleu, Bárbara Isabel

2015 Riqueza de Mamíferos Medianos y Mayores en Cafetales y Bosques de Tres Reservas Naturales Privadas (San Jerónimo Miramar-Quixayá, Pampojilá-Peña Flor y Santo Tomás Pachuj) de la Reserva de Usos Múltiples de la Cuenca del Lago de Atitlán – RUMCLA. Licenciatura thesis. Universidad de San Carlos de Guatemala. 74 pages.

Download online:

https://www.researchgate.net/publication/318793105\_RIQUEZA\_DE\_MAMIFEROS\_ MEDIANOS\_Y\_MAYORES\_EN\_CAFETALES\_Y\_BOSQUES\_DE\_TRES\_RESERVAS\_ NATURALES\_PRIVADAS\_SAN\_JERONIMO\_MIRAMAR-QUIXAYA\_PAMPOJILA-PENA\_ FLOR\_Y\_SANTO\_TOMAS\_PACHUJ\_DE\_LA\_RESERVA\_DE\_USOS\_MULTIPLES

#### ESPINOZA-García, Claudia R. and Jesús M. MARTÍNEZ-Calderas

2014 Distribución potencial del coatí (*Nasua narica*) en el noreste de México: implicaciones para su conservación. *Therya*. Vol. 5. No. 1. Pages: 331-345.

Download online: https://www.scielo.org.mx/scielo.php?pid=S2007-33642014000100017&script=sci\_ arttext

## FLEMING, C. H., DEZNABI, I., ALAVI, S., CROFOOT, M. C., HIRSCH, B. T., MEDICI, E. P., NOONAN, M. J., KAYS, R., FAGAN, W.F., SHELDON, D. and J. M. CALABRESE

2022 Population-level inference for home-range areas. *Methods in Ecology and Evolution*. Vol. 13. No. 5. Pages:1027–1041.

Available online: https://doi.org/10.1111/2041-210X.13815

#### **GIAMPAOLI, Jeremy**

2017 Vocalizations and associated behaviors of the white-nosed coati, *Nasua narica* (Issue December). 17 pages.

Available online:

https://digitalcommons.usf.edu/tropical\_ecology/650/

#### GLATSTON, Angela

1994 The Red Panda, Olingos, Coatis, Raccoons, and their Relatives. IUCN The World Conservation Union. 59 pages.

Download online: http://www.carnivoreconservation.org/files/actionplans/procyonids\_en.pdf

#### **GOMPPER, Matthew**

1995 Nasua Narica. Mammalian Species. No. 487. 10 pages.

Available online:

https://academic.oup.com/mspecies/article/doi/10.2307/3504195/2600711

#### GUZMÁN-Cornejo, C., HERRERA-Mares, A., UGALDE-Medina, A., LÓPEZ-Pérez, A. M., DEL CASTILLO-Martínez, L., ACOSTA-Gutiérrez, R., CABRERA-Garrido, M. and J. B. MORALES-Malacara

2019 Arthropods Associated with Mammals. Their Importance as Part of the Richness in a Biosphere Reserve in Mexico. *Journal of Medical Entomology*. Vol. 20. No. 10. 8 pages.

Available online: https://doi.org/10.1093/jme/tjz237

#### HIRSCH, Benjamin Thomas

2011 Long-term adult male sociality in ring-tailed coatis (Nasua nasua). Mammalia. Vol.
75. Pages: 301–304.

Available online:

https://www.degruyter.com/document/doi/10.1515/mamm.2011.030/html

#### HIRSCH, Benjamin Thomas

2009 Seasonal variation in the diet of Ring-tailed coatis (*Nasua nasua*) in Iguazu, Argentina. Journal of Mammalogy. Vol. 90. No. 1. Pages: 136-143

Available online:

https://academic.oup.com/jmammal/article/90/1/136/848758

#### HIRSCH, Benjamin Thomas

2007 Within-group spatial position in ring-tailed coatis (*Nasua nasua*): balancing predation, feeding success, and social competition. Dissertation. *Anthropological Sciences*. 349 pages.

Available online:

http://www.carnivoreconservation.org/files/thesis/hirsch\_2007\_phd.pdf

#### HIRSCH, Benjamin Thomas

2007 Spoiled Brats: Is Extreme Juvenile Agonism in Ring-Tailed Coatis (*Nasua nasua*) Dominance or Tolerated Aggression? *Ethology*. Vol. 113. Pages: 446-456.

Available online:

https://www.researchgate.net/publication/216778602\_Spoiled\_brats\_an\_extreme\_ form\_of\_juvenile\_dominance\_in\_the\_ring-tailed\_coati\_Nasua\_nasua

#### KETTUNEN, Harri and Christophe HELMKE

2011 Introducción a los Jeroglíficos Mayas. Wayeb Maya names of Coatí.. 166 pages.

Available online: https://www.mesoweb.com/resources/handbook/JM2011.pdf

#### MAURELLO, M. A., CLARKE, J. A., and R. S. ACKLEY

2000 Signature Characteristics in Contact Calls of the White-Nosed Coati. *Journal of Mammalogy*. Vol. 81. No. 2. Pages: 415-421.

Available online:

https://academic.oup.com/jmammal/article/81/2/415/2372870

#### MORA, José, MÉNDEZ, Vivian and Luis GÓMEZ

1999 White-nosed coati Nasau narica (Carnivora: Procyonidae) as a potential pollinator of Ochroma pyramidale (Bombacaceae). Revista Biologia Tropical. Vol 47. No. 4. Pages: 719-721.

Available online:

https://www.scielo.sa.cr/scielo.php?script=sci\_arttext&pid=S0034-77441999000400008

#### MUNGUÍA-Carrara, Mariana

2020 From Human-Wildlife Conflicts to Human-Wildlife Coexistence in Anthropocene Landscapes. *Agri Res & Tech: Open Access J.* Vol. 24. No. 4. 6 pages.

Available online:

https://doi.org/10.19080/ARTOAJ.2020.24.556277

#### NOVACK, Anthony J., MAIN, Martin B., SUNQUIST, Melvin E. and Ronald F. LABISKY

2005 Foraging ecology of jaguar (Panthera onca) and puma (*Puma concolor*) in hunted and non-hunted sites within the Maya Biosphere Reserve, Guatemala. J. Zool., Lond. Vol. 267. Pages: 167–178

Available online:

https://www.cambridge.org/core/journals/journal-of-zoology/article/abs/foragingecology-of-jaguar-panthera-onca-and-puma-puma-concolor-in-huntedand-nonhunted-sites-within-the-maya-biosphere-reserve-guatemala/4302357-05EECEAE9D7FEAB6BF01BC05F

## PACHECO, Jesús, CEBALLOS, Gerardo, DAILY, Gretchen C., EHRLICH, Paul R., SUZÁN, Gerardo, RODRÍGUEZ-HERRERA, Bernal and Erika MARCÉ

2004 Diversidad, historia natural y conservación de los mamíferos de San Vito de Coto Brus, Costa Rica. *Revista de Biología Tropical*. Vol. 54. No. 1. Pages: 219-240.

Download online: https://www.scielo.sa.cr/scielo.php?pid=S0034-77442006000100022&script=sci\_arttext

#### PÉREZ-Irineo, Gabriela and Antonio SANTOS-Moreno

 2012 Diversidad de mamíferos terrestres de talla grande y media de una selva subcaducifolia del noreste de Oaxaca, México. *Revista Mexicana de Biodiversidad*. Vol. 83. Pages 164-169.

Download online: https://www.scielo.org.mx/scielo.php?script=sci\_arttext&pid=S1870-34532012000100019

#### **REID A., Fiona**

1997 A field guide to the mammals of Central America and southeast Mexico. New York. Oxford University Press. 237 pages.

Buy online:

https://global.oup.com/academic/product/a-field-guide-to-the-mammals-ofcentral-america-and-southeast-mexico-9780195343236?cc=gt&lang=en&

#### REYES-Gózalez, A., CAMOU-Guerrero, A., DEL-Val, E., RAMÍREZ, M. I. and L. PORTER-Bolland

2020 Biocultural Diversity Loss: the Decline of Native Stingless Bees (Apidae: Meliponini) and Local Ecological Knowledge in Michoacán, Western México. *Human Ecology*. Vol. 48. No. 4. Pages: 411–422.

Available online: https://doi.org/10.1007/s10745-020-00167-z

#### ROVIROSA-HERNÁNDEZ, María de Jesús, GARCÍA-ORDUÑA, Francisco, MORALES-MÁVIL, Jorge E., HERNÁNDEZSALAZAR, Laura Teresa, SEGOVIA, Augusto, CHABLÉ, Juan, DELFÍN, Hugo, SOSA, Javier and Silvia HERNANDÉZ

2012 Hematological and Blood Chemistry Values in a Semi-Free Population of White-Nosed Coatis (*Nasua narica*) in La Venta Tabasco, Mexico. *Acta Zoológica Mexicana*. Vol. 28. No. 2. Pages: 391-400.

Available online:

https://pdfs.semanticscholar.org/9488/2b127170dc106a5d0de799a7bb99569cc207. pdf

#### RUIZ-García, M., JARAMILLO, M. F., CÁCERES-Martínez, C. H. and J. M. SHOSTELL

2020 The phylogeographic structure of the mountain coati (*Nasuella olivacea*; Procyonidae, Carnivora), and its phylogenetic relationships with other coati species (*Nasua nasua* and *Nasua narica*) as inferred by mitochondrial DNA. *Mammalian Biology*. Vol. 100. No. 5. Pages: 521–548.

Available online: https://doi.org/10.1007/s42991-020-00050-w

#### RUIZ-García, M., JARAMILLO, M. F. and J. M. SHOSTELL

2022 How Many Taxa or Groups are within *Nasua nasua* and *Nasuella olivacea* (Procyonidae, Carnivora)? The Mitochondrial Reconstruction of the Complex Evolutionary History of the Coatis throughout the Neotropics and Some Insights into the Systematics of the Genus. *Journal of Phylogenetics & Evolutionary Biology*. Vol. 10. No. 3. 19 pages.

Available online: https://doi.org/10.37421/2329-9002.2022.10.206

#### RUIZ-Ramoni, Damián, RINCÓN, Ascanio and Marisol MONTELLANO-Ballesteros

2018 Evidence of the origin of Nasua and Procyon (Procyonidae: Carnivora) in South America. *Revista Brasileira de Paleontologia*. Vol. 21. No. 1. Pages: 87–94.

Available online: https://doi.org/10.4072/rbp.2018.1.07

#### GRANADOS-Peña, R. and J. F. GONZÁLEZ-Maya

2022 Confirmation of the current occurrence of *Nasua narica* (Procyonidae) in the Caribbean region of Colombia. *Neotropical Biology and Conservation*. Vol. 17. No. 1. Pages: 21–28.

Available online: https://doi.org/10.3897/NEOTROPICAL.17.E70352

#### SEGOVIA, Augusto, CHABLÉ, Juan, DELFÍN, Hugo, SOSA, Javer and Silva HERNÁNDEZ

n.d. Aprovechamiento de la fauna silvestre por comunidades mayas. Uso de la fauna silvestre. Biodiversidad y Desarrollo Humano en Yucatán. Pages: 385-387.

Available online:

hhttps://www.cicy.mx/Documentos/CICY/Sitios/Biodiversidad/pdfs/Cap7/20%20 Aprovechamiento%20de%20la%20fauna.pdf

#### SHESEÑA, Alejandro

2010 Los nombres de los naguales en la escritura jeroglífica maya: Religión y lingüística a través de la onomástica. *Journal of Mesoamerican Languages and Linguistics*. Vol. 2. No. 1. Pages: 1-30.

Available online:

https://www.linguisticsociety.org/sites/default/files/765-1829-1-Shesena.pdf

#### SOLÍS, Leonor and Alejandro CASAS

2019 Cuicatec ethnozoology: traditional knowledge, use, and management of fauna by people of San Lorenzo Pápalo, Oaxaca, Mexico. *Journal of Ethnobiology and Ethnomedicine*. Vol. 15. No. 58. 16 pages.

Available online: https://doi.org/10.1186/s13002-019-0340-1

#### VALENZUELA, D.

1998 Natural History of the White-nosed Coati, *Nasua narica*, In a tropical dry forest of Western Mexico. *Revista Mexicana de Mastozoología*. Vol. 3. Pages: 26-44.

Available online:

http://revmexmastozoologia.unam.mx/ojs/index.php/rmm/article/view/59

#### VALENZUELA, D. and D. W. MACDONALD

2002 Home-range use by white-nosed coatis (*Nasua narica*): limited water and a test of the resource dispersion hypothesis. *J. Zool., Lond.* Vol. 258. Pages: 247-256.

Available online: https://www.cambridge.org/core/journals/journal-of-zoology/article/abs/ homerange-use-by-whitenosed-coatis-nasua-narica-limited-water-and-a-test-ofthe-resource-dispersion-hypothesis/D7F4245E597585DFDF969EC9DD9287F7

#### VALENZUELA, David and Gerardo CEBALLOS

2000 Habitat Selection, Home Range, and Activity of the Whitenosed Coati (*Nasua Narica*) in a Mexican Tropical Dry Forest. *Journal of Mammalogy*. Vol. 81. No. 3. Pages: 810-819.

Available online: https://academic.oup.com/jmammal/article/81/3/810/2372921

#### VAN HULLE, Michael and Christopher VAUGHAN

2008 The Effect of Human Development on Mammal Populations of the Punta Leona Private Wildlife Refuge, Costa Rica. *Revista de Biología Tropical.* Vol. 57. Pages: 441-449.

Download online: https://www.scielo.sa.cr/scielo.php?script=sci\_ arttext&pid=S0034-77442009000100039

#### ' VERNES, Karl and Fred DEVOS

2022 Use of cenotes and the cave environment by mammals on the Yucatán Peninsula, Mexico. *Biotropica*. Vol. 54. No. 4 Pages: 881–892.

Available online: https://doi.org/10.1111/btp.13111

#### VILLALBA-Briones, R., BARROS-Diaz, C., GALLO-Pérez, A., BLASCO-Carlos, M. and E. B. MOLINEROS

2022 First description of sarcoptic mange in a wild coati (*Nasua narica*), in Ecuador, and cooccurrence of canine distemper virus. *Revista Brasileira de Parasitologia Veterinaria*. Vol. 31. No. 1. 8 pages.

Available online: https://doi.org/10.1590/S1984-29612022002

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