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Short Communication

Extreme fighting and vocalisations in *Tapirus bairdii*: observations from aguadas of Calakmul, social arenas for the species

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Abstract

We report and describe unusual types of behaviour of fighting and whistling in a species considered shy and calm. Baird's tapir is the largest of all Neotropical mammals and lives in dense well-conserved tropical forests in America. For ten years, in the Calakmul Biosphere Reserve of Southern Mexico, we have monitored a tapir population in ponds locally named aguadas that serve as social arenas for the species. Recently, we obtained 97 video records in which some tapirs get involved in serious fights and perform other types of behaviour related probably to courtship, including several types of whistles. We describe what we recorded and interpret these types of behaviour whenever possible. These rare types of tapir behaviour can explain several of the wounds and scars on many adults of the population and help us better understand the social dynamics of this shy and endangered species of Neotropical ungulate. We hope that all this information can help tapir conservation.

Key words: Maya Forest, tapir courtship, tapir whistles, tapir wounds

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Introduction

The Baird's tapir or Central American tapir (*Tapirus bairdii*) is the largest Neotropical terrestrial mammal. It is a solitary, nocturnal species whose shy behaviour normally prevents observations in the wild. Tapirs are also naturally rare because they live in low densities across their distribution range due to low reproductive rates (Meyer et al. 2022). Baird's tapirs occur from Mexico to Colombia in well-preserved humid tropical forests. Their range has shrunk considerably in the last 20 years (Schank et al. 2020) due to forest loss and hunting pressure (Garcia-Vettorazzi et al. 2016; www.iucnredlist.org).

To study elusive and rare species like Baird's tapir, several tools and methods have been developed over the years. Camera traps are one of the most common non-invasive methods that wildlife ecologists use to acquire information, particularly related to behaviour and population dynamics (O'Connell et al. 2011). With camera traps for example, in the Calakmul Biosphere Reserve (Southern Mexico; CBR hereafter), we have found that tapirs socialise 13% of the time, with male-female interactions being the most common associations (Reyna-Hurtado

and Arias Domínguez 2024). It was also evident that tapirs use ephemeral ponds that exist in the protected area as social arenas (Reyna-Hurtado and Arias-Domínguez 2024), sites where individuals visit to gather information about conspecifics, interact with other members, strengthen social networks or just exchange information (Turkalo and Fay 1995; Giljov and Karenina 2024).

Tapirs are considered gentle animals that avoid fighting and whose main defence is hiding and secretively moving in the forest or fleeing to ponds, avoiding humans and predators, such as jaguars (Meyer et al. 2022). Tapirs often present several scars on the back and these are believed to result from jaguar attacks in which tapirs escaped alive due to their thick skin and large size (Pérez-Flores et al. 2021; Meyer et al. 2022). Regarding territoriality, there is no information for tapirs. However, they apparently have a defined home range in which they move constantly searching for water and other resources (Reyna-Hurtado et al. 2016; R. Reyna-Hurtado, unpublished data). Another characteristic of the cryptic behaviour of tapirs is that they rarely vocalise and when they do, they produce a high-pitch whistle that apparently has the purpose of searching for mates or warning same-sex conspecifics of their presence (Gómez-Hoyos et al. 2018).

For more than ten years, we have deployed camera traps in some ephemeral ponds (locally known as aguadas) inside the CBR, the largest protected tropical forest in Mexico and part of the Maya Forest, a shared forest with Guatemala and Belize. The purpose of the monitoring programme with camera traps is to obtain information on elusive species, such as tapirs, white-lipped peccary (*Tayassu pecari*) and jaguars (*Panthera onca*), amongst others (Reyna-Hurtado et al. 2012, 2016, 2019, 2024). During these years, we have collected more than 13,000 tapir photos that account for 600 visits of the species to 18 aguadas over 10 years. These visits to the aguadas have taught us that tapirs can show site fidelity for more than 10 years (Reyna-Hurtado and Arias-Domínguez 2024) and move and use aguadas located in large home ranges (between 40 to 70 km^2; Reyna-Hurtado et al. (2016); R. Reyna-Hurtado, unpublished data). However, in late April and early May 2024, camera traps recorded several interactions between at least three (possibly four) tapirs in an aguada for 17 days, which presented us with exciting new information about courtship behaviour, whistle behaviour and the intense fights that occur around that time. This information also explains several of the scars that we normally see in a tapir's body.

Material and methods

The Calakmul Biosphere Reserve (CBR hereafter; Fig. 1) is a protected area in southern Mexico and part of the Maya Forest. It was decreed in 1989, with an extension of 7,289 km^2. This protected area is located in southeast Campeche State, 19°15'17"N, 90°10'89"W (Carabias-Lillo et al. 1999). The CBR's hydrography is determined by the amount of rainfall, but, generally, the water flows underground and only in a few places the water accumulates on the soil's surface forming ephemeral ponds (aguadas; Reyna-Hurtado et al. (2010)). These aguadas are vital components of the landscape for wildlife and humans especially during the harsh dry season (Reyna-Hurtado et al. 2010; Pérez-Cortez et al. 2012). The main vegetation types are high evergreen forest, medium sub-evergreen forest, low evergreen and deciduous forest, savannah and hydrophytes (Carabias-Lillo et al. 1999; Martínez and Galindo-Leal 2002).

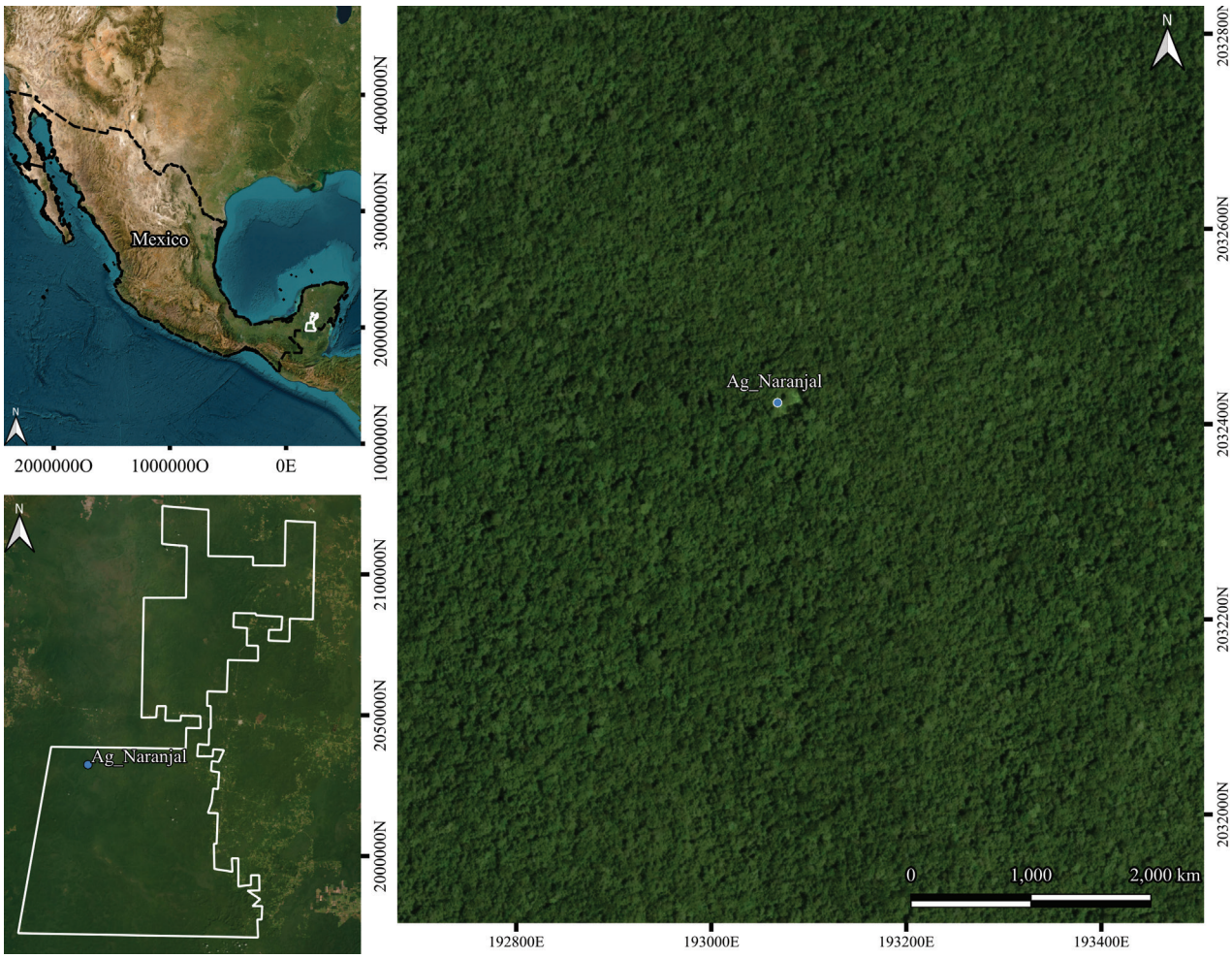

Figure 1. Calakmul Biosphere Reserve in southern Mexico (delimited by the white polygon on the lower left picture), Aguada Naranjal within it and an aerial picture of the Aguada Naranjal embedded within the Calakmul Forest (right picture).

The region's climate is tropical sub-humid, with a rainy season in summer (June to November) and a dry season in winter-spring (February to May), having an annual mean temperature of 24.6 °C and an annual mean precipitation of 1,076.2 mm (Martínez and Galindo-Leal 2002).

R. Reyna-Hurtado and collaborators have conducted a long-term study focused on wildlife uses of aguadas in the CBR using camera trapping survey from February 2014 to December 2024 in 18 ponds. Usually, a single camera trap was installed in each pond of a set of 10 to 18 ponds that were monitored during these years. Most cameras were from the models Reconyx PC800 Hyperfire professional Reconyx, Inc., Cuddeback Inc. and Browning Strike Force Co. Cameras were positioned 50 cm above the ground and they were programmed to continuously take videos every time the sensor detected movement for 10 seconds and had no time between videos. The cameras were checked every other month to change batteries and memory cards.

From 26 April to 13 May 2024, one camera trap located in an aguada named Naranjal (Fig. 1) recorded 97 videos of at least three tapir individuals around the pond interacting in several ways. These 97 videos were carefully watched by three observers (authors) and we separately wrote our conclusions about what may have happened during these days in the aguada.

We looked for scars on the body of the interacting tapirs, for sex organs and for any other mark that could possibly identify them with certainty. We also considered the time when the individuals showed up and the time when the interactions took place. Based on these observations and combining the exercise of the three authors, we described the following events and, whenever possible, interpreted them objectively.

Several vocalisations were recorded as well, so we briefly described the different sounds tapirs made during the survey. To do so, we used Raven Pro 1.6 (Yang 2024) to elaborate spectrograms and waveform graphics to obtain basic measurements like duration of the vocalisation, low frequency (Hz) and high frequency (Hz). We could not collect enough data to make a deeper sound analysis, so we compared our sounds with previous research from Gómez Hoyos et al. (2018). Of these individuals, two are males and one is female, with the possibility of an additional female visiting the pond at the same time, but there was not enough evidence to tell whether there were two or just one female given the scars detected on at least one of them. Late April and early May are the core of the dry season, with temperatures that can reach up to 43 °C in the CBR. The tapirs, as well as many wildlife species, seek refuge from heat in the aguadas. The following events happened on these days when the hot temperatures rose to their maximum.

Results

From 26 April to 5 May, two males and a female were observed visiting the pond at different times and the males sniffing several of the tree trunks around the aguada. On 5 May at night, the female was seen with one of the males. However, the next day, the male was seen alone and later that day, the female was also alone, but she emitted two large whistles with a duration of 1.13 sec and 3.24 sec, respectively. The lowest frequency of these sounds was 1009.2 Hz and the highest frequency was 6105.5 Hz. Apparently, the female was on searching mode (Fig. 2, Suppl. material 1).

From 5–9 May, two males were observed visiting the pond and one of them marked the tree trunk with urine. The female was also observed these days, although alone. On 9 May, a fight lasting 4 hours at least was observed. From 07:48 am to 11:16 am, ten videos showed a couple of tapirs (one of them male for sure, although we suspect the other was also a male) fighting and chasing each other violently (see Fig. 3, Suppl. material 2). The two tapirs were trying to reach the lower area of the hind legs of each other. Both individuals fell to the ground and stood up several times. The video also showed high turns where the animals bend their bodies in a surprising way given their heavy weight. After the fight, the two tapirs looked severely hurt, especially on the lower area of the back legs and on the back rump. One of them was limping.

On 10 May, one of the tapirs was seen chasing another one from the aguada five times, always the same male returning to the aguada after chasing the other one. In one of these chases, one of them emitted another set of short high-pitch whistles with a mean duration of 0.74 secs and an average frequency ranging from 1612.72 Hz to 5023.68 Hz (Fig. 4, Suppl. material 3), probably related to advertisement sounds.

On 11 May, a female and a male were seen together and following each other. The male also produced another set of short whistles, while following the female

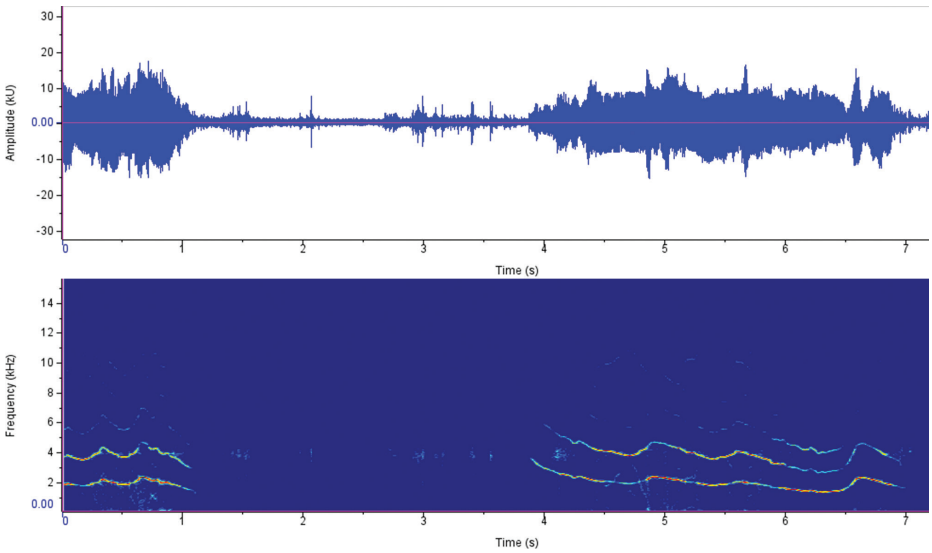

Figure 2. Amplitude (above) and frequency (below) of female Baird's tapir (*Tapirus bairdii*) whistles under searching behaviour in an aguada of the Calakmul Biosphere Reserve, southern Mexico [See also Suppl. material 1: Video of Baird's tapir (*Tapirus bairdii*) female whistling under searching behaviour in an aguada of the Calakmul Biosphere Reserve, southern Mexico].

Figure 3. Baird's tapir (*Tapirus bairdii*) adults fighting in an aguada of the Calakmul Biosphere Reserve, southern Mexico [See also Suppl. material 2: Video of Baird's tapir (*Tapirus bairdii*) adults fighting in an aguada of the Calakmul Biosphere Reserve, southern Mexico].

closely (less than one metre). On 12 May, the male and the female were again seen alone and the female also showed some wounds on the left leg. On 13 May, during the early hours of the morning (02:30 am), both individuals were seen together, with the male closely following the female and emitting the short whistle again, a similar sound to another one recorded on 11 May. This whistle had a mean duration of 0.72 to 0.85 secs, with a mean low frequency ranging from 1234.6 Hz to 5521.02 Hz (Fig. 5, Suppl. material 4). This whistle is considered a sound related to courtship since the sound was made by the male chasing the female. On 13 May, the camera stopped recording as its memory was full.

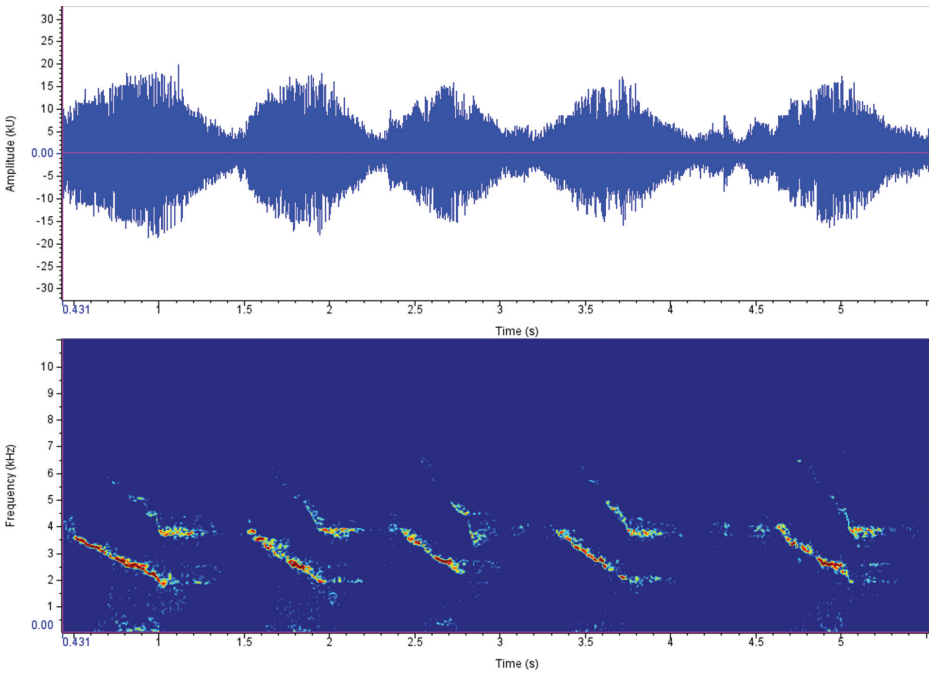

Figure 4. Amplitude (above) and frequency (below) of Baird's tapir (*Tapirus bairdii*) whistles during chasing behaviour in an aguada of the Calakmul Biosphere Reserve, southern Mexico [See also Suppl. material 3: Video of Baird's tapir (*Tapirus bairdii*) males whistling under chasing behaviour in an aguada of the Calakmul Biosphere Reserve, southern Mexico].

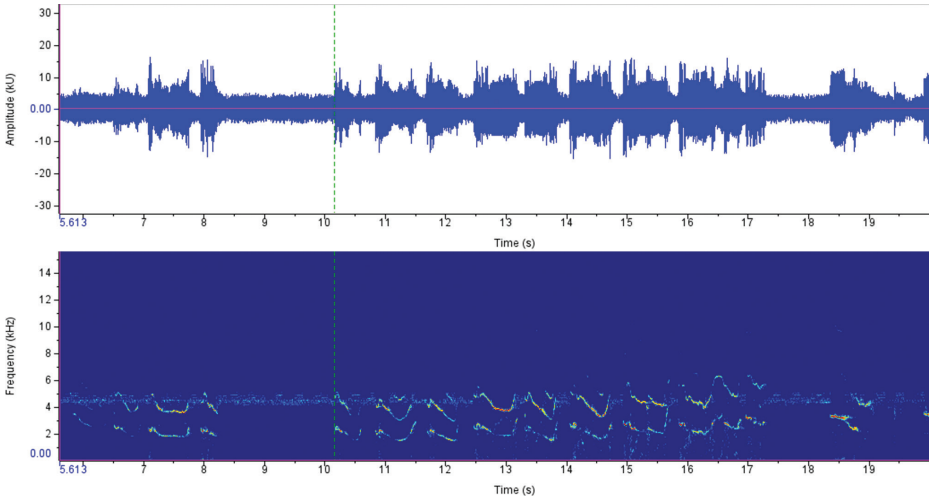

Figure 5. Amplitude (above) and frequency (below) of Baird's tapir (*Tapirus bairdii*) whistles during courtship behaviour in an aguada of the Calakmul Biosphere Reserve, southern Mexico [See also Suppl. material 4: Video of Baird's tapir (*Tapirus bairdii*) males whistling when following a female in an aguada of the Calakmul Biosphere Reserve, southern Mexico].

Discussion

Herein, we presented the most extreme fights observed between two adult tapirs, a set of 97 videos described how these fights occur and how they can inflict wounds on tapir individuals. These fights can explain the wounds that several tapirs have on the back of the rump and the lower hind legs (Pérez-Flores et al. 2022; R. Reyna-Hurtado, unpublished information; Fig. 6).

Figure 6. Wounds in a Baird's Tapir (*Tapirus bairdii*) after a fight in an aguada of the Calakmul Biosphere Reserve, in southern Mexico.

These fights illustrate how the two individuals are looking to bite each other in the back of their legs and how they protect themselves from these bites by bending and moving constantly. It is also surprising to see how much the tapir body can bend and perform sharp turns when being chased (or when chasing; Fig. 7).

We also reported the behavioural dynamics that occurred around a female that was probably in oestrus when two males occurred at that time. We believed that the two fighting individuals are two males (although the sex organs of one of them were not seen) and the fight occurred because both males met in the aguada while probably looking for the female that also visited the aguada and was seen pairing with one of them. Thus, we believe that this is a fight between two males for access to the female. This also correlates with the five times one of the males chased another individual the next day and always (the male chasing) returned to the pond. Additionally, that male is seen with the female for some days after the fight. One fact that we cannot explain is the set of wounds that the female had on her left thigh. This female is the one paired with the male, but on 12 May, she is also seen with several wounds on her leg. Was she involved in the fight against the other male? Was she the one fighting this male? Does the female fight with their partners before mating? These questions remain unanswered for now and we hope that the next sets of photographs will provide more information on the intense days before tapir mate.

From the set of videos in which tapirs emitted the whistles, we can conclude that they vocalise in three different ways. One is when one of them is searching for another individual, the other one is a courtship sound since it was emitted when a male was following a female closely in a friendly way. This could be also part of their courtship as suggested by Gómez-Hoyos et al. (2018). We also found a different pitch that tapirs emitted when in a stressful situation (when one was actively chasing another one). This suggests that tapirs are more vocal than we thought and calls are part of their courtship, their searching behaviour and fighting (or fleeing) behaviour (Gómez-Hoyos et al. 2018). Some vocalisations, at least one called pair bonding, have also been observed in the mountain tapir (*Tapirus pinchaque*; Rivera-Gómez et al. (2024)).

Figure 7. Baird's Tapir (*Tapirus bairdii*) bending and chasing each other after a fight in an aguada of the Calakmul Biosphere Reserve in southern Mexico.

Tapirs become involved in intense and physically extreme fighting that inflicts several wounds. These fights also included extreme chases and involved specific vocalisations. This means tapirs can be very aggressive with conspecifics and several of the scars we may see result from these fights and not from jaguar or puma predation attempts on them as previously reported (Meyer et al. 2022; Pérez-Flores et al. 2022). This novel information on tapir fights and courtship behaviour adds value to the versatile set of different types of behaviour that tapir can perform. They can be gentle, passive animals that almost ignore people at times (Reyna-Hurtado et al. 2024) in the forests to extremely aggressive towards conspecifics, including high jumping, high bends, marking of spots and performing specific vocalisations. In captivity, tapirs have shown aggression between male and female before copulation if the female rejects the male (Pukazhenthi et al. 2013). Nevertheless, these types of behaviour are reported in artificial conditions, unlike in the wild where more than one male may be around a female. In the wild, these types of behaviour probably occur every time a female enters oestrous and may last from some days to even weeks. The fact that these types of behaviour were recorded in an aguada and previous information showed that aguadas are social arenas for tapirs highlights the conservation value that aguadas also play for tapirs. They not only provide water to drink and refresh their bodies, but are a meeting spot for males and females.

Conclusions

There are many unanswered questions regarding tapir relationships with conspecifics, with other species and with key parts of the landscape, such as aguadas. We hope we can answer some of these in the future with the help of technologies such as camera traps, audio boots or radiotelemetry. We also hope that the CBR remains unaltered and conserves Neotropical species such as tapirs, enabling them to perform their hidden behaviour in social arenas and being a wild laboratory that allows us to observe these amazing natural types of behaviour of shy and endangered species like the tapir.

Acknowledgements

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

The research was conducted under permit # SPARN/DGVS/04801/23 of the Environmental Secretariat of the Mexican Government.

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Author contributions

Conceptualisation, R. R. H.; methodology, R. R-H., J. O. H.-R. and E. R-F. S.; formal analysis, R. R-H., J. O. H.-R. and E. R-F. S, investigation, R. R. H.; resources, R. R. H.; writing—original draft preparation, R. R-H.; writing—review and editing, R. R-H., J. O. H-R. and E. R-F; project administration, R. R-H.; funding acquisition, R. R-H.; investigation, R. R-H., J. O. H-R., supervision, R. R-H. All authors have read and agreed to the published version of the manuscript.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

Video 138

Authors: Rafael Reyna-Hurtado, Jonathan O. Huerta-Rodríguez, Edith Rojas-Flores

Data type: avi

Explanation note: Baird's tapir (*Tapirus bairdii*) female whistling under searching behavior in an aguada of the Calakmul Biosphere Reserve, Southern Mexico.

Link: https://doi.org/10.3897/neotropical.20.e143760.suppl1

Supplementary material 2

Video 174

Authors: Rafael Reyna-Hurtado, Jonathan O. Huerta-Rodríguez, Edith Rojas-Flores

Data type: avi

Explanation note: Baird's tapir (*Tapirus bairdii*) adults fighting in an aguada of the Calakmul Biosphere Reserve, Southern Mexico.

Link: https://doi.org/10.3897/neotropical.20.e143760.suppl2

Supplementary material 3

Video 188

Authors: Rafael Reyna-Hurtado, Jonathan O. Huerta-Rodríguez, Edith Rojas-Flores
Data type: avi
Explanation note: Baird's tapir (*Tapirus bairdii*) males whistling under chasing behavior in an aguada of the Calakmul Biosphere Reserve, Southern Mexico.

Link: https://doi.org/10.3897/neotropical.20.e143760.suppl3

Supplementary material 4

Video 240

Authors: Rafael Reyna-Hurtado, Jonathan O. Huerta-Rodríguez, Edith Rojas-Flores
Data type: avi
Explanation note: Baird's tapir (*Tapirus bairdii*) males whistling when following a female in an aguada of the Calakmul Biosphere Reserve, Southern Mexico.

Link: https://doi.org/10.3897/neotropical.20.e143760.suppl4