



New records of *Leopardus tigrinus* (Carnivora: Felidae) in the Department of Santander, Colombia

Mauricio Torres^{1*} , Laura Jaimes-Rodríguez¹ , Julián Lozano-Flórez² 

1 Fundación Iguaque, Reserva El Brasil, vereda Caragua, Tona, Santander, Colombia.

2 Colecciones Biológicas, Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Carrera 8 #15-08, Villa de Leyva, Boyacá, Colombia.

* Correspondencia: mauriciotorres@iguaque.org

Resumen

Leopardus tigrinus es el gato salvaje nativo más pequeño de América. En Colombia, la especie ha sido registrada rara vez en paisajes agrícolas y se encuentra asociada principalmente a hábitats naturales elevados como bosques montanos, bosque de niebla y páramo. Sin embargo, recientes registros tomados con cámaras trampa, así como registros incidentales de animales atropellados han incrementado los reportes de esta especie en el país, revelando que vive en proximidad de ciudades. En esta nota reportamos observaciones de dos individuos de *L. tigrinus* tomadas con cámaras trampa cerca de Bucaramanga, Santander. Este es el tercer y más septentrional registro de la especie en el departamento de Santander. Adicionalmente, discutimos algunos retos locales para la conservación de esta especie amenazada.

Palabras clave: Andes, cámaras trampa, oncilla, urbanización.

Abstract

Leopardus tigrinus is the smallest native cat species of America. In Colombia, the species has been rarely registered in agricultural landscapes and mostly associated to highlands of natural habitats like mountain forests, cloud forests, and paramos. However, recent camera trap and incidental roadkills observations have increased the reports of this species in the country, showing that it is also living close to cities. Here, we report camera trap records of two individuals of *L. tigrinus* in the vicinity of Bucaramanga, Santander. This is the third and northern-most record of the species in the department of Santander. Additionally, we discuss some key local challenges for the conservation of this threatened species.

Key words: Andes, camera traps, oncilla, urbanization.

The ocelot lineage is a group of small wild felids that includes 11 species of the genus *Leopardus* distributed throughout the American continent (Werdelin et al. 2010; Nascimiento & Feijó 2017; Nascimiento et al. 2020). In Colombia, the members of this lineage are commonly called Tigrillos and are considered relatively rare and elusive animals. However, one species of tigrillo, *L. tigrinus*, is coming under the national spotlight

because it has recently been recorded in the least anticipated places, such as nearby big cities (Manizales: Escobar-Lasso et al. 2014, Medellín: Arias-Alzate 2014, Delgado-V 2009, 2014, Bogotá: Liévano & López-Arévalo 2014, Jimenez-Alvarado et al. 2017).

Leopardus tigrinus is the smallest native cat species of America (Oliveira 2004, Payán & González-Maya 2011). It is distributed from Costa Rica to Northern Argentina, with a peripheral distribution in the Llanos region, from sea level to cloud forests and paramo (González-Maya & Schipper 2008, Payán & Oliveira 2016, Nascimento & Feijó 2017). Common names for this species include Northern Tiger Cat, Chat Tigre du Nord, Tigrillo, Oncilla, Tigrillo lanudo, and Tigrina (Payán & Oliveira, 2016). The conservation status of the Northern Tiger Cat is Vulnerable (Rodríguez Mahecha et al. 2006, Payán & Oliveira 2016, MADS 2017), a category due to be reevaluated now that its range extension has been drastically reduced, as some of its populations have been identified as a separate species (Nascimento & Feijó 2017). In Colombia, *L. tigrinus* prefers highlands above 1500 m a.s.l, living in mountain forests, cloud forests, and paramos (Arias-Alzate et al. 2014). They have also been reported in agricultural landscapes and near cities (Oliveira et al. 2013). However, recent efforts with trail cameras and wildlife roadkill records have drastically increased the reports of this species in the country, from just 17 observations confirmed until 2011 (Payán-Garrido & González-Maya 2011) to dozens of records (Arias-Alzate et al. 2014, Escobar-Lasso et al. 2014, Jiménez-Alvarado et al. 2017). A map of the known records of the species in the country available in publications and the Global Biodiversity Information Facility (GBIF) is shown in Figure 1. Here, we report new observations of *L. tigrinus* in the vicinity of Bucaramanga, a metropolis with more than 1.300.00 inhabitants.

The study area is a private reserve located in the Vereda Caragua, municipality of Tona, Department of Santander. This reserve is connected to the El Brasil forest, which is owned by the city's water company (Acueducto Metropolitano de Bucaramanga). The Andean Cloud forests are part of a protected land corridor formed by the Páramo of Santurbán, El Rasgón Reserve, La Judía Reserve, and Páramo of Almorzadero, in the Department of Santander. The forest corridor where the Tigrillos were recorded is embedded in a rural landscape that is crossed by roads of different order.

Two cameras (Bushnell Trophy Cam 8MP and Cuddeback Ambush 1104) on video mode were set in front of animal trails into the forest from 2015-01-18 to 2015-06-15, at the coordinates 7.14541, -73.04883 and 7.14427 and -73.04674, latitude longitude respectively (Figure 1). The cameras were installed at 40 cm above the ground and 500m near each other. The cameras were active 24 hours a day. The total sampling effort was 149 nights for the first camera and 31 for the second one. A total of six *L. tigrinus* records were obtained (2015-02-15, 02:49; 2015-03-20, 05:23; 2015-03-31, 05:52; 2015-04-06, 03:16; 2015-04-09, 17:40; 2015-04-29, 18:20; Figure 2). In separate records, the individuals were foraging, smelling or defecating (video available at: <https://www.youtube.com/watch?v=vMmgKKZ6h9Q>). The coloration pattern apparently reveals two different individuals (Figure 2).

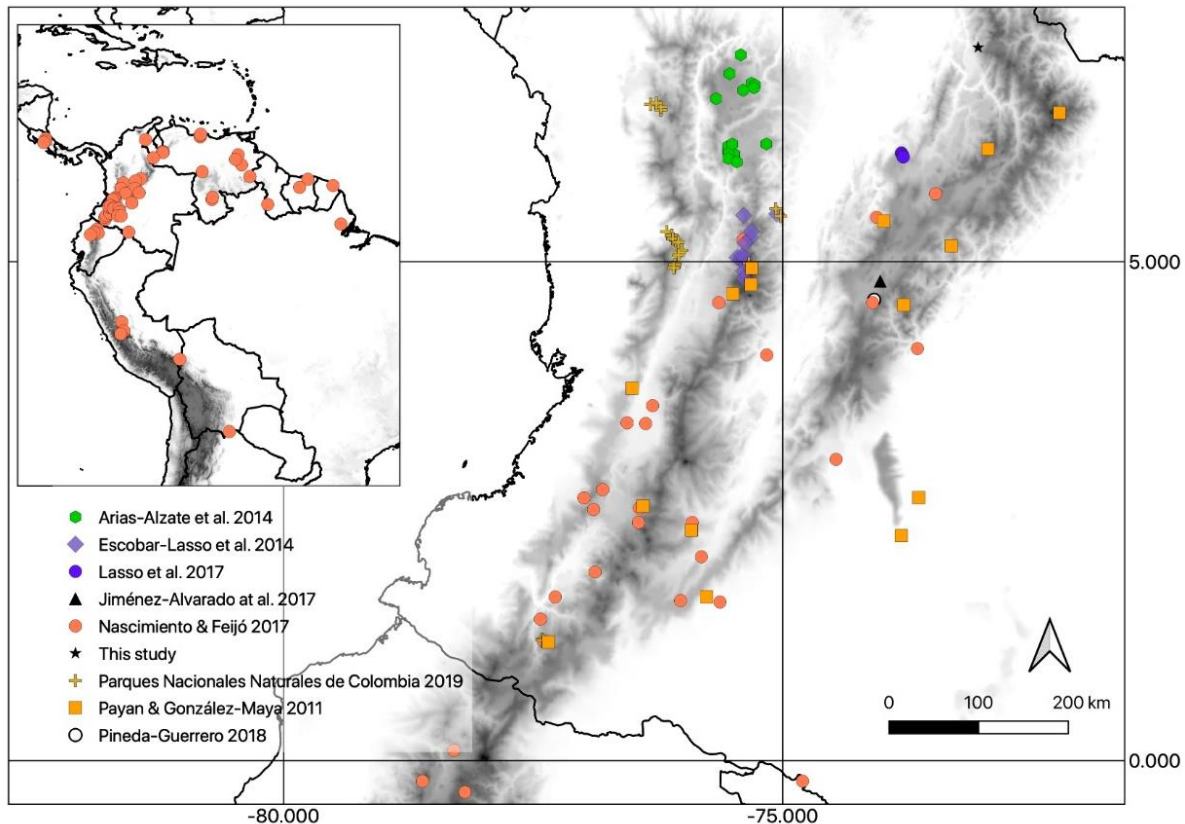


FIGURE 1. Distribution of confirmed records of *Leopardus tigrinus* in Colombia. The inset shows locations of voucher specimens of *L. tigrinus* studied by Nascimiento & Feijó (2017). Spatial data was plotted in QGIS (QGIS Development Team 2020).

Tona is the third municipality of Santander where *Leopardus tigrinus* has been recorded. The first record was a specimen collected decades ago in the Encino municipality (Payán-Garrido & González-Maya 2011). The second record was from El Peñón municipality, where researchers of the Instituto de Investigaciones de Recursos Biológicos Alexander von Humboldt made multiple observations of the species in 2016 using an arrangement of trail cameras (Lasso et al. 2017). These observations fall within the species potential distribution proposed for Colombia by other authors (Payán & González-Maya 2011; Arias-Alzate et al. 2017).

Our observations agree with previous records showing that *L. tigrinus* can live in proximity to human dominated landscapes (Escobar-Lasso et al. 2014, Arias-Alzate 2014, Delgado-V 2009, 2014; Liévano & López-Arévalo 2014, Jiménez-Alvarado et al. 2017, Pineda Guerrero 2018). The records shown in Figure 1 indicate that *L. tigrinus* is occupying mainly the Andean region, which is one of the areas of the country that is most populated and with the highest human footprint (Correa Ayram et al. 2020). The new observations reported herein are less than 9 km in a straight line from downtown Bucaramanga (Santander) extending the species range in Santander more than 111 km to the North-West of the nearest confirmed locality in Encino (Figure 1).



FIGURE 2. *Leopardus tigrinus* records and potential individuals' identification using the skin spot patterns. A and C did not allow individual identification. B, D and F are the same individual due to the same spot pattern. E seems to be a different individual with a different spot pattern.

The presence of *L. tigrinus* populations in human dominated landscapes can lead to human-wildlife conflicts. Local farmers have reported that these Tigrillos sometimes prey on chicken and other domestic animals; the first solution that they contemplate is retaliation: poisoning or hunting the Tigrillos. In addition, there could also be negative interactions with pets like dogs and cats. However, there is no information on whether feral dogs represent a threat to *L. tigrinus*, as they are to other wildlife (Zapata-Ríos & Branch 2018). Similarly, it should be studied whether *L. tigrinus* is affected by competition with domestic cats, a species known to heavily prey on small wild animals (Loss et al. 2013).

Information about basic ecological aspects of *L. tigrinus* is still scarce. Most studies have focused on describing the distribution and taxonomical status of the species (Payán &

Gonzalez-Maya 2011, Payán & Oliveira 2016, Escobar-Lasso et al. 2014, Arias-Alzate et al. 2017; Nascimento & Feijó 2017). Camera trap surveys show a range of population densities, from absence in the Amazon or Llanos of Colombia to less than 1-5 individuals per 100 km² in its distribution range (Payán & Oliveira 2016). However, robust estimations of population densities for this species in human dominated landscapes are lacking. Another research gap consists on identifying how climate change affects the habitat of *L. tigrinus* by benefiting potential competitors. In Colombia, the current climate change scenarios predict a warming of the cordilleras (IDEAM et al. 2017), where *L. tigrinus* is more frequently found. These changes may benefit *L. pardalis*, a more common species that can compete with *L. tigrinus* for resources. Previous studies have shown that in areas where the distribution ranges of *Leopardus tigrinus* and *L. pardalis* coincide, *L. tigrinus* shows lower abundances and switches its activity pattern to a more diurnal schedule (Oliveira et al. 2010, Oliveira et al. 2013, Oliveira-Santos et al. 2012). The interaction between these two species in Colombia should be monitored to anticipate any further threats to the conservation of *L. tigrinus*.

There is also an increase in road construction activities and in the number of vehicles in Colombia (Oxford Business Group 2020). Accordingly, there are escalating reports of *L. tigrinus* roadkills (Escobar-Lasso et al. 2014, Arias-Alzate et al. 2014). This species may require the implementation of infrastructure adaptations that improve the connectivity of populations living on opposite sides of the highways. Upcoming highway construction projects in the distribution range of this species should consider mitigation measurements that reduce the vulnerability of these cats to crossroads, as well as the protection of the nearest forests where this species occur.

ACKNOWLEDGEMENTS

We thank Andrés Arias-Alzate for the identification of the species. We are grateful for the suggestions made by the reviewers of this article. This study was funded by Fundación Iguaque.

REFERENCES

- Arias-Alzate A, Sánchez-Londoño JD, Botero-Cañola S, González-Maya JF. 2014. Recent confirmed records of the Oncilla (*Leopardus tigrinus*) in the department of Antioquia, Colombia. Mammalogy Notes 1: 4-5. <https://doi.org/10.47603/manovol1n2.4-5>
- Arias-Alzate A, González-Maya JF, Arroyo-Cabrales J, Martínez-Meyer E. 2017. Wild Felid Range Shift Due to Climatic Constraints in the Americas: A Bottleneck Explanation for Extinct Felids? Journal of Mammal Evolution 24: 427-438. <https://doi.org/10.1007/s10914-016-9350-0>
- Correa Ayram CA, Etter A, Díaz-Timoté J, Rodríguez Buriticá S, Ramírez W, Corzo G. 2020. Spatiotemporal evaluation of the human footprint in Colombia: Four decades of anthropic impact in highly biodiverse ecosystems. Ecological Indicators 117: 106630. <https://doi.org/10.1101/2020.05.15.098855>
- Delgado-V CA. 2009. Non-Volant Mammals, Reserva San Sebastian-La Castellana, Valle de Aburrá, Antioquia, Colombia. Check List 5: 001-004. <https://doi.org/10.15560/5.1.1>
- Delgado-V CA. 2014. Adiciones al atropellamiento vehicular de mamíferos en la vía del Escobero, envigado (Antioquia), Colombia. Revista EIA 11: 147-153. <https://dx.doi.org/10.14508/reia.2014.11.22.147-153>

- Escobar-Lasso S, Cerón-Cardona J, Castaño-Salazar JH, Mendieta-Giraldo L, Ospina-Herrera O. 2014. The Wild Cats of Caldas Central Andes of Colombia: Composition, distribution and Conservation. *Therya*. 5: 575-588. <https://doi.org/10.12933/therya-14-170>
- González-Maya JF, Schipper J. 2008. A High-Elevation Report of *Oncilla* in Mesoamerica. *CatNews* 44: 25-28.
- IDEAM, PNUD, MADS, DNP, CANCELLERÍA. 2017. Tercera Comunicación Nacional De Colombia a La Convención Marco De Las Naciones Unidas Sobre Cambio Climático (CMNUCC). Tercera Comunicación Nacional de Cambio Climático. Bogotá D.C., Colombia: IDEAM, PNUD, MADS, DNP, CANCELLERÍA, FMAM.
- Jiménez-Alvarado JS, Hurtado-Moreno AP, González-Maya JF, Moreno-Díaz C, Vela-Vargas M. 2017. Boletín Bogotá Biodiversa. Proyecto de Conservación de Aguas y Tierras 2: 1-4.
- Johnson WE, Slattey JP, Eizirik E, Kim JH, Menotti Raymond M, Bonacic C, Cambre R, Crawshaw P, Nunes A, Seuánez HN, Martins Moreira MA, Seymour KL, Simon F, Swanson W, O'Brien SJ. 1999. Disparate phylogeographic patterns of molecular genetic variation in four closely related South American small cat species. *Molecular Ecology* 8: S79-S94. <http://dx.doi.org/10.1046/j.1365-294X.1999.00796.x>
- Lasso Alcalá C, Quintana Vargas A, Barriga J. 2017. Fototrampeo de sistemas cársticos en el municipio de El Peñón, Santander - Proyecto Colombia BIO. Version 1.1. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Occurrence dataset. Accessed via GBIF.org on 2020-05-28. <https://doi.org/10.15472/ewgdzs>
- Liévano LF, López-Arévalo H. 2014. Non-Flying Mammal Community in a Periurban Area in the Andes Cundinamarca, Colombia. *Acta Biológica Colombiana* 20: 193-202. <http://dx.doi.org/10.15446/abc.v20n2.43477>
- Loss SR, Will T, Marra PP. 2013. The Impact of free-ranging domestic cats on wildlife of the United States. *Nature Communications* 4: 1-7. <https://doi.org/10.1038/ncomms2380>
- MINISTERIO DE AMBIENTE Y DESARROLLO SOSTENIBLE. 2017. Resolución 1912 del 2017, por la cual se establece el listado de especies silvestres amenazadas de la diversidad biológica colombiana continental y marino costera que se encuentra en el territorio nacional y se dictan otras disposiciones. República de Colombia.
- Nascimento FO, Feijó A. 2017. Taxonomic Revision of the Tigrina *Leopardus tigrinus* (Schreber, 1775) Species Group (Carnivora, Felidae). *Papéis Avulsos de Zoologia (São Paulo)* 57(19): 231-264. <https://doi.org/10.11606/0031-1049.2017.57.19>
- Oliveira TG, Tortato MA, Silveira L, Kasper CB, Mazim FD, Lucherini M, Jacomo AT, Soares JBG, Marques RV, Sunquist M. 2010. Ocelot Ecology and its Effect on the Small-Felid Guild in the Lowland Neotropics. In: Macdonald DW, Loveridge AJ, Editors. *Biology and Conservation of Wild Felids*. UK: Oxford University Press. p 559-580.
- Oliveira TG, Tortato MA, De Almeida LB, De Campos CB, Beisiegel BM. 2013. Avaliação do risco de extinção do Gato-do-mato *Leopardus tigrinus* (Schreber 1775) no Brasil. *Biodiversidade Brasileira* 3: 56-65.
- Oliveira TG. 2004. The *Oncilla* in Amazonia: Unravelling a Myth. *Cat News* 41: 29-32.

- Oliveira-Santos LG, Graipel ME, Tortato MA, Zucco CA, Cáceres NC, Goulart FVB. 2012. Abundance Changes and Activity Flexibility of the Oncilla, *Leopardus tigrinus* (Carnivora: Felidae), Appear to Reflect Avoidance of Conflict. *Zoología* 29: 115-120. <https://doi.org/10.1590/S1984-46702012000200003>
- Oxford Business Group 2020. Colombia's 4G road development programme back on track. Available online: <https://oxfordbusinessgroup.com/analysis/increased-transparency-and-financial-diversification-help-road-programme-get-back-track-take-high>
- Parques Nacionales Naturales de Colombia. 2019. Territorial Andes Occidentales - Densidad poblacional VOC subsistema cámaras trampa, 2018. Sampling event dataset. Accessed via GBIF.org on 2020-06-29. <https://doi.org/10.15472/gnes7k>
- Payán E, De Oliveira, TG. 2016. *Leopardus tigrinus*. The IUCN Red List of Threatened Species 2016: e.T54012637A50653881. Accessed on 24 January 2018. <http://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T54012637A50653881.en>
- Payán E, González-Maya JF. 2011. Distribución geográfica de la Oncilla (*Leopardus tigrinus*) en Colombia e implicaciones para su conservación. *Latin American Journal of Conservation* 2: 51-59.
- Pineda-Guerrero A. 2018. Nuevo registro de *Leopardus tigrinus* (Carnivora: Felidae) en la Reserva Forestal Protectora Bosque Oriental de Bogotá, Colombia. *Mammalogy Notes* 5(1-2): 15-17. <https://doi.org/10.47603/manovol5n1.15-17>
- QGIS Development Team. 2020. QGIS, Geographic Information System. 3.10. Open Source Geospatial Foundation, Beaverton, OR.
- Rodríguez-Mahecha JV, Jorgenson JP, Durán-Ramírez C, Bedoya-Gaitán M, González-Hernández A. 2006. Tigrillo gallinero *Leopardus tigrinus*. In: Rodríguez-Mahecha JV, Alberico M, Trujillo F, Jorgenson J, Editors. Libro Rojo de los Mamíferos de Colombia. Serie de Libros Rojos de Especies Amenazadas de Colombia. Bogotá, Colombia: Conservación Internacional Colombia, Ministerio de Ambiente, Vivienda y Desarrollo Territorial. p 256-259.
- Werdelin L, Yamaguchi N, Johnson WE, O'Brien SJ. 2010. Phylogeny and Evolution of Cats (Felidae). In: Macdonald DW, Loveridge AJ, Editors. *Biology and Conservation of Wild Felids*. UK: Oxford University Press. p 59-82.
- Zapata-Ríos G, Branch LC. 2018. Mammalian carnivore occupancy is inversely related to presence of domestic dogs in the high Andes of Ecuador. *PLoS ONE* 13(2). <https://doi.org/10.1371/journal.pone.0192346>

Editor: José F. González-Maya
Recibido 2020-04-16
Revisado 2020-05-10
Aceptado 2020-07-01
Publicado 2020-09-23