

Distribution update

Highest elevation record for the crab-eating fox

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Abstract

The crab-eating fox *Cerdocyon thous* is a fairly common species; however, little is known about its altitudinal range. Therefore, the aim of this paper is to increase the knowledge of *C. thous* by reporting the highest elevation record for the species. The specimen with the highest elevation record was an adult male observed opportunistically at the sub-páramo ecosystem at Playa Larga locality, near Los Nevados National Natural Park, Caldas department, Colombia, at 3,690m asl. This record extends the altitudinal range of *C. thous* by 290 meters. Our observation is consistent with the argument that this species is highly generalist and that it can inhabit different conditions and might be extending its range in the same way as other generalist canid species.

Introduction

The crab-eating fox *Cerdocyon thous* (Linnaeus 1766) is a medium-sized canid (weight c. 3.7–11kg). It has the most widespread geographical distribution among Neotropical canids (Langguth 1979, Berta 1982, Wilson and Mittermeier 2009). *C. thous* ranges from the Darien region of Panama to north of Argentina (Berta 1982, Medel and Jaksic 1988, Tejera et al. 1999, Courtenay and Maffei 2008, Solari et al. 2013, Wozencraft 2005, Tchaicka et al. 2006, Ramírez-Chaves and Pérez 2015). Throughout its range, the crab-eating fox is subject to constant persecution by ranchers in response to supposed depredation on sheep and other small livestock (Berta 1982, Ginsberg and Macdonald 1990). Many individuals are also killed on roads, although the demographic impact of this mortality is currently unknown (Rocha et al. 2008, Lemos et al. 2011, Ramírez-Chaves and Pérez 2015). No precise estimates of population sizes are available for *C. thous*, but populations are generally considered stable. This species is currently listed by the IUCN as Least Concern (Courtenay and Maffei 2008).

The crab-eating fox is a fairly common species that exhibits a generalist diet and opportunistic hunting behaviour. It feeds on fruits, eggs, crabs, small mammals, reptiles, amphibians, fish, birds, arthropods and it is also a scavenger (Delgado 2002, Rocha et al. 2004, Pedó et al. 2006, Delgado and Zurc 2007, Rocha et al. 2008, Cazetta and Galetti 2009, Gomes et al. 2012). It is found in a wide variety of vegetation types including tropical and subtropical forest, open woodlands, savannas, marshland, scrubland, dry and semi-deciduous forest, gallery forest, and in South American vegetation types e.g. páramo, Cerrado, Atlantic forest, Andean forest and Caatinga, among others (Guerrero and Cadena 2000, Courtenay and Maffei 2008, Di Bitetti et al. 2009, Ferraz et al. 2010). Moreover, *C. thous* uses human disturbed environments due to its opportunistic and generalist habits (Ferraz et al. 2010). The crab-eating fox also has a variable social behaviour; it can be solitary but can also form monogamous couples or even families of up to five individuals (Montgomery and Lubin 1978, Emmons 1990, Courtenay and Maffei 2008, Rocha et al. 2004). The changes in grouping may respond to seasonal changes in resource availability, as found in Brazil (Lemos et al. 2011).

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Of the five canids present in Colombia only two species (*Lycalopex culpaeus* and *C. thous*) are found above 3,000m asl (Alberico et al. 2000, Solari et al. 2013). *L. culpaeus* has been recorded from 2,000 to 3,700m asl and *C. thous* has been recorded from sea level to 3,400m asl (Ramírez-Chaves et al. 2013, Solari et al. 2013). However, little is known about the current altitudinal and geographical distribution of these species in Colombia (Ramírez-Chaves et al. 2013, Ramírez-Chaves and Pérez 2015). Knowing the distribution of a species, including its elevation range, is of great importance in order to understand its ecology and natural history. Therefore, the aim of this paper is to increase the knowledge about *C. thous* by reporting the highest elevation record for the species throughout its distribution range.

Methods

The record of this work was made opportunistically by J. A. Sierra-Giraldo. The altitude of the sighting location was extreme, which prompted the authors to develop a meticulous literature review of elevation reports for the species (e.g. Hershkovitz 1957, Berta 1982, Medel and Jaksic 1988, Eisenberg 1989, Emmons 1990, Tejera et al. 1999, Delgado 2002, Wozencraft 2005, Tchaicka et al. 2006, Delgado and Zurc 2007, Courtenay and Maffei 2008, Hadik-Barkoczy 2013, Solari et al. 2013, Ramírez-Chaves and Pérez 2015). After comparison with these previous reports, the validity of our record was confirmed as the highest in altitude for the species.

Results

The specimen with the highest elevation record was an adult male (Figure 1) observed opportunistically on 15 May 2014 (12:45h) at the sub-páramo ecosystem at Playa Larga locality, Caldas department, Colombia (4°51'30.6" N, 75°23'09.7" W) (Figure 2). It was moving between forest patches, in a highly fragmented area of livestock farming (near Los Nevados National Natural Park). The altitude of this record was 3,690m asl, therefore, this record extends the altitudinal range of *C. thous* by 290m. The second highest elevation record for the species comes from the Antioquia department in the central mountain chain of Colombia at 3,400m asl (Cuartas-Calle and Muñoz-Arango 2003, Solari et al. 2013).



Figure 1. Individual crab-eating fox recorded at 3,690m asl, at sub-páramo ecosystem near Los Nevados National Natural Park, Caldas department, Central Andes of Colombia. This is the highest elevation record for the species.

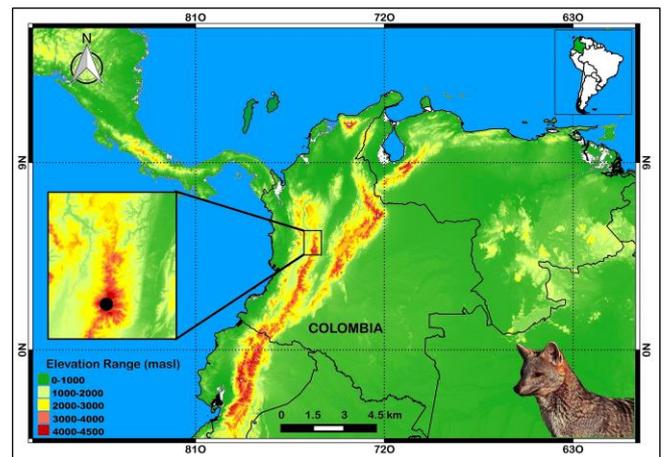


Figure 2. Geographic location of the highest elevation record of crab-eating fox recorded at 3,690m asl, at sub-páramo ecosystem (black circle), near Los Nevados National Natural Park, Caldas department, Central Andes of Colombia.

Discussion

Knowing the elevation range of canids in the Andean region is important because altitude is frequently related to changes in species richness and in the composition of assemblages (McCain 2005). To understand the inherent dispersal capacity as well as barriers and conduits to dispersal is fundamental in predicting a species' distribution and how this changes in different scenarios (Bateman et al. 2013). Due to the current changing condition of the planet it is important to understand the effects of climate change on species assemblages (Rodríguez-Eraso et al. 2010). Mountains and their unique biota are disproportionately exposed to these changes (Nogués-Bravo et al. 2007). A wide altitudinal range is related to an adaptation to factors such as rainfall, temperature, productivity, competition, resource abundance and habitat complexity (McCain 2005). The record of *C. thous* at 3,690m asl conforms with the argument that this species is highly generalist and can inhabit many vegetation types and in different conditions.

This fox is probably the most common of five fox species recognized in Colombia and is well known in the Andean, Orinoco and Caribbean regions, as shown by many references and records from several localities (Ramírez-Chaves and Pérez 2015). The Chocó and the Amazonas are the regions with the lowest number of records (Ramírez-Chaves and Pérez 2015). In Colombia, most of the records of *C. thous* are from disturbed and anthropogenic areas (Alberico et al. 2000, Solari et al. 2013). Ramírez-Chaves and Pérez (2015) suggest that new records of *C. thous* from forested areas under settlement pressure are expected in Colombia. In accordance to this, our observations took place in a highly disturbed area of livestock farming with only small fragments of sub-páramo vegetation. This range expansion, which has occurred by taking advantage of human disturbance has also been reported in other canid species such as the coyote *Canis latrans* (Weckel et al. 2015), golden jackal *Canis aureus* (Kowalczyk et al. 2015) and red fox *Vulpes vulpes* (Elmhagen et al. 2015).

Another interesting and unconventional fact from this report is that the individual observed was active during the day, whilst the crab-eating fox is considered to be a nocturnal carnivore (Hershkovitz 1957, Berta 1982, Medel and Jaksic 1988, Eisenberg 1989, Emmons 1990, Wozencraft 2005, Tchaicka et al. 2006, Courtenay and Maffei 2008). This demonstrates the need to study the activity patterns of the species in the Andean region in order to assess whether *C. thous* shows diurnal as well as nocturnal activity. Individual records of activity or distribution help to shape our knowledge of species and can have important implications which should be taken into account for further investigation; for example, distribution and habitat suitability models.

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Biographical sketches

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Julio Andrés Sierra-Giraldo is a Colombian biologist with interest in the ecology, conservation and distribution of plants and mammals. His studies have been conducted mainly on the Andean taxa.

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