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Abstract: The lion in Ghana: its historical and current status.- Historically, the lion (*Panthera leo*) population in Ghana has been little studied and its status is poorly documented. Currently, after recent unsuccessful attempts to find signs of the presence of the species, many authors believe that the Ghanaian lion population is most likely extinct. In an attempt to gather more data, since 2005 we have been carrying out lion surveys in the most important parks and other protected areas of Ghana, mainly focusing on Mole National Park (MNP). We have also been extensively reviewing the literature in an attempt to reconstruct the history of the presence of the lion in the country. Although our research has not provided unequivocal evidence of the presence of the lion, we have collected circumstantial evidence that suggests that a small lion population might still be present in MNP and its surrounding areas.

The lion in Ghana: its historical and current status

F. M. Angelici, A. Mahama & L. Rossi

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Abstract

The lion in Ghana: its historical and current status.—Historically, the lion (*Panthera leo*) population in Ghana has been little studied and its status is poorly documented. Currently, after recent unsuccessful attempts to find signs of the presence of the species, many authors believe that the Ghanaian lion population is most likely extinct. In an attempt to gather more data, since 2005 we have been carrying out lion surveys in the most important parks and other protected areas of Ghana, mainly focusing on Mole National Park (MNP). We have also been extensively reviewing the literature in an attempt to reconstruct the history of the presence of the lion in the country. Although our research has not provided unequivocal evidence of the presence of the lion, we have collected circumstantial evidence that suggests that a small lion population might still be present in MNP and its surrounding areas.

Key words: Lion, *Panthera leo*, Ghana, Status, Mole National Park

Resumen

El león en Ghana: su situación pasada y presente.—Históricamente, la población de león (*Panthera leo*) en Ghana ha sido poco estudiada y su situación actual está poco documentada. Tras los últimos intentos infructuosos de encontrar indicios de la presencia de la especie, son numerosos los autores que opinan que la población de león en Ghana está prácticamente extinguida. En un intento por recabar más datos, desde 2005 hemos venido realizando estudios sobre esta especie en los parques más importantes de Ghana y otras zonas protegidas del país, que se han centrado principalmente en el Parque Nacional de Mole (MNP). Asimismo, hemos examinado los datos publicados con el fin de reconstruir la historia de la presencia del león en el país. Si bien nuestra investigación no aportó datos inequívocos, se recabó información circunstancial que sugiere que aún podría existir una pequeña población de león en el MNP y sus zonas circundantes.

Palabras clave: León, *Panthera leo*, Ghana, Situación, Parque Nacional de Mole

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Introduction

The first scientific studies of African lion (*Panthera leo*) populations date back to the 1950s and primarily concern East Africa. Similar studies in West Africa are almost absent. Generally speaking, it is difficult to count individual lions (Myers, 1975). They can cover enormous distances and occupy areas where they have gone unreported for years, sometimes far from their normal range of distribution (Smithers, 1983). Much potential information from local people is likely to remain unknown to science or underestimated, rendering it useless for conservation purposes (Black et al., 2013). As a consequence, detecting the presence of a scarce lion population in large areas is extremely difficult and requires close collaboration with park staff and local people in order to gather as much information as possible. According to Henschel et al. (2014), the West African lion *P. leo senegalensis* (i.e., from Senegal to Nigeria), is currently in serious danger of extinction (fig. 1), with about 400 lions in the whole of West Africa, probably representing fewer than 250 mature individuals. In the last twenty years, West African lion populations in Ghana, were estimated at a few dozen individuals (Wilson, 1993; Chardonnet, 2002; Bauer & Van Der Merwe, 2004) and the species has recently been considered 'functionally extinct, if not completely eradicated' (Henschel et al., 2010; Burton et al., 2011a). The lion is 'considered absent in Ghana' (Henschel et al., 2014) (fig. 1). In this paper we aim to reconstruct the historical status of the lion in Ghana by reviewing the available literature, unpublished data, and material collected during field expeditions in the Mole National Park (MNP) and other areas between 2005 and 2014.

Materials and methods

Historical data up to 2010

We reviewed the literature on lion distribution and status in Ghana, including unpublished official reports, and compared all the available data to identify new information and any possible inconsistencies in lion population estimates over the years. We obtained data from scientific articles and books, park documents, unpublished reports provided by the Wildlife Division (Forestry Commission) of the Ghanaian Ministry of Lands and Natural Resources, IUCN and FAO publications and first preliminary expeditions led by the main author since 2005 to 2009 (Angelici, 2006; Angelici & Petrozzi, 2010). Table 1 lists all the unpublished sources we cited.

Project 'The Pride of Ghana' (Mole National Park, 2011–2014)

The project entitled 'The Pride of Ghana: Local Development and Assistance Toward for the Sustainable Management of the Mole National Park and its Fringe Communities' was officially launched in January 2011. The number of consecutive days spent in the field to date was 36 days in 2011, 22 days in 2012, 52 days in

2013 (and 23 days in 2014, in addition to the constant structured, formal collaboration over the course of the year with the Wildlife Division staff operating in MNP).

Protocols used during field activities and habitat suitability model

From April 12 to August 8, 2011, 20 digital camera traps (model LTL Welltar 8210A) were positioned. They were placed in different areas of the park, with a total of 2,474 trap days and 24 camera stations, with 1,745 trap days in high-suitability areas (228 on average) and 501 in low-suitability areas (for a definition of suitability levels, see below). A regular transect was not used to position the traps.

In 2012, there were only 163 trap days, using 12 camera traps in 14 different positions. From March 2013 to the present (camera trapping is ongoing), up to 22 camera traps have been used over the course of the year, with periods of temporary suspension, especially during the rainy season, for obvious reasons of accessibility. We have collected thousands of photographs, which are still under analysis (fig. 2 for all camera positions; in some places, there is more than one trap position).

The choice of where to position the camera traps was based on a habitat suitability model (fig. 3). This model was developed on the basis of lion sightings recorded by park staff between 1968 and 2009 by fitting logistic regression models on the habitat features of lion sightings in MNP. The results of the analysis (significant variables) were used to implement the selected predictive variables in GIS software (ArcGis v. 9.0) to produce a predictive species suitability map, i.e., to map the areas with the greatest probability of lion occurrence in the Park. The maps were built according to three intervals of the probability of occurrence: low-suitability habitat (values from 0 to 0.33); medium-suitability habitat (from 0.34 to 0.66); and high-suitability habitat (from 0.67 to 1). The reliability of the potential distribution model was assessed by AUC criteria using a Jackknife procedure. The main positive feature of AUC is its single threshold-independent measure for model performance. An AUC value can be interpreted as the probability that a presence site, randomly chosen from the dataset, will have a higher predicted value than an absence site. The overall model fitting was good: AUC=0.886.

Protocol and statistical analyses

We used data recorded over a 41-year time span by park patrols. Each data entry recorded the confirmation of lion presence, including the geographic coordinates of the site. These data were entered into DIVA-GIS software. Around each record of lion occurrence ($n = 100$), we extracted a circular 100 m radial buffer, and within this buffer we recorded several independent variables: (i) linear distance from the closest road/path (hereby DCR); (ii) rainfall (mm, per year) (RFL); (iii) linear distance from the closest pond/water body (DWB); (iv) linear distance from the closest ungulate prey (*Kobus ellipsiprymnus*,

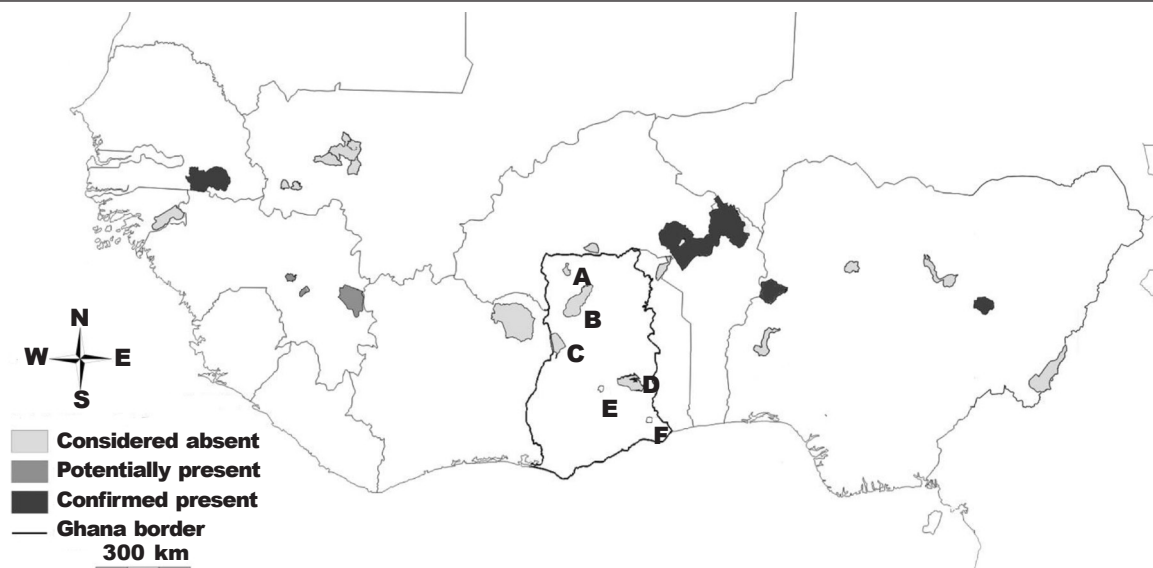


Fig. 1. Map of West Africa including all protected areas where lion occurrence has been documented according to Henschel et al. (2014). Protected areas in Ghana: A. Gbele Resource Reserve; B. Mole National Park; C. Bui National Park; D. Digya National Park; E. Kogyae Strict Nature Reserve; F. Kalapka Resource Reserve.

Fig. 1. Mapa del África occidental con todas las zonas protegidas en las que se ha documentado la presencia del león según Henschel et al. (2014). Zonas protegidas en Ghana: A. Reserva de Recursos de Gbele; B. Parque Nacional de Mole; C. Parque Nacional de Bui; D. Parque Nacional de Digya; E. Reserva Natural de Kogyae Strict; F. Reserva de Recursos de Kalapka.

Hippotragus equinus, *Kobus kob*, *Syncerus caffer*, *Alcelaphus buselaphus*) (DPR); (v) land use (LNU); and (vi) elevation (m a.s.l.) (ELE). In addition, we recorded the same independent variables for 100 random points (also with a 100 m radius) within MNP. A logistic regression modelling approach was applied to lion presence/absence (Hosmer & Lemeshow, 1989) using a backward stepwise model (Luiselli, 2006) and the Von Bertalanffy growth function (Von Bertalanffy, 1934, 1938, 1951, 1964). In these models, lion presence/absence was the dependent variable, and the six above-mentioned variables were the covariates. These techniques are powerful analytical tools that can analyse the effects of one or several independent variables, both discrete and continuous, on a dichotomous dependent variable (Hosmer & Lemeshow, 1989; Teixeira et al., 2001). In addition, logistic regression models rely on fewer statistical assumptions than their alternatives and generally produce robust results (Teixeira et al., 2001). Independence was assessed when $r^2 < 0.58$ (Hosmer & Lemeshow, 1989; Arntzen & Alexandrino, 2004).

To determine whether the probability of lion presence in relation to the studied covariates was best described by backward stepwise logistic regression or by the Von Bertalanffy growth function, we relied on a model-selection approach based on the Akaike Information criterion (AIC) (Burnham & Anderson,

2002) according to the formula:

$$AIC = -2 \log \text{Likelihood} + 2K$$

where n depicts effective sample size, and K is the number of parameters (= number of variables + 1 to include the intercept) (Sugiura, 1978).

The relative performance of alternative models was measured using the delta AIC:

$$\Delta AIC = AIC_i - \min AIC$$

where AIC_i is the AIC value for model i , and $\min AIC$ is the AIC value of the best fitting model. Hence, the differences between the AIC scores of the various models (ΔAIC) provides a measure of the relative reliability of the competing models. The advantage of this approach is that it allows the various competing models to be ranked according to their relative likelihood and is not dependent on a threshold value (α -level, Vapnik, 2000). The AIC penalizes the addition of parameters, and thus selects a model using a minimum number of parameters according to the principle of simplicity and parsimony (Akaike, 1973); therefore, the models with the lowest ΔAIC were selected.

Starting in 2012, we conducted night sessions (from about 9 pm to 1 am) along some random paths, listening for any possible lion roars. We conducted two night sessions in May 2012, 2 in March–April 2013, and 2 in February 2014.

Table 1. A list of the unpublished sources from which they were obtained indirect information, and/or references were obtained.

Tabla 1. Lista de las fuentes sin publicar de las que se obtuvieron información indirecta y referencias.

Data	Area	Origin	Year
MNP database	MNP	Wildlife Division (Forestry Commission) Ghana, compiled by MNP staff	1968–2004
Report by P. J. Pegg on wildlife management	MNP	FAO library, Rome	1969
Reports by R. Jamieson	Ghana and MNP	Wildlife Division (Forestry Commission), Ghana	1970–72
Reports by Aberdeen University Ghana expeditions to MNP	MNP	Wildlife Division (Forestry Commission), Ghana	1974–1977
Wilson (1993)	MNP	IUCN library, Gland	1993

Moreover, as of March 2013, we started to perform linear transects at night (8.30 pm – 2 am) by car along the trails in the park using directional headlights at a constant speed of about 10 km/h. In particular, we travelled along six transects in 2013, and three in 2014. Each transect was 30–35 km long.

Results

Historical data up to 2010

Our findings from a review of the historical literature were scattered, sporadic and often inaccurate, testifying

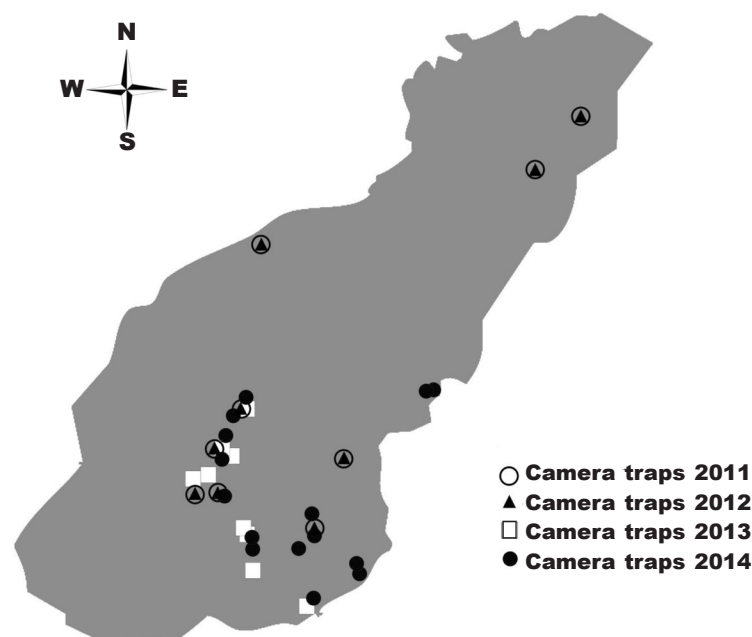


Fig. 2. Localization of camera-trapping sessions in MNP carried out from 2011 to 2014.

Fig. 2. Ubicación de las sesiones de trampeo con cámara en el MNP realizadas entre 2011 y 2014.

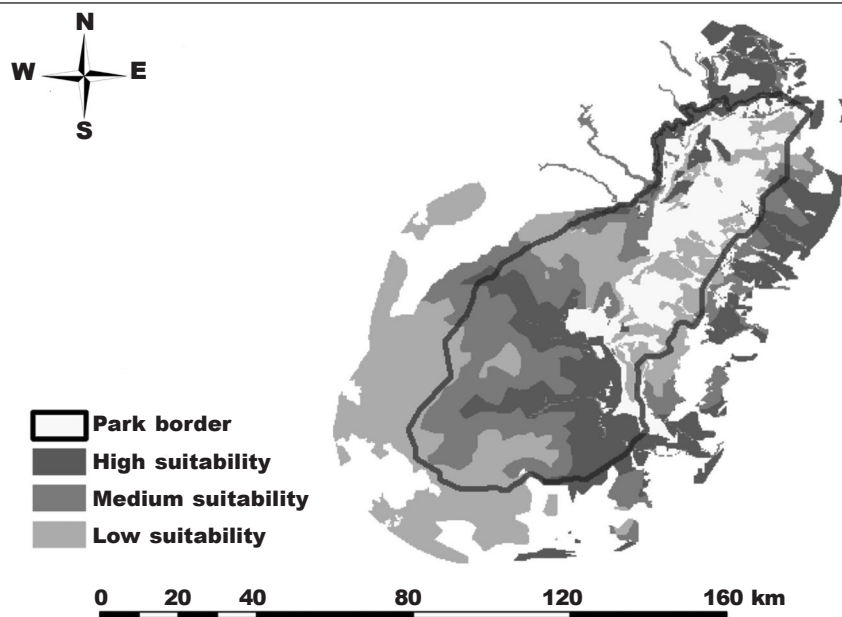


Fig. 3. Lion habitat suitability model (*Panthera leo*) in MNP and surrounding areas (for methodology, see text).

Fig. 3. Mapa de idoneidad del hábitat del león (*Panthera leo*) en el MNP y las zonas circundantes (véase el texto para obtener más información sobre la metodología).

to the lack of study of this species in Ghana. This is possibly because lions were never particularly abundant or widespread in the region. Grubb et al. (1998) meticulously collected several old records of lions from the late 19th century but even in the map presented in their paper, it is clear that the last strongholds of the species were (supposedly) protected areas, i.e., Bui National Park, Digya National Park, GRR, and MNP, apart from other occasional reports scattered throughout the North and East of the country on the Togo border. Lions were even reportedly seen in Kogyae Strict Nature Reserve and Kalapka Resource Reserve (fig. 1), albeit sporadically, at least until the 1990s (Grubb et al., 1998). For an accurate reference selection, see Grubb et al. (1998). Unfortunately, there are no data on the size of the lion populations in any area, nor are there any even preliminary data on their ecology, with the exception of MNP, as we will see later. In Cansdale's (1948) provisional checklist of the Gold Coast, he only mentions the lion as being present in the open country in the areas of Togoland, Afram Plains, north-west Ashanti and the Northern Territories. However, as it is a checklist, he does not insert any other data, particularly regarding species abundance or frequency.

Only two reports were found that relate to this period, and both were very general and based on rough estimates, not on specific work carried out in the field. Mention should be made of a male lion from Tamale, Doka woodland (about 80 km from MNP),

whose skin is stored in the Natural History Museum in London, no. 394, dated June 1943 (Rosevear, 1974). To date, Wilson's report (1993), based on three months of fieldwork, is the only document which includes data on the distribution and ecology of the species. Wilson confirmed that the lion roar was heard several times during the survey, in particular near the headquarters of the Wildlife Division and along the Lovi River, near Lovi camp (fig. 4). Wilson (1993) claims to have confirmed lion presence in MNP in at least three different locations. In January 1993, a photo was also taken of a lioness in lactation (fig. 5) by John Grainger, near Gbanwele camp (fig. 4). Various lion droppings were also collected in at least five different locations over the 3-month study, specifically in Lovi, Brugbani, Gbanwele, Samole, and Nyanga (fig. 4) (Wilson, 1993). Rangers also collected the skulls of some probable lion kills. Wilson (1993) also states that 'while the lion population in MNP is certainly not high there must be at least sufficient numbers to maintain a breeding population'. Furthermore, the same author reported that in December 1992 the rangers saw prides of up to eight lions all together, including three cubs, in particular at Lovi and Nyanga. He also concluded that lions were more easily encountered at Lovi and Nyanga, along the Lovi River, extending east and south to Brugbani and Samole. While lions could also be found going towards Gbanwele and Konkori, as well as near Kwomwohglugu. Moreover, they often

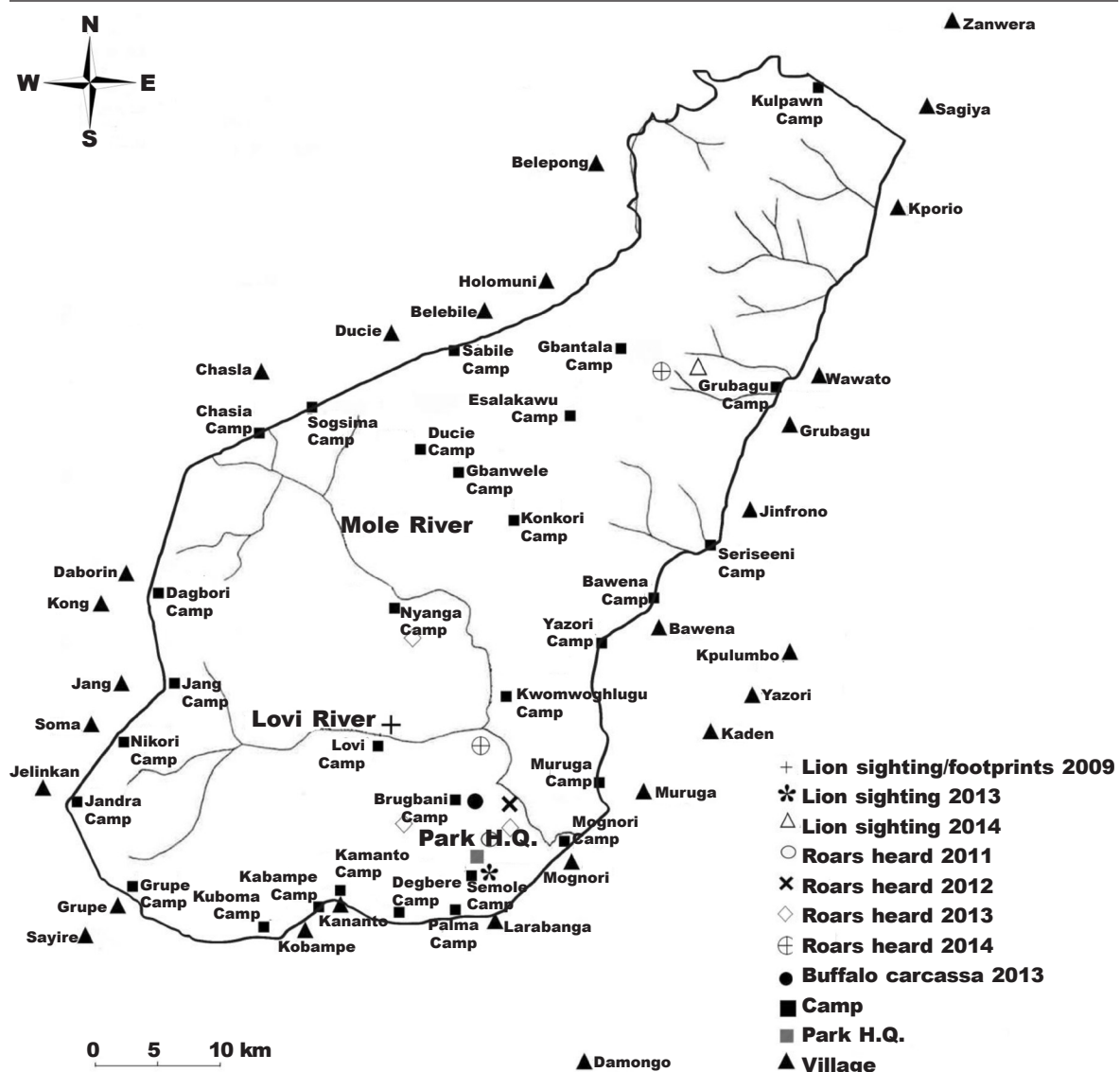


Fig. 4. Detailed map of MNP showing data on lions collected from 2005 to 2014.

Fig. 4. Mapa detallado del MNP en el que se muestran los datos, obtenidos entre 2005 y 2014, relativos a la presencia de leones.

ventured outside the boundaries of the park, according to rangers' records, particularly those from the camps of Kananto, Jang, Gbanwele and Gbantala (for all localities see figure 4).

In Chardonnet's (2002) account of African lions, he estimates that 15 (12–18) lions are present in MNP in the table, while in the text he refers to a range from 15 to 50 lions in MNP according to the estimates of various specialists. Bauer (2003) and Bauer & Van Der Merwe (2004) report on an indirect estimate made by the Ghana Wildlife Society of 20 (12–28) lions in MNP and 10 (6–14) in GRR.

In 2002, a lioness was killed by poachers in MNP, and in 2004 a male was shot (fig. 6) very close to

the village of Larabanga (fig. 4). A few days earlier, the same lion had killed several heads of cattle and had also had an aggressive encounter with another man (see Angelici & Petrozzi, 2010). We collected the results of questionnaires administered in both MNP ($n = 47$) and GRR ($n = 6$), and only 21.3% of the respondents in MNP reported seeing lions between 2000 and 2009. For further details regarding the methodology applied, see Angelici & Petrozzi (2010).

According to MNP records for the 1968–2009 period, the maximum number of sightings of a single lion (of any age) observed on a single occasion was 21, in 1969. No sightings were reported between 1998 and 2008. In 2009, two individuals were spotted



Fig. 5. Lioness photographed in January 1993 in MNP.

Fig. 5. Leona fotografiada en enero de 1993 en el MNP.

(Angelici & Petrozzi, 2010). Our results date back to the end of 2005 when our fieldwork was undertaken, and are intermittent up to 2010. The project was officially launched in 2011. At the same time, the results of research carried out in MNP by C. Burton and collaborators (2006–2008), *i.e.*, Henschel et al.

(2010) and Burton et al. (2011a, 2011b), begin to emerge. During their research, according to their protocols, the authors did not obtain any findings regarding the lion, whereas they collected a lot of data relating to other mammals. Their conclusion was that in MNP the lion had likely been functionally, if



Fig. 6. Lion shot near Larabanga in August 2004.

Fig. 6. León abatido cerca de Larabanga en agosto de 2004.

Table 2. Summary of the results obtained in the literature and in the present work (updated to December 2014) regarding lions in Ghana (for all localities see figures 1, 4).

Tabla 2. Resumen de los resultados obtenidos en las publicaciones y en el presente estudio (actualizados en diciembre en 2014) con respecto a los leones en Ghana (consúltense las figuras 1 y 4 para ver todas las localidades).

Data	Area	Reference	Year
Several anecdotal records of single lion sightings (late 19th until the 1960s)	Bui National Park, Digya National Park, GRR, MNP, other occasional reports scattered throughout the North and East Kogyae Strict Nature Reserve and Kalapka Resource Reserve	Grubb et al. (1998)	1893–1960, some undated
General data of occurrence	Togoland, Afram Plains, north–west Ashanti and the Northern Territories	Cansdale (1948)	Until 1948
Skin stored in the Natural History Museum, London, no. 394 (male)	Tamale, Doka woodland (about 80 Km from MNP)	Rosevear (1974)	June 1943
Many records (sightings, roars, droppings, prey remains, etc.)	MNP: Lovi, Brugbani, Gbanwele, Samole, Nyanga, Konkori, Kwomwoghlu. Frequently outside the park, e.g. Kananto, Jang, Gbanwele, Gbantala (fig. 5)	Wilson (1993)	1992–1993
15 (12–18) or 15–50 lions (estimate)	MNP	Chardonnet (2002)	2002
20 (12–28) lions in MNP, and 10 (6–14) in GRR	MNP and GRR	Bauer & Van Der Merwe (2004)	2004
Lioness shot by poachers	MNP, unknown locality	Angelici & Petrozzi (2010)	2002
Lion shot by Larabanga shepherds	MNP, Larabanga surroundings (fig. 6)	Angelici & Petrozzi (2010)	2004
Several direct observations made by MNP staff between 1968–2009 (see Discussion)	MNP	Angelici & Petrozzi (2010)	1968–2009
Questionnaires administered in both MNP (n = 47) and GRR (n = 6), 21.3% in MNP reported seeing lions, none in GRR	MNP, GRR	Angelici & Petrozzi (2010)	2000–2009
Sighting of one lion	Digya National Park	Henschel et al. (2010)	October 2008
Case of human–lion interaction	Kalapka Resource Reserve	Henschel et al. (2010)	February 2009
Sighting of a couple of lions, footprints, prey remains, by a park manager	MNP, Lovi (fig. 7)	Angelici & Petrozzi (2010)	May 2009

Table 2. (Cont.)

Data	Area	Reference	Year
Roars heard	MNP: staff lodge compound	Original data	April 2011
Roars heard	MNP: along the road Mognori–Lovi	Original data	May 2012
Roars heard	MNP: three localities (fig. 4)	Original data	April 2013
Sighting of a male lion by a staff guard	MNP: close to the staff quarters	Original data	August 2013
Possible lion predation of an adult buffalo	MNP: near Brugbani camp (fig. 8)	Original data	October 2013
Roars heard	MNP: between Lovi and Kwomwoghlu	Original data	February 2014
A couple of lions sighted by poachers, roars heard	MNP: near Gbantala camp	Original data	August 2014

not fully, extirpated. The same conclusion was reached regarding lion presence in GRR. Henschel et al. (2010), however, did report some anecdotal local sightings that they considered plausible, although further confirmation and investigation would be needed. One such incidence occurred in Digya National Park where a lone lion was sighted in October 2008 after years with no sightings. An extremely unusual case regarding a human–lion interaction was reported in February 2009 in Kalapka Resource Reserve in south-eastern Ghana near Togo. If confirmed, this would support what was stated in the introduction of this article, that a large predator may unexpectedly 'reappear' in areas where it has been declared extinct despite incomplete knowledge of its status, causing unforeseen problems (Smithers, 1983; Black et al., 2013), as recently happened in Gabon (Anonymous, 2015). In May 2009, park staff in MNP, including an executive manager (Oliver K. Chelewura), clearly sighted a two lions, a male and a female. This event was reported in a paper the following year (Angelici & Petrozzi, 2010). Lion footprints were also observed (fig. 7) at the same sight along with the skull of a hartebeest that the lions abandoned when they saw humans. Unfortunately, the picture contains no elements to estimate footprint size but all the footprints were found in the general area of the sighting and appear convincing.

Status 2011–2014

Camera trap sessions

We have not collected any photos of lions to date, but more than 20 species of mammals have been photographed, as evidenced in more than 6,000 selected pictures and about one hundred short films.



Fig. 7. A lion footprint found immediately after the sighting of two lions in May 2009 in MNP.

Fig. 7. Un huella de león encontrada inmediatamente después del avistamiento de dos leones en mayo de 2009 en el MNP.

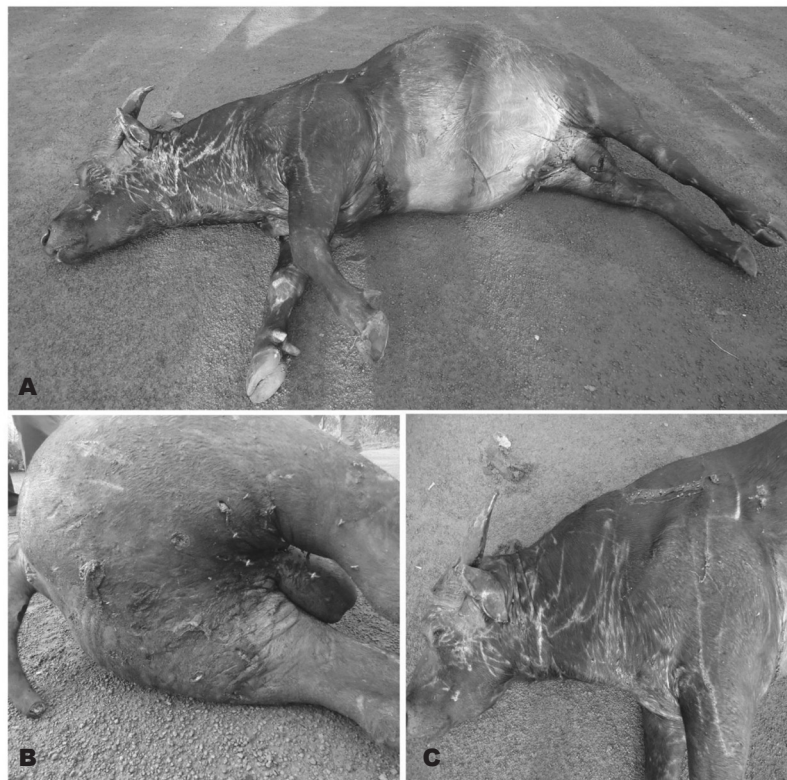


Fig. 8. Buffalo carcass shot by poachers in MNP (October 2013) with clear signs of a probable attacks by lions, in particular the holes in the hindquarters which are infected and invested with larvae, and the deep and recent long lateral scratches.

Fig. 8. Cadáver de búfalo abatido por los cazadores furtivos en el MNP (octubre de 2013) con signos evidentes de un probable ataque de leones, en particular las heridas en los cuartos traseros, que están infectados e infestados por larvas, y los largos arañazos laterales, profundos y recientes.

Reports of direct lion sightings

At 8:07 pm on the evening of April 13 2011, we distinctly heard a roar from the staff lodge compound. During the night transect sessions in May 2012, a roar was heard twice on one occasion and in April 2013, repeated roars were heard three times in two different areas within the park (for all roars heard, fig. 4). All these roars were heard at night by one of the authors (F. M. A.) along with some Ph. D. and MSc. students and guards Eric Bani and David W. Kabuiri, two of the most experienced members of the staff.

We have yet to encounter any lions on any night transects: However, we did encounter and recognized 16 mammal species.

An event of greater note was the sighting by a guard (D. W. Kabuiri) of an adult male lion very close to the staff quarters and to the entrance gate to the park in August 2013. (see fig. 4). The following year, in February 2014, we heard the night roarings of male lions in the south-central region of the park on two occasions (fig. 4).

In October 2013, we collected some data regarding the possible lion predation of an adult buffalo. The

buffalo was shot by poachers and retrieved by rangers and was severely wounded and limping (see the deep wounds and large, long scratches on the body as well as the holes on its buttocks made by claws that are severely infected and full of blowfly maggots, fig. 8).

In August 2014, we obtained information from a poacher who was questioned by rangers. The poacher had seen two adult lions near Gbantala camp (fig. 4), where several roars had also been heard. Further investigation is currently underway in the region and camera traps are being placed throughout the area.

All data are summarized in table 2

Discussion

Although compelling evidence has yet to be gathered (*i.e.*, clear videos or photographs), the presence of a few individual lions in MNP should not be ruled out *a priori*. Although the most recent empirical evidence (*i.e.*, a male that was shot) dates back to 2004, the adult lions observed in 2002 and 2004 could have reproduced before being killed. Several previous state-

ments have proven unreliable regarding the extinction of large cats (Black et al., 2013) and the evidence we have collected also challenges such a conclusion. The buffalo shot in October 2013, in addition to the healed injuries probably caused by other buffalos, seems to bear the typical signs of a lion attack. Most of the remaining evidence that has turned up during our work has been from eyewitness. However, on two occasions (May 2009 and August 2013) this evidence was based on reports by qualified and reliable MNP staff. When management resources are scarce, reports of a supposedly extinct species can cause controversy (Roberts et al., 2009), as was the case for lion sightings in the MNP. Monitoring program of the park has been criticized by Burton (2012) as not always reliable.

Although often overlooked, the role of parataxonomists (local assistants trained by professional biologists, see Janzen, 1991, 2004) can play a critical role in conservation (Basset et al., 2004), and information provided by trained assistants and the local people can be as accurate as those of field biologists (Danielsen et al., 2014).

The May 2009 sighting is supported by additional evidence: footprints that can be attributed to a large cat on the site and the remains of a hartebeest, apparently killed by a large predator. Considering the eyewitnesses' statements, the footprints and the typology of the prey, the lion is the most likely candidate. Evidence of lion sightings and roars dated August 2014 near Bantala camp is of particular importance as it was provided by poachers, who generally understate the occurrence of wildlife, in particular by not supplying information about lions, for fear of retaliation. The opinion of Henschel et al. (2010) and Burton et al. (2011a), which in our view is perhaps too hasty, was later accepted by many authors and authorities and reiterated in other articles (e.g., Burton et al., 2011b; Henschel et al., 2014). Nevertheless, we believe it is only right to continue to seek out objective data that attests to the continued persistence of a few lions in MNP and the immediately surrounding areas. As pointed out by other authors (e.g., Black & Copsey, 2014), we believe that from the point of view of the governments and park leaders, a mix of incomplete knowledge about the presence of a species is better than assuming its extinction. The possible implications of a wrongful assumption of the extinction of the lion would be so important that in the light of indirect evidence we have collected, we believe it is wiser to apply the Precautionary Principle (Foster et al., 2000) and assume the survival of the species until more scientific data tell us the full picture. If there is a chance that some lions are still present in the MNP, it is essential to avoid Romeo's Error (Collar, 1998) for which a species is thought to be extinct in an area without assessing all available information. Finally, it should be kept in mind that considering the lion as extinct quickly leads to safety rules concerning a direct encounter with the big cat and all that this implies: danger to livestock but also danger to man himself, being overlooked. Apart from the lion attack on a farmer in 2004 (see above), a good example can be the totally unexpected and reliable report of a lion in Kalapka Resource Reserve,

Eastern Ghana, towards the border with Togo, where no-one expected such an occurrence.

In agreement with the proposal by Chardonnet (2002), we consider the survival of lions in MNP and in Ghana in general could be of strategic importance to having a core group of lions forming a central corridor bridge between Western (Senegal, Guinea) and Eastern (Burkina Faso, Niger, Benin, Nigeria) populations (fig. 1), ideally in the Ivory Coast and in Ghana.

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