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# Lion status updates from five range countries in West and Central Africa

**The lion *Panthera leo* is listed as Vulnerable on the IUCN Red List of Threatened Species and the species' current status raises increasing concern among lion specialists across its African range. The situation is particularly alarming in West and Central Africa, where as few as 1000-2850 lions might remain, and where it is considered regionally Endangered in West Africa. Here we present results from lion surveys conducted in 2006-2010, covering 12 Lion Conservation Units (LCUs) in West Africa and three LCUs in Central Africa. We were able to confirm lion presence in only two of the LCUs surveyed in West Africa, and in none of the LCUs surveyed in Central Africa. Our results raise the possibility that no resident lion populations exist in Congo, Côte d'Ivoire and Ghana.**

The historical distribution of the lion in Africa encompassed almost the entire African continent, with the exception of the interior of the Saharan desert and regions dominated by dense tropical rainforest (Nowell & Jackson 1996). While the lion became extinct in northern Africa prior to 1950 (Nowell & Jackson 1996), populations in sub-Saharan Africa received relatively little international conservation concern until 1996, when the species was first listed as Vulnerable on the IUCN Red List of Threatened Species (Bauer et al. 2008). An inventory of free-ranging lions in Africa conducted in 2001-2002 revealed that the situation for lions was particularly alarming in West and Central Africa (Bauer & van der Merwe 2004). The authors estimated that as few as 450-1,300 animals remained in West Africa, with a comparable low of 550-1,550 for Central Africa, totaling a mere 8% of the continental estimate (Bauer and van der Merwe 2004). While certain lion populations in Central Africa, particularly in northeastern Democratic Republic of Congo (DRC) and southeastern Central African Republic (CAR), were apparently linked to larger populations in East Africa, lions in West Africa appeared to be isolated from adjacent populations in Central Africa, with little or no exchange of breeding individuals (Bauer & van der Merwe 2004). Consequently, lion populations in West Africa have been listed as Regionally Endangered in 2004 while lions in the remainder of Africa remain classified as Vulnerable (Bauer et al. 2008).

In an unprecedented effort to define strategies for effective lion conservation across sub-Saharan Africa, IUCN, the Wildlife Conservation Society (WCS) and Panthera organized two sub-regional lion conservation workshops in 2005 and 2006, assembling over 50 lion specialists representing all lion range countries (Nowell et al. 2006). Both workshops consisted of a technical session to map current lion range and status, followed by a strategic planning session to develop lion conservation strategies (Nowell et al. 2006). The technical session was modeled after the Range Wide Priority Setting process developed by WCS for jaguars (Sanderson et al. 2002), during which specialists were guided to produce maps of current lion range and delimit critical areas harboring known populations called Lion Conservation Units (LCUs; Nowell et al. 2006). The results of the mapping exercise revealed an 85% range reduction in West and Central Africa, and a reduction by 73% in Eastern and Southern Africa compared to the historical lion range in Africa (IUCN 2006a, b). Less than a quarter of the mapped lion range was situated in West and Central Africa (IUCN 2006a, b). Lion specialists from West Africa defined 16 LCUs in their region of expertise, while participants from Central Africa outlined 11 units, four of which extended into the East African region (IUCN 2006a, b). During this process, the lack of recent data and need for surveys in West and Central Africa was highlighted as a priority. Accordingly, Panthera assisted statutory authorities and other local partners in conducting a series of survey efforts across the region, as part of Panthera's Lion Conservation Program. This article summarizes information resulting from those surveys and presents an update on the current status of the lion for those countries where surveys covered all LCUs outlined during sub-regional workshops. The data presented here will appear in more comprehensive form in various manuscripts in preparation and should be considered preliminary.

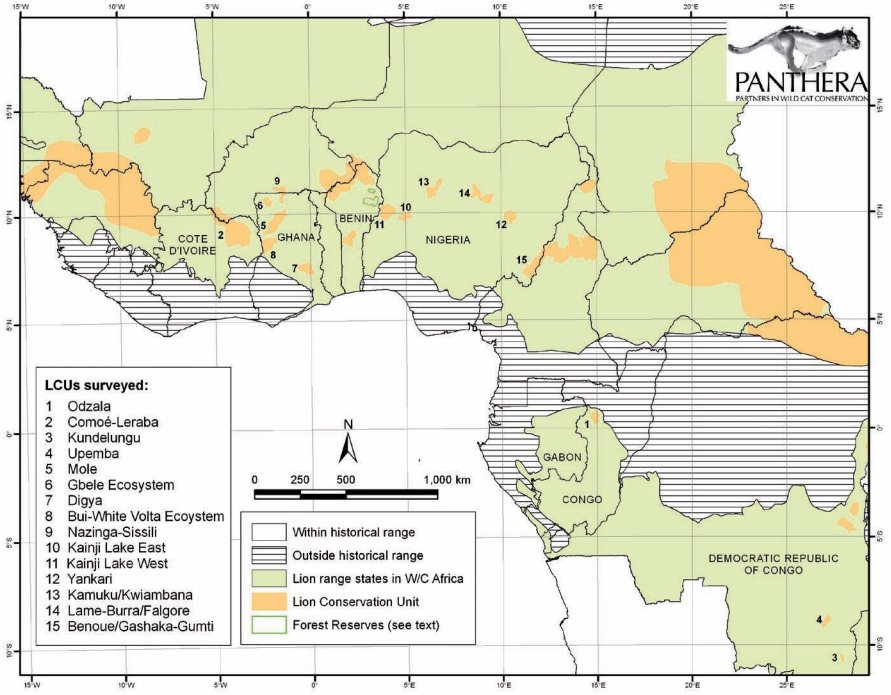


**Fig. 1.** Lion Conservation Units in West and Central Africa. Surveyed LCUs are annotated with numbers. Modified from (IUCN 2006a, b).

## Congo

During the sub-regional lion conservation workshop a single LCU was outlined for the Congo (SOM T1; Fig. 1), comprising the

southern tip of the Odzala NP. This 13,600 km$^2$ park is dominated by lowland tropical rainforest, and only its southern extreme is characterized by a mosaic of forest and savanna, earlier considered as the last stronghold for lions in Congo (Dowsett 1995). In July-September 2007, we surveyed the savanna sector of Odzala NP in a joint initiative between Panthera, the Congolese Ministry of the Environment, and WCS Congo.

*Methods*

We surveyed the savanna sector of Odzala NP with a combination of foot surveys and camera trapping. More specifically, we conducted spoor searches along roughly predefined survey circuits, always following game trails, dry riverbeds, old park roads or other features that are commonly used as travel routes by lions and other large carnivores. These circuits incorporated habitat features that could be expected to attract larger herbivores, such as water reservoirs, floodplains, saltlicks and marshes, or other sites with high herbivore abundance indicated by park guards. In addition, we mounted 25 camera trap units at a 5 km spacing along game trails that had shown large carnivore use, or at otherwise promising landscape features that appeared to attract potential lion prey, and could therefore be expected to attract lions as a consequence. Our design was not optimized for mark-recapture sampling, but rather was intended to cover as large an area as possible for presence-absence sampling.

*Results*

We completed 460 km of foot surveys and our camera traps recorded 512 photographic captures over 424 trap-days. We detected no sign of lion presence during the survey. We found leopard *Panthera pardus* sign on five occasions, and camera traps photographed leopards six times. For spotted hyenas *Crocuta crocuta*, we recorded three direct observations, four den sites and 43 latrine sites, and our camera traps produced 154 hyena photographs (Henschel 2008). We recorded several species of smaller carnivores, including African golden cat *Profelis aurata*, two photographs of a serval *Leptailurus serval*, showing the rare "servaline" pattern (Fig. 2), and one photograph of a melanistic African civet *Civettictis civetta*.

*Conclusions for Congo*

Despite persistent rumors about the continued presence of lions in Odzala and in the Batéké Plateau in southern Congo and neighboring Gabon, no material evidence for the species has been produced in the last 15 years. Although we cannot unequivocally rule out the species' presence, it is reasonable to assume that resident populations are extirpated in both countries (Henschel 2009). With the nearest known lion populations in northern Cameroon being separated from the Congolian savannahs by a 1000-km wide rainforest belt outside the historical range (Fig. 1), natural recolonisation does not appear possible. Therefore, any effort to re-establish lions in Congo/Gabon at this stage would rely on translocation from populations in other countries. For a detailed discussion on the potential for lion reintroduction in Congo/Gabon see Henschel (2009).

**Fig. 2.** Camera trap photograph of the servaline morph of the serval, Odzala NP, August 2007 (Photo P. Henschel, Panthera).

**Côte d'Ivoire**

The participants of the sub-regional lion conservation workshop outlined one LCU for Côte d'Ivoire (SOM T1; Fig. 1), comprising the 10,000 km$^2$ Comoé NP, extending slightly into neighboring Burkina Faso. We surveyed Comoé in March-April 2010, in a joint effort between Panthera, the Office Ivoirien des Parcs et Réserves (OIPR) and the Wild Chimpanzee Foundation (WCF). WCF and OIPR conducted an over-flight of the park and surrounding landscape in early March, completing almost 3,000 km of aerial transects (WCF 2010). The over-flight team recorded 8,477 observations of mammals, 90% of which represented domestic livestock (WCF 2010). Observations of larger ungulates were largely constrained to a 2,000 km$^2$ core area in the center of the park, to which we restricted our lion ground survey.

*Methods*

We initially intended to employ a combination of foot surveys, camera trapping and calling stations (Ogutu & Dublin 1998). However, the over-flights revealed very high poacher and pastoralist activity in the park and we abandoned the idea of using camera traps. Additionally, vehicle access to the park was limited to two jeep tracks, and the lack of a functional road network in the park interior prohibited the use of call-up stations to attract lions. Accordingly, we conducted spoor searches on foot along roughly predefined survey circuits, following the approach described in the Congo country-section.

*Results*

Our survey covered >600 km on foot, concentrating entirely on the central core area that had shown concentrations of larger ungulates during the over-flight. We detected no sign of lions in Comoé. We found leopards in localized areas with dense gallery forest, where we recorded eight scats, two sets of tracks, and two vocalizations. Spotted hyenas were widespread and locally abundant, and we recorded 60 scats, 36 sets of tracks and 5 vocalizations. We recorded 88 campsites, most of them used by poachers; in one camp we found evidence for the direct persecution of large carnivores, i.e. a large gin trap (Fig. 3). We encountered 20 groups of people, representing 16 groups of poachers and four groups of pastoralists. While poachers fled or reacted very aggressively to our presence, we were able to interview pastoralists. Of the four groups of pastoralists interviewed, repre-

**Fig. 3.** Large steel gin trap found in a poacher camp in Comoé NP, northern Côte d'Ivoire, April 2010. Scale measures 10 cm (Photo P. Henschel, Panthera).

senting 12 individuals, nobody had heard or seen lions in recent years; the last observation from these reports dated to 2004.

*Conclusions for Côte d'Ivoire*

Our survey results suggest that lions no longer occur within the surveyed area of the Comoé NP. Given this represents the most suitable area for the species in Comoé NP and indeed in Côte d'Ivoire, the prospects for lions in the country are poor. Having said that, given the vast size of the park and the limited temporal and spatial coverage of the present survey, we suggest monitoring for lion presence should be continued in the park; the existing framework of ecological monitoring currently conducted by the OIPR, and by the staff trained in this survey presents an excellent opportunity to continue surveys. If lions are indeed absent from this LCU, the chances of natural recolonisation are very limited, since there are no known resident populations in adjacent protected areas in Ghana (see below) or Burkina Faso (Chardonnet 2002).

**Democratic Republic of Congo (DRC)**

At the sub-regional lion conservation workshops, seven LCUs were outlined which were at least partially situated within the DRC (Fig 1; IUCN 2006a). We surveyed the Upemba and Kundelungu NPs, which comprise two of these LCUs (SOM T1), for lion presence in September-October 2008, in the context of a large mammal survey conducted in collaboration between WCS, the Institut Congolais pour la Conservation de la Nature (ICCN) and Panthera (Vanleeuwe et al. 2009).

*Methods*

We preceded ground surveys by 2,500 km of aerial transects flown in Upemba, and 500 km flown in Kundelungu. Following analysis of the over-flight data, we concentrated our ground surveys in areas which were least impacted by humans. We deployed eight ground survey teams, seven of which conducted line transects to establish the abundance of large mammals, while one team specifically searched for large carnivore spoor along game trails, dry riverbeds and similar features in areas that had shown the highest concentrations of larger ungulates during the overflight. All team leaders were trained in the recognition and documentation of large carnivore spoor, and carried sampling tubes for the collection and storage of carnivore fecal samples.

*Results*

Our large mammal teams completed 86 km of transects, linked by 1194 km of reconnaissance walks in both parks, while the carnivore team covered an additional 330 km within Upemba NP. We found no evidence for the presence of lions in either of the two parks. In Upemba, we found leopard sign on seven occasions (representing four scats, one set of tracks, one kill and one vocalization), and directly observed serval on three occasions. Cheetah *Acinonyx jubatus*, African wild dog *Lycaon pictus* and spotted hyena formerly occurred in both parks, but we detected no evidence for their presence in either park. Wildlife populations were generally very low in Upemba and critically low in Kundelungu, and the vast majority of animal sign detected belong to smaller, more resilient ungulate species (Vanleeuwe et al. 2009).

**Ghana**

Five LCUs were identified in Ghana during the sub-regional lion conservation workshop: Mole, Digya and Bui national parks and Gbele Resource Reserve are entirely situated within Ghana, while the Nazinga-Sissili LCU lies primarily in Burkina Faso (SOM T1; Fig 1). Population size estimates were very low for all LCUs, although recent survey data were lacking. The lion survey in Ghana was a collaborative effort between the University of California-Berkeley, the Wildlife Division of Ghana, and Panthera. It focused primarily on Mole National Park which was considered to have the best chance of harboring a viable population, although a brief survey was also conducted in Gbele Resource Reserve and additional information was collected for the other LCUs.

*Mole National Park*

*Methods*

We undertook lion surveys in Mole between October 2006 and January 2009, consisting primarily of camera trapping and spoor transects (details in Burton et al. in review; Burton 2009). We deployed a total of 253 camera stations for 5,469 trap-days across much of the park, with effort concentrated in the central and southeastern portions known to contain higher prey densities and key dry-season water sources. We conducted foot surveys for direct and indirect evidence of lions around and between camera stations, and executed five call-in surveys, using a protocol adapted from Ogutu & Dublin (1998). In addition, we searched park law enforcement patrol monitoring records spanning the 40-year period from 1968 to 2008 for lion sightings, and we undertook semi-structured interviews on human-lion relations with 68 key informants from 27 villages adjacent to Mole.

*Results*

No lions were detected during the extensive camera trapping survey, and we documented no unequivocal evidence of lions during the foot transects and call-in surveys. We confirmed the presence of nine carnivore species

in Mole, including two large carnivores (leopard and spotted hyena) and one other felid (caracal *Caracal caracal*). The frequency of lion sightings by park patrol staff declined significantly over the 40-year period of monitoring, from a high of ~2 lions/100 patrols in the early 1970s down to only three sightings between 2004-2008 (~0.1 lions/100 patrols; Burton et al. in review). Among interview respondents, only 11% reported having seen a lion within the last five years, and 48% of respondents expressing familiarity with lions suggested that the species had declined or no longer occurred in the area. Nearly three-quarters (73%) of respondents indicated that lions were used for traditional purposes (such as ceremonial skins, food and medicine), and 45% reported livestock depredation due to lions. Official park reports documented two instances of human-lion conflict in 2004 that resulted in at least one lion being illegally killed (Fig. 4).

**Fig. 4.** Photograph of lion killed by local hunters at the edge of Mole National Park in August 2004 (Photo Wildlife Division of the Forestry Commission of Ghana).

*Gbele Resource Reserve*
*Methods*
We did a single foot survey in April 2008 within a southeastern portion of Gbele reserve, and deployed 10 camera stations for one month (17 April-23 May 2008) at sites with evidence of recent wildlife activity. We conducted one group interview in the village of Wellembelle near the eastern edge of Gbele, and made informal interviews with reserve staff.

*Results*
No evidence of lions was detected during the surveys in Gbele. Camera-trap capture rates were very low, with only three of ten stations detecting any wildlife (medium-sized ungulates and olive baboon *Papio anubis*). Village and staff interview respondents indicated that lions no longer occurred in the reserve.

*Other areas in Ghana*
*Methods*
We held Ghana's first national workshop on carnivore conservation during the Wildlife Division's Annual Officers Meeting in January 2009. The workshop had 45 participants, including representatives from the Wildlife Division's head office and all of Ghana's wildlife protected areas, as well as other representatives from the Forestry Commission, three local NGOs and two of Ghana's universities. A key component of the workshop was to discuss the status of lions in Ghana, and participants were asked to report recent evidence of lions from anywhere in the country. Additionally, we examined unpublished data sources such as recent wildlife surveys, management plans, and patrol monitoring records from Ghana's protected areas for evidence of lion occurrence (details in Burton 2009).

*Results*
None of the workshop participants could confirm the continued presence of lions in any of Ghana's wildlife protected areas. The manager of Digya National Park noted a potential lion sighting by patrol staff in October 2008, stating that it was the first credible report of a lion in his nine years as Digya manager, but that it required further investigation. We found no verifiable evidence of lion occurrence in the unpublished data examined, although indirect accounts of lion sightings were relayed in recent consultant reports from Bui and Digya (Burton 2009). The Bui LCU will be impacted by a large hydroelectric dam being constructed on the Black Volta River that is projected to flood 21% of the national park's habitat. An unexpected instance of human-lion conflict was reported in February 2009 near the small (320 km$^2$) Kalakpa Resource Reserve in southeastern Ghana, close to the Togo border, in an area where lions were not expected to occur. The incident attracted national media attention and the evidence of lion sign was deemed credible by local Wildlife Division staff (Burton 2009).

*Conclusions and recommendations for Ghana*
The recent survey efforts present a grim picture for lions in Ghana. Results suggest that the Mole LCU population has declined to the point of extreme rarity and is possibly now extirpated, while there is no verifiable evidence for the persistence of resident lions elsewhere in the country. Further survey effort is warranted given the anecdotal and incomplete nature of some of the evidence, although the problem of low detectability that accompanies rarity presents a formidable challenge. We recommend prioritizing the unsampled northern portions of Mole (near the Kulpawn River), Digya and Bui national parks, the Nyankamba-Boachipe area between Bui and Mole, and perhaps the area in and around Kalakpa Resource Reserve (where the recent incident was reported). Regardless, the longer-term focus should shift towards the restoration of Ghana's lions, whereby effective habitat protection and prey recovery, combined with efforts to alleviate human-carnivore conflict, may enable lions to recolonize and repopulate the LCUs. Prospects for natural recovery are made more daunting in light of the apparent loss of lions from neighboring protected areas like Côte d'Ivoire's Comoé National Park (see above), yet attempts to reintroduce lions to Ghana's parks would likely prove futile (or worse) without careful planning and attention to prey availability, human-lion conflict, and regional connectivity.

**Nigeria**

During the sub-regional lion conservation workshop, wildlife specialists from Nigeria defined six LCUs within Nigeria (SOM T1; Fig. 1), all comprising protected areas. While five of the units are entirely situated within Nigeria, the LCU containing Gashaka-Gumti NP in Eastern Nigeria forms part of a larger LCU extending into neighboring Cameroon (Fig. 1). Workshop participants estimated that the largest and the only two stable populations in Nigeria occurred in Kainji Lake West and Yankari.

In January-August 2009, we conducted a country-wide lion field survey, in a collaborative effort between the Nigerian National Park Service (NPS), Panthera and WCS Nigeria. The dual objective of the survey was to establish the presence/absence of lions in all six LCUs, and to estimate lion population size for sites where lion presence could be confirmed. We adapted our survey methods to the local conditions and available infrastructure at each LCU. In the following, LCUs are grouped by survey method for convenience.

*Kainji Lake NP (East & West) and Yankari GR*

Kainji Lake NP consists of two sections which are geographically separated by Lake Kainji. Kainji Lake West, with >4000 km$^2$ roughly three times the size of Kainji Lake East, has reportedly always harbored more significant populations of larger mammals. This disparity appears to have intensified over time, and today most larger mammal species, including the lion, are considered to be absent in the isolated Eastern section (NPS, pers. comm.). Our survey efforts in Kainji Lake NP were consequently restricted to the Western section.

*Methods*

At Kainji Lake West and Yankari, lion presence was confirmed by PA staff upon the arrival of our survey team, and the existence of a relatively well-maintained road network permitted the use of calling stations to estimate lion population size (cf. Ogutu & Dublin 1998). We essentially followed the call-in protocol established by Ogutu & Dublin (1998), with the only modification being that we used a buffalo distress call for our broadcasts. We were not able to conduct site-specific calibrations for the effective range of the broadcasts and for lion response rate, since we never encountered lions apart from those recorded at calling stations. For the purposes of this paper, we have used published figures from Ogutu & Dublin (1998), who estimated an effective broadcast range of 2.5 km and a response rate of 26.4%, but it should be noted this is very speculative.

*Results*

Lions responded at three stations each for both sites but twice as many individuals were recorded at Kainji Lake West (SOM T2). No other large carnivore species responded at Kainji Lake West, while one spotted hyena was observed at the same call-in station as an adult male lion at Yankari. Also at Yankari, poachers appeared at four call-in stations located towards the perimeter of the PA, forcing us to abort the call-in at those sites. The resulting population density was higher at Kainji Lake West with 2.97 lions/100 km$^2$, compared to 2.41 lions/100 km$^2$ at Yankari (SOM T2). We repeat the caveat that site-specific effective broadcast range and lion response rate was unknown, so these estimates serve as a crude approximation. Total lion population size at both sites can also only be roughly estimated. Applying the respective density estimates to the entire LCUs would certainly result in a gross overestimate of lion population size, as lion distribution appeared to be restricted to small core areas within both LCUs. Lion responses to broadcasts and records of lion field sign were restricted to areas within 10 km of perennial water and to within 20 km of the respective PA headquarter, where patrol efforts were highest. For Kainji Lake West this core area encompassed 800 km$^2$, whereas for Yankari, lions appeared to be restricted to an area of roughly 630 km$^2$. Applying our density estimates to these areas yields lion population size estimates of 24 lions for Kainji Lake West, and of 15 lions for Yankari.

*Kamuku/Kwiambana*

*Methods*

This LCU consists of the Kamuku National Park, and the Kwiambana Game Reserve. While Kamuku NP possesses a relatively extensive road network, an ongoing violent conflict between PA staff and nomadic pastoralists penetrating the LCU prohibited our team from conducting fieldwork inside this LCU. We therefore restricted our work at this site to interviews. We chose interview partners with an intimate knowledge of the LCU, and posed a standardized set of questions concerning the presence/absence of lions and other key species in the LCU.

*Results*

We interviewed 21 people, comprising 5 park rangers, 5 hunters or former hunters, and 11 pastoralists. All interviewees responded that lions were absent from the LCU, and the last observation of a lion reportedly occurred in 2001, inside Kamuku NP. Leopard, buffalo *Syncerus caffer* and kob antelope *Kobus kob* were also considered absent by respondents, while roan antelope *Hippotragus equinus* and hartebeest *Alcelaphus buselaphus* appear to be restricted to Kamuku NP.

*Lame-Burra/Falgore and Gashaka-Gumti*

*Methods*

PA staff at both LCUs generally considered lions as present, but could not cite a recent sighting. Both LCUs are currently inaccessible by vehicle, and PA staff at both sites was not familiar with the interior of the respective PAs, reportedly due to their inaccessibility. Accordingly, we conducted foot surveys in both LCUs to search for lion field sign, following the approach described in the Congo country-section. In Gashaka-Gumti, we restricted our foot survey to the northern half of the LCU. The southern half of this national park is dominated by tropical lowland and montane forests, interspersed with montane grasslands, while the northern half is characterized by a mix of open woodlands, grasslands and gallery forest along drainage lines. Historically, lions also occurred in the montane grasslands in the southern sector of the park but all recent sightings of the species are restricted to its northern sector (Pepeh et al. 2002).

*Results*

We covered 212 km in Lame-Burra/Falgore and 246 km in Gashaka-Gumti, concentrating our foot surveys on the remoter core areas of the respective PAs. We detected no sign of lion presence in either of the two LCUs. In Lame-Burra/Falgore, we detected spotted hyena in the Lame-Burra GR, and we recorded leopard in a remote part of northern Gashaka-Gumti. Large ungulates were extremely rare in Lame-Burra/Falgore with no direct observation obtained, compared to 3718 head of livestock, 101 humans (mainly pastoralists) and 30 campsites recorded. In Gashaka-Gumti large ungulates were also rare with 6 direct observations obtained, compared to 1600 head of livestock, 79 humans and 64 campsites. Pastoralists encountered at Lame-Burra/Falgore were easily approachable; they had paid local

authorities for access to the game reserves. We interviewed 14 groups, representing 24 individuals, who unanimously considered the lion as absent. Several individuals had been using the game reserves for grazing for up to 15 years, and had never seen or heard lion. In Gashaka-Gumti, the people we encountered either fled or were openly hostile, and were not willing to respond to questions. Opportunistic discussions in local communities outside the LCU produced two recent lion records; one observation of one lion inside the park near Gumti village in 2006, and one lioness poisoned by pastoralists north of the park near the Cameroon border (opposite Faro NP) in 2008.

*Conclusions for Nigeria*

Lions in Nigeria persist in two disjunct populations, located in the relatively well-protected core areas of Kainji Lake NP (Western section) and Yankari GR. Population size of both is small, with respective estimates of 24 and 15 lions, resulting in a total population of < 50 lions for Nigeria. Current population size could potentially be more than doubled if protection measures at both LCUs could be increased to cover the entire PAs. Kainji's population could potentially be linked to the population of WAP-Complex, through forest reserves in neighboring Benin (Fig 1).

*Overall conclusions and recommendations*

The presented survey efforts covered 12 of the 16 LCUs outlined for West Africa, and three of the 11 LCUs outlined for Central Africa. Lions were confirmed in only two of the 12 LCUs surveyed in West Africa, and in none of the three LCUs surveyed in Central Africa. Even more alarmingly, our survey results raise the possibility that no resident lion populations persist in Congo, Côte d'Ivoire and Ghana. If true, this means there are vast gaps in the lion range in West and Central Africa far beyond those indicated in 2005 and 2006 (Fig. 1). It is unclear whether our results indicate a true deterioration in lion status since 2005-6 or whether the LCUs in question were delimited based on outdated or inaccurate information. Our survey results suggest a combination of both. The last confirmed lion observations in sites like Mole in Ghana or Gashaka-Gumti in Nigeria occurred contemporaneous with, or following the subregional workshops, suggesting a very recent disappearance of the species. Other LCUs outlined in 2005 such as Lame-Burra/Falgore in Nigeria appear to have lost their lions more than 15 years ago, reflecting the poor quality of data that delimited those LCUs in 2005-6. We therefore strongly advocate for systematic and urgent field surveys in LCUs that have not been recently surveyed, and for ongoing monitoring of lion presence in the LCUs only partially or insufficiently covered in the present study (see country-sections for detailed recommendations). Priority areas for field surveys in West Africa include the vast Niokolo-Guinea LCU in Senegal, Guinea, Guinea-Bissau and Mali (Fig. 1), and Mt Kouffe/Wari Maro in Benin. In Central Africa, priority areas are southern Chad, eastern and northern CAR, and the LCUs Garamba-Bili Uéré and Albertine North and South in north-eastern DRC.

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**Supporting Online Material SOM**

Tables T1 and T2 at www.catsg.org

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