



SPATIALLY EXPLICIT STRATEGIC ACTION PLAN FOR THE RECOVERY OF THE NORTHERN LION IN AFRICA 2023–2027

Part B:

**SPATIALLY EXPLICIT CONSERVATION ACTION PLAN
(SECAP)**



Lion Recovery Fund



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Cover photograph: Laurent Geslin

The spatial information and population figures used in this report are based on the data compiled in the **African Lion Database**



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Preamble

Part A of this report is a technical review and scientific assessment of the conservation status of the Northern Lion *Panthera leo leo* in West and Central Africa, and the hybrid population in the North-East Overlap Zone. Part B proposes a spatially explicit plan for the maintenance of remnant populations and the recovery of local Lion populations in suitable areas where Lions have gone extinct in the past decades. This second part will be submitted to and reviewed by the African Range States and will be revised according to their comments. The submission, review, revision, and final endorsement process will be arranged within the frame of the Joint CITES-CMS African Carnivores Initiative (ACI). Part B has hence the character of a proposal that will be finalised in a participatory process with the Range States and other institutions involved in or important for the conservation of the Northern Lion in Africa.

Acronyms and Glossary

ACI	Joint CITES-CMS African Carnivores Initiative
Cat SG	IUCN SSC Cat Specialist Group
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMP	Collaborative Management Partnership
CMS	Convention on the Conservation of Migratory Species of Wild Animals
IUCN	International Union for the Conservation of Nature
KLA	Key Lion Area
POW	Programme of Work
SECAP	Spatially Explicit Action Plan
SSC	Species Survival Commission

Use of vernacular names

The Lion *Panthera leo* includes two subspecies, *P. l. leo* in West and Central Africa and India, and *P. l. melanochaita* in eastern and southern Africa. We use the term « Northern Lion » in English and « Lion du Nord » in French for *P. l. leo* in the respective languages.

Executive Summary

The Lion *Panthera leo* is listed as Vulnerable in the IUCN Red List of Threatened Species™. While the subspecies *Panthera leo melanochaita* in southern and eastern Africa is doing fairly well, the Northern Lion *Panthera leo leo* in West and Central Africa has been continuously decreasing and is Critically Endangered in West Africa.

As several of the Northern Lion's remnant populations reside in conflict zones where it is difficult to implement conservation programmes, concentrating merely on maintaining these populations might be a risky conservation strategy. To enhance the demographic and genetic viability of the Northern Lion and to secure its survival and diversify the risks of extinction, the species should be actively recovered in all areas within the historic range that offer enabling conditions. These conditions include suitable habitats, sufficient wild prey, adequate support from local people, interest groups and the authorities, and a security situation allowing the implementation of conservation projects.

As Lions in the Overlap Zone in North-East Africa share genes of both subspecies, this region is considered in the Spatially Explicit Action Plan (SECAP) too. Under the auspice of the Joint CITES-CMS African Carnivores Initiative (ACI), this SECAP for the Lion in West and Central Africa, based on a comprehensive review of the situation, operationalises the conservation planning into a concrete programme of work to recover the Northern Lion in Africa covering the period 2023–2027. Based on the IUCN standards for strategic planning in species conservation, the SECAP contains a Vision, a Goal, Objectives, Results and Actions (Sections 2 and 3, p. 11–22).

The Objectives from the 2006 Strategies and the ACI POW remain valid and need to be considered for the conservation of the Northern Lion. However, in order to produce a more practical and site-specific recovery plan for the Northern Lion, three additional Objectives are proposed for West and Central Africa, and another one for the Overlap Zone. These are the following:

- 1) To secure the survival of the Northern Lion in Africa through a range-wide comprehensive approach and concerted activities of all Range Countries. This Objective consists of 4 Results and 11 Actions.
- 2) To re-establish and maintain a metapopulation of Northern Lions in West Africa through the protection and, where needed, reinforcement of the remnant populations, the reintroduction of Lions in suitable key sites, and securing the genetic and demographic viability through assisted dispersal where natural exchange of Lions is impossible or insufficient. This Objective consists of 6 Results and 21 Actions.
- 3) To maintain the metapopulation of Northern Lions in Central Africa through the protection of extant populations, the re-establishment of vital populations in suitable key sites, and securing the natural or assisted migration between the populations. This Objective consists of 7 Results and 27 Actions.
- 4) To conserve the remnant Lion populations in the Overlap Zone and initiate research to understand the extent and pattern of the hybridisation between the two Lion subspecies, allowing to issue specific recommendation with regard to the metapopulation management. This Objective consists of 2 Results and 4 Actions.

The SECAP recognises that several Key Lion Areas (see Table 2 and Fig. 2, 3, 4 and 5) in the region either have currently extirpated populations or have Lion populations at such low numbers that recovery without population and genetic augmentation may not be possible. In these cases, some amount of Lion translocation and fast tracking of Lion recovery would be required to ensure Lions are on a path to recovery within the next 10–15 years.

Remnant populations of Northern Lions largely reside within protected areas, but this does not lead to an increase of the number of Lions as long as these areas are not strongly protected and well

managed. Although this strategic action plan focusses mainly on the overall conservation of the Lion across West and Central Africa, the importance of protected area management is highly recognised. Collaborative Management Partnerships (CMPs) between NGOs and state wildlife authorities have demonstrated particular importance for the effective conservation of the Northern Lion, and indeed 74% of the remaining Lions occur within Protected Areas under CMPs (Table 4.1, Part A). The most important and immediate step is to strengthen and expand CMPs where they occur, and to consider them for parks where they are currently absent. Such an approach will help to ensure that sufficient funding reaches the target Protected Areas.

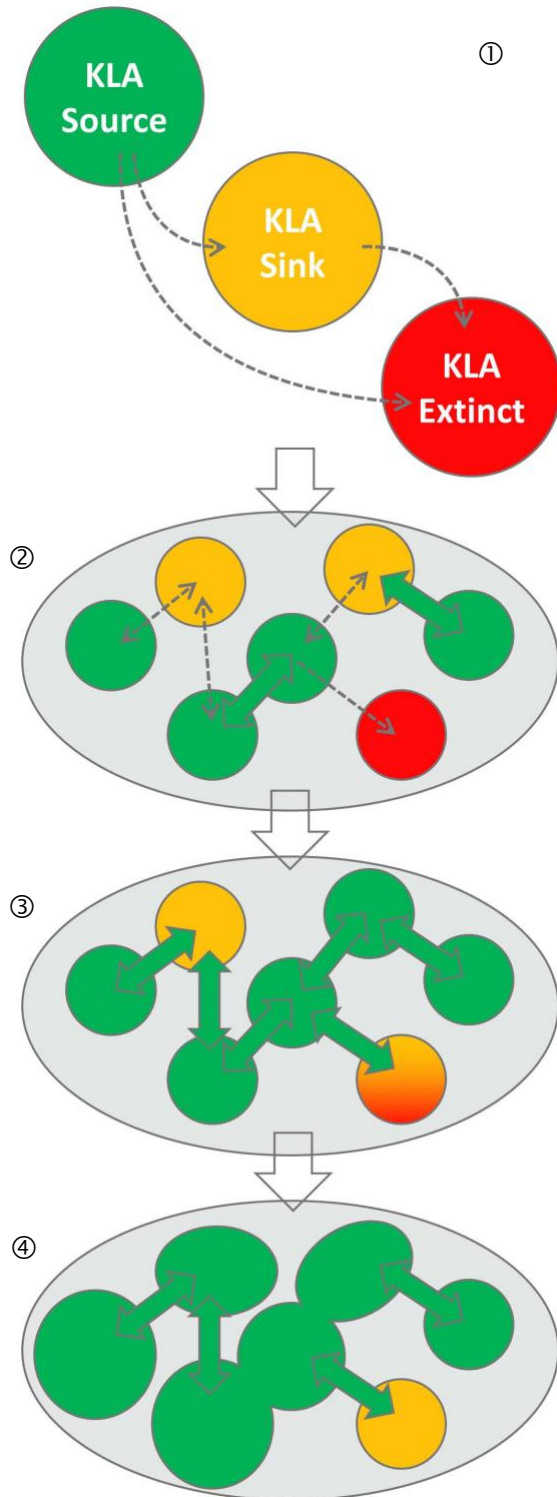
Beyond ensuring effective Protected Area management, specific recommendations to help Lions recover from small remaining populations are given in Section 4 (p. 22). These include: (1) the creation of 'safe zones' around small groups or individual Lions, (2) restocking very small groups of Lions, (3) enlarging Lion-safe zones over time, and (4) eliminating anthropogenic Lion mortality. In addition to that baseline conservation intervention, we then recommend the introduction of meta-population management of remnant and reintroduced populations.

A strategy utilising Key Lion Areas (KLAs) and corridor areas with a metapopulation-based Lion recovery plan is recommended (see Flowchart below), along with key short- and medium-term interventions resulting in local and overall population size targets. Whereas there is at present no realistic chance of non-assisted Lion dispersal in West Africa, the conditions for a functional metapopulation exist to some extent in Central Africa. The extent of, and opportunities for, connectivity need to be assessed further, along with the implementation of rigorous surveys and monitoring frameworks in extant or possibly extant Lion areas. The long-term goal must be to replace assisted dispersal through natural dispersal by re-establishing functional corridors (see also Flowchart – 1, 2 and a bit of 3 are covered by the SECAP). The genetic management of the metapopulation, and balancing between the risks of inbreeding and outbreeding when reinforcing very small populations, must be analysed using a genetic population modelling approach.

Supportive collaborative management partnerships as well as higher financial investments by NGOs and international (institutional) donors are needed in order to expand conservation efforts over an effective large surface area to sustain large Lion populations.

This SECAP has been drafted and peer-reviewed by several Lion experts and was submitted to the ACI for the attention of the Range States of the Northern Lion in Africa to be reviewed, revised according to their comments, and then endorsed. After finalising the SECAP, a tabulated LogFrame including indicators, actors, timeline, budget, etc. should be formulated using a participatory approach. This first version of the SECAP is designed for a five-years period, i.e. 2023–2027. Along the implementation of the plan, the progress of the projects with regard to achieving the Results will be monitored and shared. In 2027, the overall progress towards the Goal and Objectives through the Results will be assessed and the SECAP will be revised and renewed.

Flowchart of the spatial concept of the SECAP based on the creation of a managed and then increasingly self-sustaining metapopulation of Northern Lions in their historic range in Africa. This concept implies several phases (1–4 in the flowchart below), which will reach beyond the timespan covered in the Conservation Action Plan outlined in this document.



1. Introduction

The Lion *Panthera leo* is listed as Vulnerable (VU) in the IUCN Red List of Threatened Species™ (Bauer et al. 2016). While the subspecies *Panthera leo melanochaita* in southern and eastern Africa is doing fairly well with some populations showing an increasing trend, the Northern Lion *Panthera leo leo* in West and Central Africa has been continuously decreasing and nowadays meets the IUCN Red List Criteria for Critically Endangered (CR) in West Africa (Henschel et al. 2014, Bauer et al. 2016). Considering the dire situation of the Northern Lion in Africa, and the fact that many of the remnant populations reside in conflict zones where it is difficult to implement conservation programmes (→ Part A), concentrating merely on maintaining these populations might be a risky conservation strategy for the Northern Lion. To enhance the demographic and genetic viability of the Northern Lion and to secure its survival, the species should be actively recovered in all areas within the historic range that offer enabling conditions. These include suitable habitats, sufficient wild prey, adequate support from local people, interest groups and the authorities, and a security situation allowing the implementation of conservation projects. As Lions in the Overlap Zone in North-East Africa share genes of both subspecies, important genetic sequences aligned with the Northern Lion are resident in this region and call for its inclusion in the Spatially Explicit Action Plan (SECAP).

The first Conservation Strategies for Lion in West and Central Africa were developed in 2006, based on a mandate from CITES COP 13 (IUCN 2006a). These Strategies lacked an implementation and monitoring plan, and the impact of the Strategies was limited. The Strategies did, however, inform the development of some National or Regional Action Plans and site-specific conservation programmes (Table 1), but did not lead to a regional and transboundary conservation approach. In May 2016, a joint CMS/CITES meeting brought together all African Lion Range Countries in Entebbe, Uganda, to review the conservation status of the Lion in Africa and to reconsider the Strategies (Fig. 1). To provide input to this meeting, Bauer et al. (2015) reviewed the 2006 Lion Conservation Strategies and concluded that in general the 2006 Strategies were still relevant. All threats identified ten years earlier were still valid, and a new one, illegal trade, had additionally emerged as an important threat.

At the Entebbe meeting in 2016, enhanced international cooperation in Lion conservation was proposed – especially in the range of the Northern Lion – and the idea of a joint [CITES-CMS African Carnivore Initiative](#) (ACI) was launched. The First Range State Meeting of the Joint CITES-CMS ACI was held in November 2018 in Bonn, Germany (→ [ACI1 Report](#)).

Table 1. List of National or Regional Action Plans developed for the conservation of the Northern Lion (*Panthera leo leo*) in Africa. MSP = multi-species plan.

Name of document	Year	Area covered	Leading institution(s)/authors	MSP
Plan d'actions pour la Conservation du Lion au Bénin	2014	Benin	CENAGREF, Leo foundation, WildCRU, Panthera	No
Plan d'action de Conservation du Lion au Cameroun (2013–2018)	2013	Cameroon	Ministry of Forestry and Wildlife, Leo foundation, WildCRU, Panthera and CEDC	No
National Action Plan for the conservation of the African Lion Panthera leo in Ethiopia	2012	Ethiopia	Ethiopian Wildlife Conservation Authority	No
Strategie nationale de conservation des grands carnivores en Guinee	?	Guinea	Ministère de l'Environnement, des Eaux et Forêts et du Développement Durable	Yes
Plan National d'Action pour la Conservation du Lion au Senegal	?	Senegal	Direction des Parcs Nationaux, Leo Foundation, WildCRU, Panthera and CEDC	No
Strategic Action Plan for Large Carnivore Conservation in Uganda 2010–2020	2012	Uganda	Uganda Wildlife Authority	Yes
Plan d'Action pour la Conservation des Grands Carnivores au niveau du complexe WAPO	2014	WAP complex (Burkina Faso, Benin, Niger)	Bureau de Coordination Générale du PAPE	Yes

**Fig. 1.** Participants of the joint CMS/CITES meeting on the conservation of the Lion in Africa, Entebbe, Uganda, 30–31 May 2016. At this meeting, the Joint CITES-CMS African Carnivore Initiative was initiated.

CITES Parties at COP18 (Geneva 2019) and CMS Parties at COP13 (Gandhinagar 2020) directed their respective Secretariats to cooperate closely, and to develop, in collaboration with IUCN, a dedicated Programme of Work for the ACI. The ACI [Programme of Work](#)¹ (POW) aims to unite CITES and CMS Resolutions and Decisions concerning Lions, Cheetahs, Leopards, and African Wild Dogs under one concept and to streamline them with the respective Conservation Strategies developed under the auspices of the two conventions or IUCN in recent years. The ACI is facilitated by CITES, CMS and IUCN. All Parties, governmental agencies, non-governmental organisations, and scientific institutions working for the conservation of the ACI species are invited to participate in the implementation of the POW. This SECAP for the Lion in West and Central Africa, based on a comprehensive review of the situation (→ Part A), operationalises the conservation planning so far into a concrete programme of work to recover the Northern Lion in Africa.

2. Conservation Strategy for the Northern Lion in Africa

The 2006 Lion conservation Strategies (IUCN 2006a, b) were based on the IUCN standards for strategic planning in species conservation (Appendix B-I); the [ACI POW](#) adapted the same hierarchical structure of planning with a Vision, a Goal, Objectives addressing the major threats, and Results with a number of Actions to meet the Objectives. The SECAP follows the same logic but specifically emphasises the level of Results (measurable outcomes) and Actions (concrete activities to achieve a Result).

2.1. Vision and Goal

The Vision and Goal of the ACI POW – narrowed down for the Northern Lion – serve as guiding principles also for the SECAP:

Vision: Viable and ecologically functional populations of the *Northern Lion* are restored and maintained through appropriate conservation measures for the species and its prey, effective conservation or restoration of suitable habitats, and sustainable management of natural resources for the mutual benefit of wildlife and humans, successfully coexisting with and valued by the people as a common heritage and part of the identity of the African continent.

Goal: Implementation of a long-term, adequately funded, science-based conservation programme to effectively conserve populations of the *Northern Lion*, its prey and habitats in Africa, addressing present and emerging threats.

2.2. Objectives

The ACI POW proposes 11 Objectives to mitigate threats or meet deficiencies identified for the conservation of the ACI species in Africa (→ pages 2 and 3 in the [ACI POW](#); Appendix B-II).

The 2006 Conservation Strategy for the Lion in West and Central Africa (IUCN 2006a) listed the following Objectives:

¹ URL French version: https://www.cms.int/sites/default/files/document/cms_stc52_outcome-5_pow-joint-cites-cms-african-carnivores-initiative_f.pdf

West Africa:

1. To maintain habitat sufficient for the survival of the Lion in West Africa
2. To ensure a wild prey base sufficient for viable Lion populations
3. To make Lion-human cohabitation sustainable
4. To reduce the factors leading to loss of viability for Lion populations

Central Africa:

1. To guarantee better conservation of habitats in Lion range
2. To reduce human-Lion conflict
3. To guarantee the availability of wild prey in all Lion habitats

The 2015 review of the Lion Strategies (Bauer et al. 2015) proposed an additional Objective valid for all regions of Africa:

- To minimise trade in Lion bones and body parts

Overlap Zone in north-eastern Africa:

In north-eastern Africa, the distribution of *P. l. leo* and *P. l. melanochaita* overlap, foremost in Ethiopia and South Sudan (Table 2; → Part A). This Overlap Zone was covered by the Conservation Strategy for Eastern and Southern Africa (IUCN 2006b; see also there for relevant Objectives). All general recommendations for the conservation of Lions concerning protection habitats, prey, conflicts, and illegal killing and trafficking are valid for the Overlap Zone, too. However, the present understanding of the hybridisation of the two Lion subspecies is not sufficient to allow specific recommendations for managing the metapopulation. The Overlap Zone is therefore treated as a distinct part of the Lion distribution range hereafter. However, it is recognised that further research is required to gain a greater understanding of the genetic delineations of the different subspecies before refining national and local action plans, using larger samples that are more representative of the different populations regionally. Genetic studies should encompass not only all the isolated wild populations, but also analysis from captive individuals including research into their origin. Broader genetic studies on lions are already ongoing, and such an analysis should be included therein.

Additional Objectives for Northern Lions in Africa

The Objectives from the 2006 Strategy for West and Central Africa (IUCN 2006a) address primarily the preservation of habitats, the conservation of wild ungulates as prey base for the Lion, and the direct and indirect threats to Lions leading to anthropogenic mortalities. The Objectives in the ACI POW cover these, too, but also additional factors such as land use (planning), international cooperation, policy and legislation, and capacity building. As such, they are more in line with the Objectives for Lions in Eastern and Southern Africa (IUCN 2006b). All these Objectives need to be considered for the conservation of the Northern Lion. However, to produce a more practical and site-specific recovery plan for the Northern Lion (the SECAP) three additional Objectives are proposed for West and Central Africa, and another one for the Overlap Zone:

Objective 1: To secure the survival of the Northern Lion in Africa through a range-wide comprehensive approach and concerted activities of all Range Countries.

Objective 2: To re-establish and maintain a metapopulation of Northern Lions in West Africa through the protection and, where needed, reinforcement of the remnant populations, the reintroduction of Lions in suitable key sites, and securing the genetic

and demographic viability through assisted dispersal where natural exchange of Lions is impossible or insufficient.

Objective 3: To maintain a metapopulation of Northern Lions in Central Africa through the protection of extant populations, the re-establishment of vital populations in suitable key sites, and securing the natural or assisted migration between the populations.

Objective 4: To conserve the remnant Lion populations in the Overlap Zone and initiate research to understand the extent and pattern of the hybridisation between the two Lion subspecies, allowing to issue specific recommendation with regard to the metapopulation management.

Table 2. Lion Conservation Units with as recent as possible survey estimates and literature sources for West, Central and North-East Africa. LCU type: * =areas not designated as LCUs by IUCN (2006a, b). #: identification numbers used in the maps. (Protected) areas: NP = National Park; bold = Proposed Key Lion Areas. Source: ALD = estimates from the African Lion Database, provided by S. Nicholson.

Lion Conservation Unit	LCU type	Country	#	(Protected) Area	Lion status	Pop. estimate	Source
West Africa							
Niokolo-Guinea	I	Guinea-Bissau	1	Boé and Dulombi NPs	Extinct	-	Henschel pers. comm.
		Senegal	2	Niokolo Koba NP and Falémé hunting area	Extant	29 (15–50)	Henschel pers. comm.
		Mali	3	Bafing-Falémé	Extinct	-	Henschel et al. 2014
		Guinea	4	Kankan Faunal Reserve	Extinct	-	Henschel pers. comm.
		Guinea	5	Haut Niger NP	Extinct	-	Henschel pers. comm.
Boucle du Baoulé	III	Mali	6	Boucle du Baoulé NP	Extinct	-	Henschel pers. comm.
Comoé-Léraba	II	Côte d'Ivoire	7	Comoé NP	Extinct	-	Henschel et al. 2014
Bui-White Volta	II	Ghana	8	Bui NP	Extinct	-	Henschel et al. 2014
Mole	II	Ghana	9	Mole NP	Extinct	-	Henschel et al. 2014
Gbele Ecosystem	II	Ghana	10	Gbele Resource Reserve	Extinct	-	Henschel et al. 2014
Digya	III	Ghana	11	Digya NP	Extinct	-	Henschel et al. 2014
Nazinga-Sissili	*	Burkina Faso	12	Nazinga Game Ranch	Extinct	-	Henschel pers. comm.
Oti-Mandouri	II	Togo	13	Oti-Mandouri National Park	Extinct	-	Henschel pers. comm.
W-Arly-Pendjari	I	Benin, Burkina Faso, Niger	14	W, Arly and Pendjari NPs and hunting areas, and adjacent Tamou Total Wildlife Reserve	Extant	155–187	African Parks 2019, 2021
Mt Kouffé/Wari Maro	II	Benin	15	Mt Kouffé/Wari Maro	Extinct	-	Henschel pers. comm.
Old Oyo	III	Nigeria	16	Old Oyo NP	Extinct	-	Henschel pers. comm.
Kainji Lake	II	Nigeria	17	Kainji Lake NP	Extant	10–20	Dunn pers. comm. (ALD)
Kamuku/Kwiambana	II	Nigeria	18	Kamuku NP	Extinct	-	Henschel pers. comm.
Approximate estimate						215 (180–257)	
Central Africa							
Lame-Burra/Falgore	II	Nigeria	19	Falgore and Lame-Burra GR	Extinct	-	Henschel pers. comm.
Yankari	II	Nigeria	20	Yankari NP	Extant	<10	Dunn pers. comm.
Waza	II	Cameroon	21	Waza NP	Extant	<15	Tumenta et al. 2021
Bénoué complex-Gashaka-Gumti-Sena Oura	I	Nigeria	22	Gashaka-Gumti NP	Extinct	-	Volker pers. comm. (ALD)
		Cameroon	23	Bouba Njida, Bénoué and Faro NPs and hunting areas	Extant	250	Bauer et al. 2015
	*	Chad	24	Sena Oura NP	Extant	2	Kirsten pers. comm. (ALD)

Melfi-Rokoum	*	Chad	25	Melfi-Rokoum (included below as part of the Zakouma Complex)	Extant	6	Fratlicelli pers. comm. (ALD)
Chad-RCA	II	Chad	26	Zakouma NP, Siniaka Minia, Bahr-Salamat and Abou Telfan faunal reserves, and Aouk hunting area	Extant	130	Olléová & Dogringar 2013
		Central African Republic (CAR) CAR	27	Bamingui-Bangoran and Manovo-Gounda Saint Floris NPs, Vassako Bolo Wildlife Reserve and hunting sectors – Northern CAR	Extant	20	WCS 2020
			28	André Félix NP and Yata-Ngaya Faunal Reserve	Extant	35	Mararv pers. comm. (ALD)
			29	Greater Chinko Conservation Area	Extant	108	Aebischer et al. 2020, African Parks 2022
Southwestern Sudan	I	South Sudan	30	Numatina, Chelkou and Boro Game Reserves and Bahr-al-Ghazal Swamp Wilderness	Poss. Extinct	Unknown	Aebischer pers. comm.
			31	Southern NP	Extant	<20	FFI 2022
Garamba-Bili Uere Complex		DRC	32	Bomu and Bili Uere hunting areas	Extant	Unknown	Elkan pers. comm.
		DRC and South Sudan	33	Garamba and Lantoto NPs and hunting zones	Extant	43	African Parks (ALD)
Approximate estimate						640	
North-East Africa – overlap zone							
Sudd wetland		South Sudan	34	Shambe NP and Zeraf Game Reserve	Extant	Unknown	Elken pers. comm.
Boma-Gambella	I	South Sudan and Ethiopia	35	Badingilo, Boma and Gambella NPs and the proposed Loelle protected area	Extant	150	Gebretensae and Kebede 2022
Kidepo Valley South Sudan/Uganda	III	South Sudan and Uganda	36	Kidepo Game Reserve and Kidepo NP	Extant	132	Omoya et al. 2014 for Uganda
South Omo	II	Ethiopia	37	Omo, Borana and Mago NPs, Tama and Chelbi wildlife reserves and hunting areas	Extant	170-200	Gebretensae and Kebede 2022
Kafa-Chebera-Maze-Nechisar	*	Ethiopia	38	Kafa, Chebera Churchura, Maze and Nechisar NPs	Extant	Unknown	Yirga et al. 2021
Bale	II	Ethiopia	39	Bale Mountains Area – Bale, Yabello and Gerale NPs	Extant	30	Gebretensae and Kebede 2022
Wemel-Genale	III		40		Extinct		Bauer pers. comm.
Ogaden	II	Ethiopia	41	Ogaden region including Easter Hararge Controlled Hunting area and Shebelle-Somali	Extant	100	Gebretensae and Kebede 2022
Babile	*	Ethiopia	42	Babile	Extant	Unknown	Yirga et al. 2021
Awash	II	Ethiopia	43	Awash NP and controlled hunting areas and game reserves	Extant	50	Gebretensae and Kebede 2022
Dinder-Alitash	*	Sudan and Ethiopia	44	Dinder, Alitash and Bejimiz NPs	Extant	30–82	Mohammed et al. 2019
Mao-Komo	*	Ethiopia	45	Mao-Komo	Extant	162-255	Gebretensae and Kebede 2022
Approximate estimate						Unknown	

3. Spatially Explicit Conservation Action Plan

The technical review of the situation of the Northern Lion in Africa (Part A) revealed that the situation is very critical and that the survival of the Lion – especially in West Africa – requires immediate and site-specific activities. There are only few vital Lion populations left, and – besides the typical threats to all Lions in Africa – most of these populations are situated in areas with severe security problems, where it is or in the foreseeable future might be very difficult to implement conservation programmes. As soon as possible, the Lion populations in West and Central Africa should therefore become more resilient by having more Lions at more sites and thus not only improve the demographic and genetic viability of the Northern Lion (or the genetic clades identified as evolutionary significant units; → Part A and below), but also creating a number of additional backup populations if the extant source populations should not be able to fulfil this function in the future. This will avoid an overreliance on certain populations and diversify the risk of extinction in the region. To start with, reintroduction efforts will focus on areas where the ecological and anthropogenic situation already fulfils at least minimum requirements. In other areas, these prerequisites for the reintroduction of Lions will first need to be created, e.g. by enhancing prey populations. A special case is the area reaching from south-eastern Chad via CAR to western South Sudan. This appears to be by far the largest contiguous landscape with intact connectivity existing in the range of the Northern Lion. As such, it currently offers the potential for hosting the largest Lion population. Nevertheless, efforts should not only focus on recovering Lions there, as this would again create the risk of overreliance and as the long-term conservation goal should be to conserve Northern Lions across their historic distribution range.

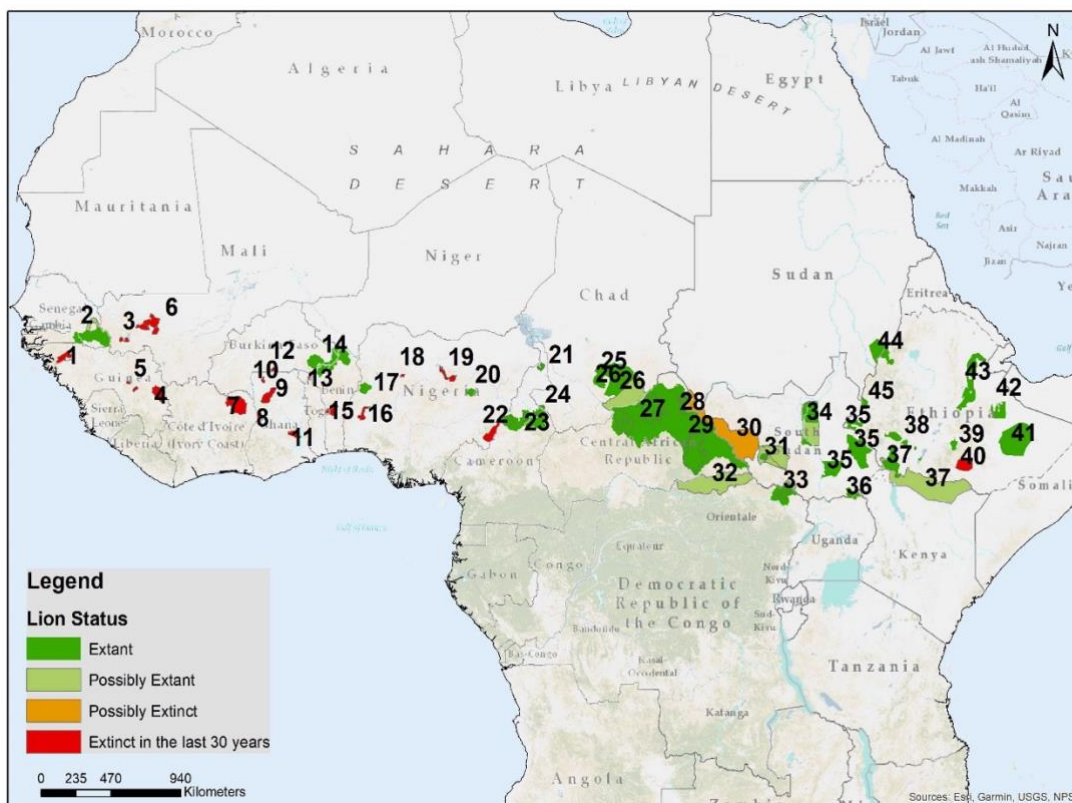


Fig. 2. Network of protected areas in West, Central, and North-East Africa, including Key Lion Areas (names given in Table 2) that presently host Lion populations or did so within the last 30 years.

The aim is to create a “managed metapopulation” of Northern Lions in West and in Central Africa as fast as possible. The term “managed metapopulation” refers to the fact that for the foreseeable future, the distribution range of the Northern Lion in Africa will remain fragmented (more so in West than in Central Africa; → Part A), and many of the protected sites that offer suitable conditions for small Lion populations will remain isolated for a long time. As migration of Lions between these small populations is important to maintain (or restore) their demographic and genetic vitality, assisted dispersal (translocations) will be needed for all populations that are not connected to other populations through functional corridors.

The SECAP for the Northern Lion in Africa should be implemented over the next ten to fifteen years. The following outcomes (Results) and Actions outline how to create such a network of Lion populations in West and in Central Africa (Fig. 2), based on extant populations of Northern Lions and existing protected areas where the conditions for hosting Lions is considered good or enabling conditions could be created in a relatively short time.

Objective 1: To secure the survival of the Northern Lion in Africa through a range-wide comprehensive approach and concerted activities of all Range Countries.

Result 1.1: Suitable source populations for translocations of Northern Lions are identified

- Action 1.1.1: Assess the grade of genetic distinction between Lions in West and Central Africa and conduct a (meta) population viability analysis of the Northern Lion and the clades as identified by Bertola et al. (2022) and identify and agree on the genetic units of Northern Lion to be conserved in Africa.
- Action 1.1.2: Assess all remaining potential source populations of Northern Lions in Africa with regard to their ecological, demographic and genetic status, and the enabling conditions and constraints, respectively, with regard to security, wildlife protection capacity, wildlife health situation, access and logistics, etc. at the respective sites.
- Action 1.1.3: Develop and implement a programme to maintain the demographic and genetic viability of these source populations and, wherever needed, to improve the enabling conditions for the management of the sites.
- Action 1.1.4: Establish a scheme for the demographic/genetic monitoring of the source population and the ecological and anthropogenic conditions at the sites.

Result 1.2: Capacity of key protected areas in West and Central Africa is secured

- Action 1.2.1: Assess, improve where needed, and secure management capacity of key protected areas in West and Central Africa (Fig. 2; Table 2), equipment and supplies. (Including the Overlap Zone in North-East Africa → Objective 4).

Result 1.3: (Inter-) governmental support is formalised and secured

- Action 1.3.1: Organise a special meeting of the West and Central African Lion Range Countries to discuss and operationalise the SECAP and to discuss range-wide and transboundary cooperation and administrative agreements needed for the implementation of the SECAP.
- Action 1.3.2: Make an agreement for the recovery of Lions in Key Lion Areas (Fig. 2, Table 2), under the auspices of the Joint CITES-CMS African Carnivores Initiative (ACI), among all governments (or the agencies concerned) and NGOs concerned involved.

Action 1.3.3: Budget the costs for the SECAP and organise joint fundraising for the implementation of the plan.

Result 1.4: A plan to address transboundary threats to Lions such as transhumance (i.e. pastoralists moving with their herds across international borders and through Key Lion Areas) is created

Action 1.4.1: Identify and analyse all relevant transboundary threats regarding their scale, impact and roots.

Action 1.4.2: Create a plan to mitigate the identified threats in a bilaterally and internationally coordinated manner.

Action 1.4.3: Budget the costs for distinct projects within the framework of the plan and organise joint fundraising for the subsequent implementation.

Objective 2: Re-establish and maintain a metapopulation of Northern Lion in West Africa through the protection and, where needed, reinforcement of the remnant populations, the reintroduction of Lions in suitable key sites, and securing the genetic and demographic viability through assisted dispersal where natural exchange of Lions is impossible or insufficient.

Result 2.1: Lion recovery targets are set and approved

Action 2.1.1: Define and agree, in cooperation with relevant national authorities of the Range Countries, on short-, mid- and long-term population targets (as estimated based on the Hayward et al. (2007) formula for Lion abundance based on prey abundances and considering situation challenges) to inform management measures aiming to reach 'realistic carrying capacity' of the Key Lion Areas.

Action 2.1.2: Develop a priority ranking index of suitability and feasibility for each of the 5 Key Lion Areas (Fig. 3) for a metapopulation approach.

Result 2.2: Lion and prey population monitoring in the relevant areas is established

Action 2.2.1: Adapt and implement guidelines for robust, yet practical and feasible monitoring for Lions and prey in West Africa, which allow continuously tracking population trends (→ Part A, Chapter 6).

Action 2.2.2: Conduct surveys for Lions and prey in all key areas from where no (recent) data are available.

Result 2.3: Collaborative management partners are involved and engaged

Action 2.3.1: Review management effectiveness for the 5 Key Lion Areas (Fig. 3; Table 2) and make recommendations for improvement (→ Actions 1.2.1 and 3.4.1)

Action 2.3.2: Improve management and seek funding and collaborative management partnerships for Comoé [# 7 in Fig. 3 and Table 2], Kainji Lake [17] and Mole NP [9].

Action 2.3.3: Secure greater funding for collaborative management partnerships for Niokolo Koba NP [2].

Action 2.3.4: Assess Lion population status and impacts of recent security challenges in the WAP complex [14] and secure funding to address challenges, or to secure some of these Lions at other Key Lion Areas.

Result 2.4: Community development is integrated into Lion conservation and local communities benefit from wildlife conservation (→ Result 3.7)

- Action 2.4.1: Assess the extent and scope of all community development programmes in the boundary areas of the five Key Lion Areas.
- Action 2.4.2: Establish forums to harmonise community development programmes with the aims and objectives of protected area and conservation managers.
- Action 2.4.3: Implement tangible benefit-sharing mechanisms and programmes designed to transfer financial, employment and other benefits to adjoining rural communities in ways that are demonstrably linked to successful Lion/wildlife conservation.
- Action 2.4.4: Identify and gazette key corridors and assure that they receive an adequate legal status.

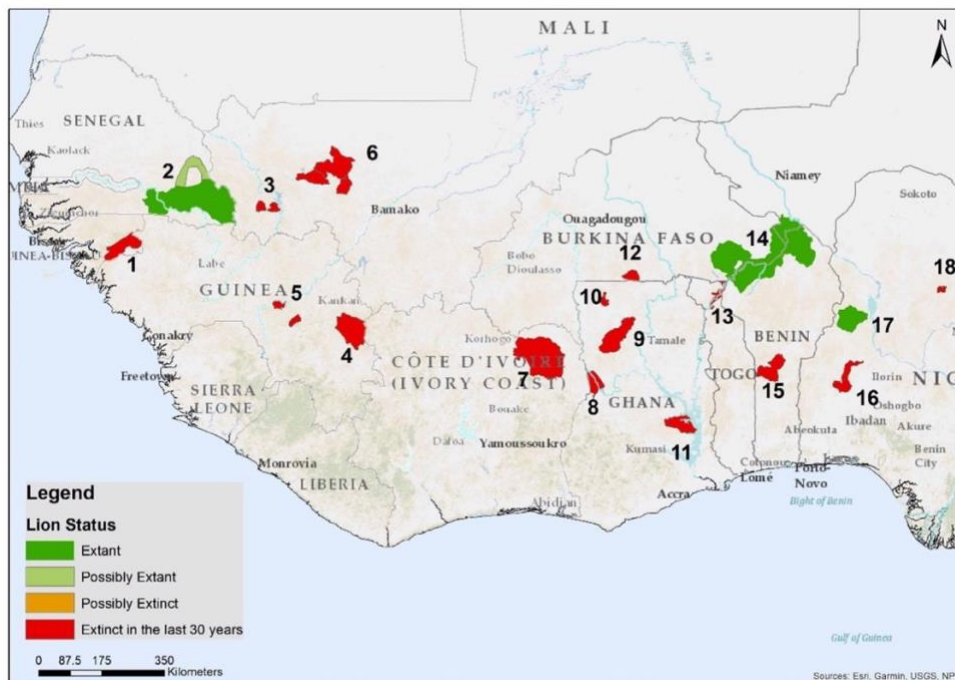


Fig. 3. Protected Areas with Extant (green) or recently Extinct (red) Lion populations and Key Lion Area [2, 7, 9, 14, 17] in West Africa where Comoé [7] and Mole [9] national parks offer the best possible sites for Lion reintroduction.

Result 2.5: A feasible Lion reinforcement/reintroduction plan is designed and approved

- Action 2.5.1: Develop a realistic Lion translocation/reintroduction plan based on the outcomes of Results 1.1, 1.3, 2.1 and Action 2.3.1 and seek the endorsement from all relevant governmental institutions and other partners.
- Action 2.5.2: Actively pursue the practical, technical and authorised mechanisms to facilitate Lion translocation between Key Lion Areas.

Result 2.6 Prepare releases in Key Lion Areas

- Action 2.6.1: Create safe core zones in and management plans for the reinforcement in Niokolo Koba [2] and Kainji Lake [17] and reintroduction into Comoé [7] and Mole [9] (Fig. 3, Table 2).
- Action 2.6.2: Develop a detailed translocation and release plan for each reinforcement or reintroduction site (including capacity and infrastructure requirements).
- Action 2.6.3. Secure the demographic and genetic monitoring of the source population(s).

- Action 2.6.4: Develop a robust monitoring plan for the released Lions, the emerging population and the relevant prey species.
- Action 2.6.5: Develop an information campaign for and communication strategy with local communities and interest groups to secure their involvement and prevent/mitigate possible human-Lion conflicts.
- Action 2.6.6: Train the necessary staff to implement actions 2.5.2–5 for each site (→ Action 3.6.6)
- Action 2.6.7: Secure the short-, mid- and long-term funding for the management of the reinforced or reintroduced Lion population, site management needed, and the mitigation of possible conflicts (including compensation where needed).

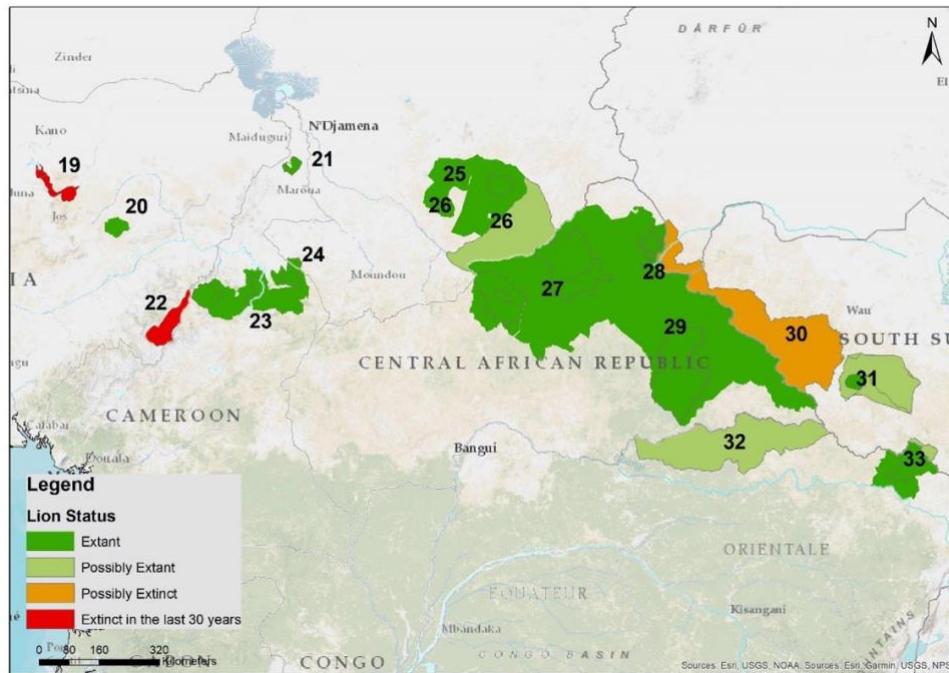


Fig. 4. Protected Areas with Extant (green), Possibly Extant (light green), Possibly Extinct (orange) or recently Extinct (red) Lion populations and Key Lion Areas [20, 21, 23, 26, 27, 29, 30, 31, 33] in Central Africa.

Objective 3: Maintain a metapopulation of Northern Lions in Central Africa through the protection of extant populations, the re-establishment of vital populations in suitable key sites, and securing the natural or assisted migration between the populations.

Result 3.1: Lion recovery targets are identified, set and approved

- Action 3.1.1: Define and agree, in cooperation with relevant national authorities of the Range Countries, short-, mid- and long-term populations targets (as estimated based on the Hayward et al. (2007) formula for Lion abundance based on prey abundances) to inform management measures aiming to reach the carrying capacity of the Key Lion Areas in Central Africa (Fig. 4, Table 2; → Action 2.1.1).
- Action 3.1.2: Develop a priority ranking index of suitability and feasibility for each of the 9 Key Lion Areas (Fig. 4) for a metapopulation approach connected either by real or simulated corridors, and prioritise actions accordingly.
- Action 3.1.3: Assess the status of Lions in Yankari [# 20 in Fig. 4, Table 2], Waza [21], and Bouba Njida, Bénoué and Faro [23], Billi-Uere [32] and Northern CAR [27] (Fig. 4, Table 2) and identify recovery targets.

Action 3.1.4: Assess the recovery potential for Lions in Gashaka-Gumti NP [22], including the possibility of (timely) natural recolonisation and make a feasibility study for reintroducing Lions if considered necessary.

Action 3.1.5: Assess the potential of greater Zakouma [26], Chinko [29] and Garamba [33] areas to host resident Lions outside core zones (Fig. 5).

Action 3.1.6: Identify areas where Lions could reside beyond and/or move between the identified Key Lion Areas if protection capacity is improved and ecological and anthropogenic conditions are favourable, notably in the Greater Chinko Conservation Area [29] and Western South Sudan [30] and Southern National Park [31].

Result 3.2: Lion and prey population estimates in the relevant areas are established

Action 3.2.1: Adapt and implement guidelines for robust, but practical and comparable monitoring for Lions and prey in Central Africa, which allow tracking population trends.

Action 3.2.2: Conduct surveys for Lions and prey in all Key Lion Areas (Fig. 4) where no (recent) data are available.



Fig. 5. Protected areas in the Chad-CAR LCU, depicting the Greater Zakouma Landscape (Zakouma Key Lion Area [25,26]) in Chad, Northern CAR (Bamingui-Bangoran and Manovo Gounda St Floris) [27,28] and the Greater Chinko Conservation Area [29] in Chad, and neighbouring Key Lion Areas in South Sudan [30,31], and the Democratic Republic of Congo [32].

Result 3.3: Core areas and areas where people and Lions co-exist are expanded, and their effectiveness improved

Action 3.3.1 Implement improved Lion protection for Yankari [20], Waza [21], Faro, Bénoué and Bouba Njida [23], Billi-Uere [32], Northern CAR [27] and Southern NP [31] (Fig. 4).

Action 3.3.2. Assess the need for genetic augmentation of the populations mentioned under Action 3.3.1.

Action 3.3.3: Secure Lion populations in all core areas of Key Lion Areas and identify and secure suitable existing corridors.

Action 3.3.4: Identify zones for expanding Lion populations residing alongside people (coexisting) in Greater Zakouma [26], Chinko [29] and Northern CAR [27] (Fig. 4), increase Lion populations in these coexistence areas by two-fold until 2028, and adjust monitoring to the enlarged zones.

Result 3.4: Collaborative management partners are involved and engaged

Action 3.4.1: Review management effectiveness for the 9 Key Lion Areas in Central Africa (Fig. 4) and make recommendations for improvement (→ Action 2.3.1).

Action 3.4.2: Actively pursue the practical, technical and authorised mechanisms to facilitate Lion translocation between Key Lion Areas.

Result 3.5: A feasible Lion translocation plan is designed and approved

Action 3.5.1: Assess connectivity between the 9 Key Lion Areas (Fig. 4) regarding the possible migration of Lions (natural gene flow between the populations).

Action 3.5.2: Design a translocation plan that includes assisted dispersal between source sites, reinforcement of sink sites, and reintroduction for key sites where Lion populations went extinct and seek the endorsement from all relevant governmental institutions and other partners.

Result 3.6: Prepare releases in Key Lion Areas requiring Lion reintroduction or reinforcement

Action 3.6.1: Create safe core zones in and management plans for the identified sites for reinforcement and, respectively, reintroduction.

Action 3.6.2: Develop a detailed translocation and release plan for each reinforcement or reintroduction site (including capacity and infrastructure requirements)

Action 3.6.3: Secure the demographic and genetic monitoring of the source population(s).

Action 3.6.4: Develop a robust monitoring plan for the released Lions, the emerging population and the relevant prey species.

Action 3.6.5: Develop an information campaign for and communication strategy with local communities and interest groups to secure their involvement and prevent/mitigate possible human-Lion conflicts.

Action 3.6.6: Train the necessary staff to implement actions 3.6.2–5 for each site (→ Action 2.5.6)

Action 3.6.7: Secure the short-, mid- and long-term funding for the management of the reinforced or reintroduced Lion population, site management needed, and the mitigation of possible conflicts (including compensation where needed).

Result 3.7: Community development is integrated into Lion conservation and local communities benefit from wildlife conservation (→ Result 2.4)

Action 3.7.1: Assess the extent and scope of all community developments programmes in the boundary areas of the 9 Key Lion Areas.

Action 3.7.2: Develop forums to harmonise community development programmes with the aims and objectives of protected area and conservation managers.

Action 3.7.3: Implement tangible benefit sharing mechanisms and programmes designed to transfer financial, employment and other benefits to adjoining rural communities in ways that are demonstrably linked to successful Lion conservation.

Action 3.7.4: Identify and gazette key corridors and assure their adequate legal status.

Objective 4. To conserve the remnant Lion populations in the Overlap Zone and initiate research to understand the extent and pattern of the hybridisation between the two Lion subspecies, allowing to issue specific recommendation with regard to the metapopulation management.

Result 4.1: Conservation of the local Lion populations is advanced through the development and implementation of National Action Plans in the entire Overlap Zone, based on national assessments and red lists.

Action 4.1.1. Develop and endorse, based on the 2006 Lion Conservation Strategies (IUCN 2006a, b) and the ACI POW, National Action Plans (NAPs) to conserve remnant Lion populations in all countries that have no NAPs yet.

Action 4.1.2. Seek institutional and financial support for the implementation of the NAPs (including capacity building → Result 1.2).

Result 4.2: The phylogenetic background and the spatial pattern of the hybridisation in the Overlap Zone is understood and integrated into the range-wide conservation concepts.

Action 4.2.1. Initiate a research project across the Overlap Zone to improve the understanding of the extent and spatial pattern and the phylogenetic background of the hybridisation between the two Lion subspecies.

Action 4.2.2. Based on the results from Action 4.2.1, issue recommendations for specific conservation measures for the mixed metapopulation in the Overlap Zone and integrate, as needed, the scientific findings into the conservation concept for the adjacent populations of *P. l. leo* and, respectively, *P. l. melanochaita*.

4. Conservation Approach

As with Lion conservation initiatives elsewhere in most parts of Africa, the three key Lion conservation strategies required in the region include:

1. Securing and recovering prey and Lion populations in Key Lion Areas, also known as core areas.
2. Securing and maintaining corridors between various Key Lion Areas or simulating connectivity through translocation ('assisted dispersal').
3. Effectively mitigating intense human killing and persecution of Lions and their prey by communities living adjacent to or alongside Lions.

The SECAP recognises that several Key Lion Areas in the region either have currently extirpated Lion populations (e.g., Comoé and Mole National Parks) or have Lion populations at such low numbers that recovery without population and genetic augmentation may not be possible in the short term (e.g., Kainji Lake, Yankari, Waza). In these cases, some amount of Lion translocation and fast tracking of Lion recovery would be required to ensure Lions are on a path to recovery within the next ten to fifteen years.

The threats and challenges Lions face can often result in small populations seemingly trapped and not able to recover. This is known as the 'small population paradigm' (Caughley 1994). Few Lion recovery projects have found effective ways to deal with these challenges. This may be in part because most park support projects focus their limited resources on improving overall park protection, without a specific and emphasised effort on protecting individual Lions. Although overall park protection is a crucial element in the conservation of Lions – as is shown by the fact that

remaining populations of Northern Lions largely reside within protected areas – it does not automatically lead to an increase in those Lion populations. Thus, conservation managers are advised to follow some of the following recommendations to get Lions to recover from small remaining populations:

1. Creating 'safe zones' around small groups, or even individual Lions, as they can, and manage stochastic challenges as effectively as possible. Activities here need to be Lion focussed, even when the park needs more general support to become an intact functional ecosystem.
2. Restocking very small groups of Lions with breeding age lionesses brought in from elsewhere and established through a slow-release translocation process. Where and how to get additional Lions will be a challenge but will certainly be needed. Managers ideally require more than one starter population possibly in two or three areas, or as neighbours.
3. Lion-safe zones need to be enlarged with time and managers will have to keep at it in a concerted way, keeping individual Lion mortality as low as possible until the population indicates that it has started to increase at an exponential rate. This requires constant vigilance, dealing with human pressures and threats effectively and an effective long-term Lion monitoring framework.
4. Anthropogenic Lion mortality needs to approach zero, with Lion populations being closely monitored, and removals to augment other sites need to be carefully considered in terms of the dynamics of the respective source population.

The key approach here must therefore be to work towards a clear Lion outcome that requires tactics beyond those generally used to secure a protected area. A plan utilising core and corridor areas with a metapopulation based Lion recovery plan is recommended, along with key short- and medium-term interventions resulting in local and overall population size targets. Metapopulation theory with applied conservation interventions embraces both key ecological considerations with conservation practice and is likely to be the only viable approach to recovering wild Lion populations. Maintenance and transfer of as much genetic diversity as possible (but always within the realm of the identified conservation unit) needs to be tightly integrated with a numeric population driven process as a cornerstone of the recovery plan.

Whereas there is no realistic chance of non-assisted Lion dispersal throughout West Africa, the opportunity for Lions to disperse from one protected area complex to another still exists throughout much of Central Africa. Notable exceptions could include Yankari, Waza and the Bénoué Complex with it being unclear if Lions could move from areas to the east through Chad into Cameroon. Thus, to some extent at least the conditions for a functional metapopulation may exist in at least parts of Central Africa. The extent of, and opportunities for, connectivity need to be assessed further and along with the implementation of rigorous surveys and monitoring frameworks. The long-term goal must be to replace assisted dispersal through natural dispersal by re-establishing functional corridors.

Given the collapse of Lions in Waza and Yankari, it is likely that augmenting genetic variability here with Lions most likely from the Bénoué Complex would be important if the management of the park can be improved. Similarly, recovering Lions in Comoé, Mole, Kainji Lake and possibly Niokolo Koba in West Africa hinges on the success and availability of Lions from the W-Arly-Pendjari Complex. However, the genetic management of the metapopulation, and balancing between the risks of

inbreeding and outbreeding when reinforcing very small populations, must be more in detailed analysed by means of a genetic population modelling approach.

A successful conservation approach in the recent past has been the establishment of collaborative management partnerships (CMPs) between protected areas and NGOs. Without a supportive collaborative management partner in sites such as Comoé, Mole, Kainji Lake, Waza and Bénoué National Parks, and a much higher financial investment by NGOs and international donors in sites such as Yankari, Boubou Njida-Sena Oua, Faro National Park, Northern CAR, Bili-Uere and Southern National Park, outlooks for Lions there are not that promising. Meanwhile, the collaborative management partnerships in Zakouma, the Chinko Conservation Area and Garamba look increasingly promising provided that the conservation efforts can be expanded over an effective large surface area to sustain large Lion populations.

5. Range States review, fine-tuning and implementation

The SECAP is a proposal for a recovery plan for the Northern Lion in Africa to be implemented in the frame of the Joint CITES-CMS African Carnivores Initiative (ACI). It has been drafted based on a comprehensive technical and scientific review (Part A), and has been peer reviewed by several Lion experts. The draft was submitted to the 2nd ACI Range States Meeting in Uganda in May 2023. The Range States were invited to review the document in the weeks following the meeting. The results of the discussion at the meeting and the feedback were then incorporated in this revision. At this stage, the plan does not include a tabulated LogFrame including indicators, actors, time-line, time-line, budget, etc. All this will be best achieved in a participatory approach.

For the fine-tuning and implementation of the SECAP, the following steps are foreseen:

1. Development of a work plan with time-line and budget, of a funding strategy, and a monitoring plan in a meeting within the geographic range of the Northern Lion with the Range Country representatives and partner organisations;
2. Establish a Steering Group with representatives from Range Countries, NGOs, and other institutions involved (or a single institution as a coordination entity) to oversee the implementation of the SECAP;
3. Implementation of the SECAP according to the priority assessment and as funding for these projects is secured.

This first version of the SECAP is designed for a five-years period from 2023 to 2027. Along the implementation of the plan, the progress of the projects with regard to achieving the Results will be monitored and shared. It is not realistic to expect the recovery of the Northern Lion in Africa to be achieved by 2027, but substantial progress must be made within these five years. In 2027, the overall progress towards the Goal and Objectives through the Results will be assessed and the SECAP will be revised and renewed.

References

- Aebischer T., Ibrahim T., Hickisch R., Furrer R., Furrere R. D., Leuenberger C. & Wegmann D. 2020. Apex predators decline after an influx of pastoralists in former Central African Republic hunting zones. *Biological Conservation* 241, 108326.
- African Parks 2019. Inventaire Grands Carnivores Complexe W-Arly-Pendjari: Composantes W (Bénin, Niger) et Pendjari. African Parks, Johannesburg.
- African Parks 2021. Inventaire des Grands Carnivores de la composante Béninoise du Complexe W-Arly-Pendjari. African Parks, Johannesburg.
- African Parks 2022. Management and conservation of large carnivores in the Greater Zakouma Ecosystems. Progress Report to the Lion Recovery Fund, African Parks, Greater Zakouma Ecosystem. African Parks, Johannesburg.
- Bauer H., Nowell K., Breitenmoser U., Jones M. & Sillero-Zubiri C. 2015. Review of lion conservation strategies. Report on behalf of CMS, UNEP. 20 pp.
http://www.catsg.org/fileadmin/filesharing/3.Conservation_Center/3.4.Strategies_Action_Plans/African_lion/CMS_2015_Review_of_lion_conservation_strategies.pdf
- Bauer H., Packer C., Funston P. F., Henschel P. & Nowell K. 2016. *Panthera leo* (errata version published in 2017). The IUCN Red List of Threatened Species 2016: e.T15951A115130419.
<https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T15951A107265605.en>. Accessed on 10 January 2023.
- Bertola L. D., Miller S. M., Williams V. L., Naude V. N., Coals P., Dures S. G., Henschel P., Chege M., Sogbohossou E. A., Ndiaye A., Kiki M., Gaylard A., Ikanda D. K., Becker M. S., & Lindsey P. 2022. Genetic guidelines for translocations: Maintaining intraspecific diversity in the lion (*Panthera leo*). *Evolutionary Applications* 15, 22–39.
- Caughley G. 1994. Directions in Conservation Biology. *Journal of Animal Ecology* 63: 215-244.
- Fauna and Flora International (FFI). 2022. Final Report to the Lion Recovery Fund: Restoring Effective Management to Southern National Park in South Sudan.
- Gebretensae, K., & Kebede, F. (2022). Review of the status of African lion (*Panthera leo*) in Ethiopia. *International Journal of Biodiversity and Conservation*, 14(2), 94-102.
- Hayward M. W., O'Brien J. & Kerley G. I. H. 2007. Carrying capacity of large African predators: Predictions and tests. *Biological Conservation* 139, 219-229.
- Henschel P., Coad L., Burton C., Chataigner B., Dunn A., Macdonald D., Saidu Y. & Hunter L. T. B. 2014. The lion in West Africa is critically endangered. *PLoS ONE* 9(1): e83500.
- IUCN. 2006a. Conservation Strategy for the Lion in West and Central Africa, IUCN, Yaounde, Cameroon. 45 pp.
http://www.catsg.org/fileadmin/filesharing/3.Conservation_Center/3.4.Strategies_Action_Plans/African_lion/IUCN_CatSG_2006_West_and_Central_Africa_Lion_Conservation_Strategy.pdf
- IUCN. 2006b. Conservation Strategy for the Lion in Eastern and Southern Africa. IUCN SSC Cat Specialist Group, 55 pp.

http://www.catsg.org/fileadmin/files/3.Conservation_Center/3.4.Strategies_Action_Plans/African_lion/IUCN_CatSG_2006_East_and_South_Africa_Lion_Conservation_Strategy.pdf

Mohammed A. A., Bauer H., El Faki A. & Sillero-Zubiri C. 2019. Lion and spotted hyaena abundance in Dinder National Park, Sudan. *African Journal of Ecology* 58, 1–3.

Olléova M. & Dogringar S. 2013 Zakouma National Park: Carnivore monitoring programme. African Parks, Ndjaména, Chad.

Omoya E. O., Mudumba E., Buckland S. T., Mulondo P. & Plumtree A. J. 2013. Estimating population sizes of lions *Panthera leo* and spotted hyaenas *Crocuta crocuta* in Uganda's savannah parks, using lure count methods. *Oryx* 43, 394–401.

Tumenta P. N., Croes B., Bertola L. & de longh, H. 2021. Final narrative report of an assessment of lion, prey abundance and human intrusion evidence in Waza National Park, Cameroon.

WCS 2020. Yankari Game Reserve: Annual Report. Unpublished Report from the Wildlife Conservation Society.

Yirga G., Amare S., Gebresenbet F., de longh H., Vos M., Sillero-Zubiri C. & Bauer H. 2021. Lion (*Panthera leo*) ecology and survival in protected areas of Ethiopia. *Mammalian Biology* 101, 791–801.

Appendix B-I – Development of a Conservation Strategy or Action Plan

Tabea Lanz and Urs Breitenmoser, IUCN SSC Cat Specialist Group

For the development of conservation strategies and action plans, the IUCN SSC Cat Specialist Group (Cat SG) follows the IUCN [Guidelines for Species Conservation Planning](#) (IUCN SSC Species Conservation Planning Sub-Committee 2017) and, more specifically, the Strategic Planning Cycle as explained in the Cat SG’s [Cat Conservation Compendium](#) (Breitenmoser et al. 2015), which are both based on the same principles (Fig. B1).

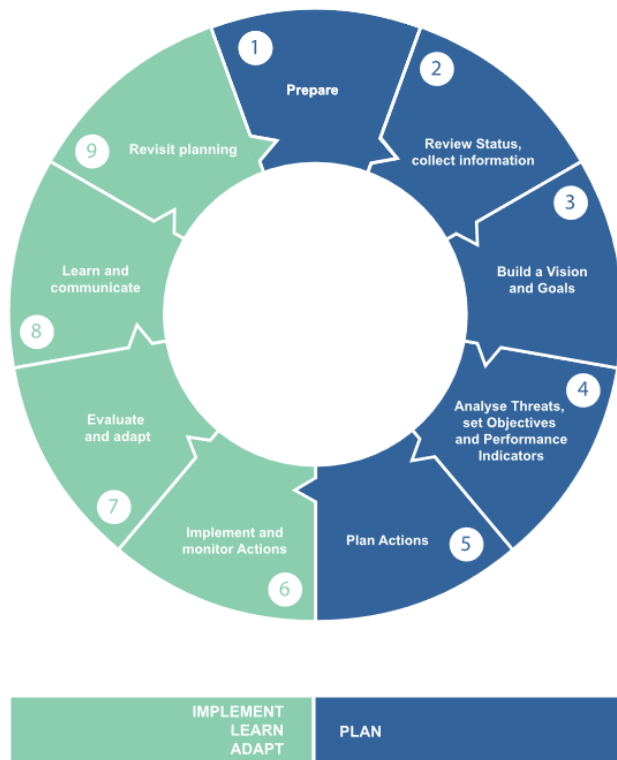


Fig. B1. The SSC Species Planning Conservation Cycle. Species conservation is a cyclical process from the initial decision to intervene for a species (the plan) through its successful and sustainable conservation (implement, learn, adapt). It consists of nine steps. In the planning phase, the scale and scope, and the starting point are defined (steps 1–2), the strategy and action plan are developed (steps 3–5). The next phase deals with the implementation of the plans, the monitoring, evaluation and adaptation of the interventions (steps 6–7), considers learning and communication and the revising the planning (steps 8–9). Source: IUCN SSC Species Conservation Planning Sub-Committee 2017.

In a first step, the taxonomic entity and the geographic scope are defined, the partnership between the key players (experts, responsible governmental institutions and authorities, local people) is built up, and stakeholders identified. In a second step, the conservation status and the state of knowledge of the target (sub)species is assessed by experts from all Range States. This work may be facilitated by online meetings, electronic communication and/or personal meetings. Part of this review is an updated map of the distribution of the species. For widely distributed species, regional status reports instead of one range-wide review may be more practical.

The status report(s) serve(s) to inform the development of the range-wide strategy for the conservation of the (sub)species. The Strategy is created in a participatory, multiple-step approach according to the “Zielorientierte Projekt Planung” (ZOPP) concept, including the status reviews and analyses of threats and results in the development of a logical framework (Fig. B2).

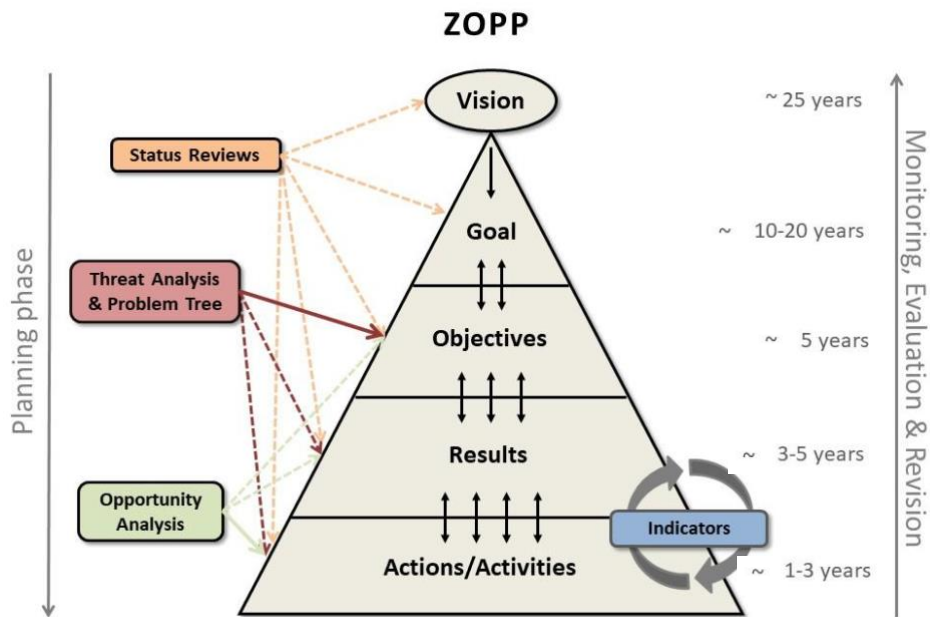


Fig. B2. The ZOPP “Zielorientierte Projektplanung” (goal-oriented project planning) pyramid as a scheme to explain the planning process in a participatory workshop (Breitenmoser et al. 2015).

The strategic planning process of a conservation strategy includes six elements:

1. A **Vision**, a wishful perspective for the next 25–50 years, describing the ideal future scenario for the species. It reflects an optimistic view of the future of the species and is meant to be a source of inspiration;
2. A **Goal**, a materialisation of the Vision. It is a feasible, realistic and measurable long-term aim (10–20 years) for the conservation of the species;
3. A **Threat Analysis** resulting in the **Problem Tree** (Fig. B3), including (direct) **Threats**, **Drivers** and **Constraints** in order to understand, which obstacles and shortcomings are preventing the achievement of the Goal and Vision. Evaluation of Threats faced by the taxon across its range is a crucial component of strategic planning for its conservation. Threats are ranked according to their severity and the available capacity to address them by country/region.
 - **(Direct) Threats** represent the immediate causes of detrimental impacts on a population. Threats are typically the result of human interventions, often linked to one another and tend to have a cumulative effect;
 - **Drivers** of Threats are the root causes of a direct Threat to a population; e.g. poverty is not a threat as such, but certainly encourages many forms of direct threats to wildlife;
 - **Constraints** are factors that do not affect the target subspecies directly or indirectly, but prevent the mitigation of Threats or Drivers. Human population growth, lack of education or political issues are typical constraints;

Based on the Problem Tree and the Threat analysis, general themes are identified (e.g. conservation and sustainable management, human dimensions or policy, legislation and transboundary conservation). These themes are then used to identify conservation **Objectives** and related **Results**.

4. **Objectives** are sub-units of the Goal addressing a specific set of Threats, Drivers and Constraints;

5. **Results** are the concrete achievements or direct outcomes needed to reach an Objective. Results are the direct product of Activities and should be S.M.A.R.T. (Specific, Measurable, Achievable, Relevant and Time-bound);
6. **Activities = Actions** to achieve each Result, including a Timeline, Actor, Approach and Indicator, and a rough Budget. Implementation of Activities/Actions and reaching the Results is the ultimate goal of the strategic planning process. Actions can be prioritised per country/region (Breitenmoser et al. 2015, IUCN – SSC Species Conservation Planning Sub-Committee 2017).

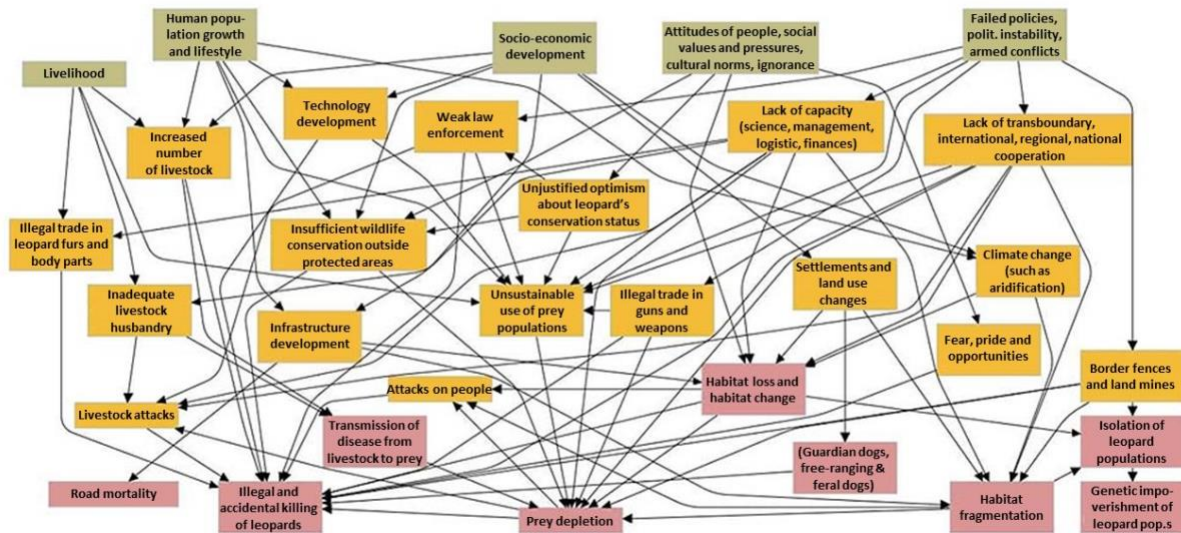


Fig. B3. Example of a Problem Tree as developed for the Range-wide strategy for the conservation of the Persian Leopard (UNEP CMS 2022a). Brown = Constraints, orange = Drivers, and red = Threats.

The Strategy is finally summarised in a Logical Framework (LogFrame) matrix, providing a short, tabulated overview of the elements facilitating the monitoring and evaluation of the implementation of the Conservation Strategy (Fig. B4).

Result	Activity	Actor	Indicator	Timeline	Cost (USD)	CAMI POW	Priority ¹
Theme 1: Conservation and sustainable management of the Persian Leopard and key wild prey species.							
Objective 1: To increase the viability of the Persian Leopard and key wild prey populations across the range and ensure their recovery in priority areas².							
Result 1.1 Priority areas including cross border habitats are identified, properly managed and protected to secure the existence of viable populations, safe movements and residence of Persian Leopard individuals by 2028 (see Results 5.1 & 5.2).	Activity 1.1.1.a Review recent information and available data on: climate change predictions, habitat and Persian Leopard occurrence in the Range States, including historical data in local languages and identify priority areas, research and conservation needs to secure viable Persian Leopard populations in these priority areas.	NGOs, research and GOs, invited experts and local/regional stakeholders	Report and map of priority Persian Leopard habitats is compiled	2025	10,000 per country	1.3, 19.2, 19.5	3
	Activity 1.1.1.b Based on the climate change predictions and the gathered habitat and occurrence information, conduct a species climate vulnerability assessment and include the resulting climate change considerations in all activities, where necessary.	NGOs, research and GOs, invited experts and local/regional stakeholders	Species Vulnerability Assessment report, including predictive maps and changes in Persian Leopard habitat is compiled	2025	TBD		3

Fig. B4. Example of a LogFrame as developed for the Range-wide strategy for the conservation of the Persian Leopard (UNEP CMS 2022b).

For the practical implementation of the Conservation Strategy, Regional or National Action Plans should be developed to concretise the conservation measures according to national needs and prerequisites. Subsequently, the Conservation Strategy and the Action Plans will be implemented. This generally requires a Work Plan or Implementation Plan that defines the activities much more in

detail and serves as a control tool during the work of the team and the wider partnership. Furthermore, progress and achievement are strictly monitored,

Rigorous planning takes some time and effort, but it will allow saving time and funding during the implementation. Generally, not all information needed is available for sensible planning at the beginning of such a process. Therefore, conservation programmes need to be organised as adaptive processes, allowing adjustments to new developments and insights as they come up. Consequently, the implementation of conservation activities needs to be monitored and progress regularly evaluated, what requires a related Monitoring Plan. This plan focuses on the achievement of the S.M.A.R.T. Results and the difficulties when implementing Activities. Regular monitoring or progress report help to correct errors at short notice and so guarantee effective conservation. According to the findings of the evaluation, the plans may have to be revised.

References

- Breitenmoser U., Lanz T., Vogt K. & Breitenmoser-Würsten C. 2015. How to save the cat - Cat Conservation Compendium, a practical guideline for strategic and project planning in cat conservation. Cat News Special Issue 9, 36 pp.
- IUCN SSC Species Conservation Planning Sub-Committee (2017) Guidelines for Species Conservation Planning. Version 1.0. Gland, Switzerland: IUCN. xiv + 114 pp.
- UNEP (UN Environment Programme) & CMS (Convention on the Conservation of Migratory Species of Wild Animals) 2022a. Background information on the development of a draft Range-wide Conservation Strategy for the Persian Leopard. First Range State Meeting for the Persian Leopard. Tbilisi, Georgia, 20–22 September 2022. UNEP/CMS/PL-RS1/Inf.1/Rev.1. 33 pp.
- UNEP (UN Environment Programme) & CMS (Convention on the Conservation of Migratory Species of Wild Animals) 2022b. Range-wide Strategy for the Conservation of the Persian Leopard. First Range State Meeting for the Persian Leopard. Tbilisi, Georgia, 20–22 September 2022. UNEP/CMS/PL-RS1/Outcome. 22 pp.

Appendix B-II – Objectives from the ACI POW

The [Programme of Work of the Joint CITES-CMS African Carnivores Initiative](#) lists the following eleven Objectives for all four species considered in the initiative:

Objective 1: International cooperation, coordination and strategic conservation planning

To strengthen the cooperation and coordination between ACI Range State Parties and the global community for the conservation of the ACI species through the development and timely implementation of the ACI POW, which will regularly be reviewed and amended as needed.

Objective 2: Land use planning and habitat conservation/restoration

To conserve and, where needed and possible, restore the habitats of the ACI species and their prey across Africa, and secure the connectivity between populations by promoting ecological corridors, transboundary protected areas and other best practice land uses, and by minimising adverse effects of land use and development leading to habitat destruction and fragmentation, or impoverished biodiversity.

Objective 3: Prey base conservation and restoration

To maintain and enhance healthy populations of wild prey of the ACI species through effective conservation, habitat protection and sustainable management.

Objective 4: ACI species conservation and restoration

To restore, wherever possible and desired, viable populations of Lion, Leopard, Cheetah or African Wild Dog.

Objective 5: Conflict and coexistence

To promote coexistence of local communities with the ACI species through understanding and mitigating human-carnivore conflicts by co-management, and by providing socio-economic benefits and improved livelihoods to communities living with these carnivores.

Objective 6: Sustainable use and management

To ensure that any use and management of the ACI species and their prey (be it for consumptive or non-consumptive purposes) is non-detrimental and enhances their conservation and their value for people and the environment.

Objective 7: Illegal trade and illegal or incidental killing

To minimise illegal or incidental killing of the ACI species and their prey, and to minimise illegal trade and use at local, national and global levels.

Objective 8: Infectious and zoonotic diseases

To minimise the impact of infectious disease threats, including zoonoses, to populations of wildlife, including the ACI species, by supporting measures that protect human, wildlife, and domestic animal health.

Objective 9: Policies and legislation

To support appropriate global, regional and national policies and legal frameworks for the long-term conservation of the ACI species, their prey and their living space and, where necessary, generate

incentives for enhanced political commitment, for local community support, and for stronger international support for the conservation of African wildlife and natural habitats.

Objective 10: Capacity and awareness

To develop and strengthen human resources and capacity of ACI Range State Parties to conserve, sustainably manage and monitor populations and habitats of the ACI species, and increase local, national and global awareness for the conservation of these species in collaboration with stakeholders, institutions, and the people and communities at the local, national and international level.

Objective 11: Knowledge and information

To continually increase the knowledge base on the conservation status of, threats to, and effective management tools for the ACI species and their most important prey species by promoting the development of appropriate methods, coordinated data collection and analyses to enable adaptive conservation and management, and facilitate communication and information sharing among ACI Range State Parties and between the ACI Range State Parties and the local, national and international communities.