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Panthera leo, Lion

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THE IUCN RED LIST OF THREATENED SPECIES™

Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Scientific Name: Panthera leo (Linnaeus, 1758)

Synonym(s):

• Felis leo Linnaeus, 1758

Regional Assessments:

• Mediterranean

Infra-specific Taxa Assessed:

- Panthera leo Asiatic subpopulation
- Panthera leo West Africa subpopulation

Common Name(s):

 English: 	Lion, African Lion
• French:	Lion
 Spanish; Castilian: 	León
 Afrikaans: 	Leeu
 Amharic: 	Ambessa
 Chichewa; Chewa; 	Mkango
Nyanja:	
 Portuguese: 	Leao
• Shona:	Shumba
 Sotho, Southern: 	Tau
• Swahili:	Simba
• Tswana:	Tau
• Venda:	Ndau
• Xhosa:	iNgwenyama

Taxonomic Source(s):

Kitchener, A.C., Breitenmoser-Würsten, C., Eizirik, E., Gentry, A., Werdelin, L., Wilting, A., Yamaguchi, N., Abramov, A.V., Christiansen, P., Driscoll, C., Duckworth, J.W., Johnson, W., Luo, S.-J., Meijaard, E., O'Donoghue, P., Sanderson, J., Seymour, K., Bruford, M., Groves, C., Hoffman, M., Nowell, K., Timmons, Z. and Tobe, S. 2017. A revised taxonomy of the Felidae. The final report of the Cat Classification Task Force of the IUCN/SSC Cat Specialist Group. *Cat News Special Issue* 11.

Taxonomic Notes:

Taxonomy currently used by the IUCN SSC Cat Specialist Group (see Kitchener et al. 2017):

Panthera leo leo—Central Africa, West Africa and Asia Panthera leo melanochaita—Southern and East Africa

Lions were previously described as two subspecies: the African Lion (*Panthera leo leo*) and the Asiatic Lion (*Panthera leo persica*). However, this has subsequently changed.

Recent studies (Bertola *et al.* 2015, 2016, 2022) indicate that lions in Western and Central Africa are more closely related to lions found in India than they are to those found in Southern and East Africa. This is likely the result of lions being reduced to local refugia during the more recent part of the Pleistocene climatic cycles (Bertola *et al.* 2011, 2016). Divergence times estimated from genetic data match large-scale changes in habitat, including expansion and contraction of forested areas, possibly reducing connectivity and isolating Lion subpopulations (Bertola *et al.* 2016). This temporary isolation may have led to divergence of subpopulations, which can still be observed today. Historical connectivity between Lion subpopulations in West or Central African and subpopulations in India explain the close evolutionary relationships between these subpopulations, even though a series of bottlenecks have led the Indian subpopulation to differentiate quickly as a result of increased genetic drift (Bertola *et al.* 2015, 2016). Based on recent genetic studies, the two subspecies of lions overlap in a contact zone in Ethiopia which possibly extends into Sudan and South Sudan (Bertola *et al.* 2015, 2016, 2021, 2022).

Assessment Information

Red List Category & Criteria:	Vulnerable A2abcd <u>ver 3.1</u>
Year Published:	2023
Date Assessed:	February 1, 2023

Justification:

The Lion is assessed as Vulnerable under criterion A2abcd based on an estimated 36% decline in the species' range over three generations (approximately 21 years) and therefore a similar population reduction is suspected.

Despite the Lion being well-studied, uncertainty remains a challenge in assessing this species (refer to the section on this topic under Population below for more detail). In recent years, considerable conservation effort has led to stable Lion populations in some areas and even species recovery in others (e.g., reintroductions into the Zambezi Delta in Mozambique, Akagera in Rwanda, and Zakouma National Park in Chad). However, over the last 21 years, declines in certain populations have also occurred (e.g., Limpopo National Park, Etosha National Park, and Niassa Game Reserve) with some areas experiencing local extinctions (e.g., Quirimbus National Park in Mozambique, Yankari Game Reserve in Nigeria (P. Funston pers. comm. 2023) and Toro-Semuliki Wildlife Reserve in Uganda). The present assessment is guided by the best available data and methods. Uncertainty is a common problem in the assessment of long-lived species where trends are assessed over a time span that either includes historical periods where some survey techniques were not yet available, or future periods that are inherently unpredictable.

Extant Lion range in 2023 is estimated to be 1,566,529.59 km², only 7.4% of its historical range. This is an estimated 36% range decline since 2002 (three Lion generations), where range was estimated to be 2,460,986 km². This decline, which is likely to continue, reflects a combination of recent known and inferred decline, as well as improved knowledge.

A population of ~23,000 adult and subadult lions in Africa (African Lion Database, unpub. data 2023) and ~670 adult and subadult lions in India (Gujarat Forest Department 2020) was estimated for this

assessment. This is an estimated decline from ~33,000 lions in 2006 (IUCN 2006 a, b), an estimated 30% decline in 17 years (i.e., less than three generations). The former figure shares a common background with Bauer *et al.* (2018), and the latter informed estimate in 2013 (Riggio *et al.* 2013) show that these numbers are similar but with different reference years. These numbers all have extensive caveats, enormous uncertainty, and were partly based on differing methodologies; they cannot be used for a direct calculation of population trends, but they are consistent with the estimated range decline of 36%. Riggio *et al.* (2013) showed that declines in savanna habitat translate into declines in Lion numbers. Lindsey *et al.* (2017) showed that Lion densities vary substantially across their range, and that lions occur at levels below 50% of carrying capacity in two thirds of the sites they analysed. However, these sites were spread all over the African continent, and the range decline is also across the continent, so we have no reason to reject Lion range declines equate proportionately to Lion population declines, and that range is an appropriate measure for our assessment. Therefore, this suspected decline of 36% in population is justified.

The previous Red List Assessment (Bauer *et al.* 2015) used a representative subset of estimates to infer a global population decline of 43%, albeit with regional variation. That same dataset was used in the same year with the same result, but with a much-improved methodology that involved Bayesian modelling to predict the probability of population decline (Bauer *et al.* 2015). This assessment used the same improved methodology to demonstrate the plausibility of our assessment (see the Population section for more details). In summary, using Bayesian modelling, we estimated Lion populations in Africa to have a 41% probability of declining by one third (33%) within three Lion generations (including past, present, and future), while this risk is estimated at 2% in India (Table 1 in the Supplementary Information). This supports a \geq 30% reduction threshold for a Vulnerable listing for Lion. The probability of a 33% decline within three generations is estimated to be 74% in West Africa, 36% in East Africa, 33% in Central Africa, and 20% in Southern Africa (Table 1 in the Supplementary Information). However, while it demonstrates strong support for a Vulnerable listing, it cannot be used as a formal method to which we assess the species as this method is not fully consistent with the IUCN Red List Guidelines.

There are high threat levels across the species' broad geographic range, with 12 recent extirpations and two suspected extirpations recorded (Table 2). However, it is encouraging to note that the number of extirpations has not increased since the previous (2015) assessment. The most important driver of Lion decline is habitat loss (Bauer et al. 2020). Prey base depletion is also a significant driver and is partly linked to habitat loss, but more importantly to poaching and the bushmeat trade (Becker et al. 2013). Human-Lion conflict, which results in the indiscriminate killing of lions in defence of human life and livestock, is another major threat to the species (Sibanda et al. 2021). The trade in bones and other body parts for traditional medicine, both within Africa and in Asia (Williams et al. 2017, Mole and Newton 2020, Coals et al. 2022) is an emerging threat. Furthermore, although trophy hunting can contribute positively to Lion conservation, improvements in management practices of this practice have been recommended (Edwards et al. 2014, Dickman et al. 2019), as when poorly regulated, it also contributes to population declines (Packer et al. 2009, Croes et al. 2011, Rosenblatt et al. 2014, Loveridge et al. 2023). Poorly regulated trophy hunting has been previously highlighted as a threat to lions, however, attempts have been made to mitigate through the implementation of science-based management practices. Populations that are trophy hunted should be effectively monitored to ensure that there are no negative population impacts. The impact of violent extremism in several parts of Lion ranges in Africa (Lhoest et al. 2022) is likely to further drive the declining nature of lions in these regions. The increasing number of lions poached for their body parts in Mozambique (African Lion Database, unpub. data 2023; Mole and Newton 2020) is of concern, but this presently appears to be confined to this region (Coals *et al.* 2020), however, illegal trade is reported in at least six African countries (see CITES CoP 17 Prop. 4).

Given the evidence of ongoing and increasing threats to lions across much of their fragmented range, we recommend that the Lion is a species under observation and its threat status is closely monitored, with a reassessment after a minimum three-year period or as soon as new information emerges.

This decline in both population and range, which is likely to continue, reflects a combination of recent known and inferred decline, as well as improved knowledge. This meets the requirements for listing as Vulnerable (A2abcd).

For further information about this species, see Supplementary Material.

Previously Published Red List Assessments

2016 – Vulnerable (VU) 2016 – Vulnerable (VU) 2015 – Vulnerable (VU) 2015 – Vulnerable (VU) 2012 – Vulnerable (VU) 2008 – Vulnerable (VU) 2004 – Vulnerable (VU) 2002 – Vulnerable (VU)

Geographic Range

Range Description:

Lions are the carnivores that have undergone the largest range contraction, with about 85% of Lion range lost since CE 1500 (Morrison *et al.* 2007). Outside sub-Saharan Africa, the Lion formerly ranged from North Africa through Southwest Asia (where it disappeared from most countries within the last 150 years), west into Europe (where it became extinct almost 2,000 years ago), and east into India (Nowell and Jackson 1996). Today, the only remainder of this once widespread northern population is a single isolated subpopulation in the 1,400 km² Gir Forest National Park and Wildlife Sanctuary and the surrounding landscape in India. Lions are extinct in North Africa, having perhaps survived in the High Atlas Mountains up to the 1940s (Nowell and Jackson 1996, West and Packer 2013).

Lion distribution was assessed using the Lion distribution map created and maintained by the IUCN SSC Cat Specialist Group's African Lion Database (ALD). The ALD is used to provide a continually updated assessment of the abundance and distribution of lions in Africa. Based on the data in the ALD, regional

maps were generated, and adjustments made based on feedback from country experts. Where new data were lacking, the 2015 Red List Assessment and the IUCN Cat Specialist Group's Guidelines for the Conservation of lions in Africa (IUCN SSC Cat Specialist Group 2018) were used as both have been through a peer-review process. Repeated observation data from areas previously considered as out-ofrange were obtained. These areas do not necessarily indicate range expansion since the last assessment, but rather more accurate data. Such areas include: Luando area in Angola (J. Anderson pers. comm. 2019), the Mpem and Djem area in Cameroon (Bauer et al. 2019), the northern boundary of Central Kalahari Game Reserve in Botswana (A. Loveridge pers. comm. 2022), additional wildlife management areas in the Okavango (A. Stein pers. comm. 2022; A. Albertson pers. comm. 2019), Southern National Park in South Sudan (M. Moeller pers. comm. 2022), Zeraf area in South Sudan (R. Gony pers. comm. 2023), Erindi Private Game Reserve in Namibia; (Erindi PGR, unpub. data 2020), various hunting concessions in Mozambique (e.g., in Tete Province; R. Lovemore pers. comm. 2022; Rio Save Safaris Lda, unpub. data 2022) and Chad (African Parks, unpub. data. 2022) and several game reserves in South Africa (SANBI, unpub. data. 2022). However, some areas do reflect an increase in range due to the successful reintroductions of lions into fenced areas (e.g., fenced reserves in South Africa, Liwonde and Majete in Malawi, Akagera in Rwanda).

Several amendments were made to this assessment's distribution map that were not accurately captured in the previous assessment. These are as follows:

- The Benoué Complex in Cameroon was previously incorrectly mapped. This has been corrected to include the surrounding concessions that are included in the complex and are known Lion range.
- Bubye Valley Conservancy in Zimbabwe was previously incorrectly mapped (in terms of size and location) and this has been corrected.
- An expansive range in the Northern Cape Province in South Africa was removed as it was depicted as Lion range, but was inaccurate as no known Lion population has existed there.
- Coutada 9 in Mozambique was included as it was previously not mapped.
- Revision of range in Ethiopia following Yirga et al. (2021) and Gebretensae and Kebede (2022).

Furthermore, some of the mapped subpopulations are in areas where armed conflict may have had an impact on Lion persistence (e.g., Central African Republic and South Sudan). Until proof to the contrary and based on the lack of recent data to confirm Lion presence, we therefore classified such areas as "Possibly Extinct" but maintained Protected Areas as Lion range (including many large hunting concessions, such as in the Central African Republic). Some of the areas currently mapped as "Possibly Extinct" could contain relict Lion subpopulations and should be prioritized for field surveys (e.g., large areas in South Sudan, Central African Republic, and Somalia) aimed at establishing Lion status.

Finally, to account for recent loss of habitat in areas where data are lacking, continental Lion range was overlaid with a cropland layer obtained from the ESA WorldCover V2 2021 product (https://esa-worldcover.org/en). Areas of at least 100 km² of continuous range that consisted of over 50% cropland were reclassified from "Extant" to "Possibly Extinct", as it is unlikely that such areas still sustain resident Lion populations.

Lions are difficult to survey, and knowledge of Lion numbers and distribution is limited. Therefore, Lion researchers have worked with two metrics: known or extant Lion range, where Lion presence has been confirmed, and possible or possibly extant Lion range, where Lion presence is suspected. Lions were

once widely distributed across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range. In Supporting Online Information Table 3 we present the range figures from 2002, 2005, 2016, and 2023. We estimate extant Lion range in 2023 to be 1,566,529.59 km², or 7.4% of historical range. This is a 33% decline from 2005, and a decline of 36% over three Lion generations. This range reduction reflects a combination of recent known and inferred decline, as well as improved knowledge.

In West Africa, lions are largely confined to small populations (<50 individuals) in Niokolo-Koba (Senegal), and Yankari and Kainji Lake National Parks (Nigeria) with the largest population (estimated 187 lions) in the W-Arly-Penjari Complex (Benin, Burkina Faso, and Niger). In Central Africa, lions are found within the Bénoué Complex and Waza National Park in Cameroon. Dispersed individuals have been found south of Bénoué, around Mpem and Djem National Park, and in Sena Oura National Park in Chad. Zakouma National Park and the surrounding areas have the largest population of lions in Chad. There is more uncertainty around the exact presence of lions in both the Central African Republic and South Sudan. In the Central African Republic, they are found in some of the national parks, including Bamingui-Bangoran National Park, Andre Felix National Park, Yata-Ngaya Faunal Reserve, and the Chinko Conservation Area (CCA). The latter is believed to have the largest population, estimated at ~150 lions (T. Aebischer pers. comm. 2023). Based on conservation projects in the area, it can be assumed that the CCA is the only place in eastern Central African Republic where the Northern Lion population is increasing, in all other areas it is likely stable or more likely decreasing, locally even dramatically (T. Aebischer pers. comm. 2023). In South Sudan there are small populations throughout the country confirmed in Southern National Park, Badingilo National Park, Zaref Game Reserve, and Boma National Park. In the Democratic Republic of the Congo, there are two populations, one in Garamba National Park and the surrounding hunting complex (and extending into Lantoto in South Sudan) and Virunga National Park.

In East Africa, lions are found in several areas in Ethiopia—although there is considerable uncertainty regarding their extent. Populations of lions occur in Uganda (including Queen Elizabeth National Park, Murchison National Park and Kidepo Valley). In Rwanda, one small, reintroduced population (<50 individuals) is found in Akagera National Park. Lions have significantly larger distributions in both Kenya and Tanzania, where they are found in most National Parks, protected areas, and hunting concessions. However, range in Tanzania has been reduced due to the increasing conversion of habitat into agricultural land. Field surveys for many areas of Tanzania are also still lacking. In Somalia there have been some reports of Lion presence, but there is no tangible evidence to support this, thus this range is assigned to the uncertain category.

In Southern Africa, lions occur in multiple fenced reserves in Malawi, where they have been reintroduced (each population <50 lions). In Zambia, lions are found in Kafue, Liuwa Plains National Park, Sioma Ngwezi National Park and within the South Luangwa Valley. Lions are believed to have been recently extirpated from Northern Zambia. Within Namibia, lions are found in Etosha National Park, up the Skeleton Coast, and the Kunene and Caprivi regions. South Africa's largest Lion populations are in the Transfrontier parks of Kruger and Kalahari Gemsbok National Park, as well as a large managed metapopulation network of fenced reserves. In Botswana, they are found in the Central Kalahari and the Okavango-Delta region. The largest population in Zimbabwe occurs in the Hwange ecosystem. In addition, lions also occur in Gonarezhou National Park and the surrounding areas (including Savé Valley Conservancy and in Bubye Valley Conservancy, a large fenced protected area). Lions also occur in

northern Zimbabwe in the Zambezi Valley protected area complex bordering Zambia and protected areas south of Lake Kariba. In Mozambique, lions have been extirpated from much of their range (including Quirimbus National Park and the Tete Province). The largest population (>800 lions) within the country occurs in Niassa Reserve. In addition, lions occur in the Zambezi Delta, extending north towards Coutada 9, Limpopo National Park, Lebombo Conservancy, Zinave National Park, and a restricted area south of the Tete Province.

The global population of lions is highly fragmented (Loveridge *et al.* 2022). This is especially true in West Africa were the seven subpopulations (Niokola-Koba, WAP, Yankari Game Reserve, Kainji Lake, Waza National Park, Benoué Complex and Mpem and Djem) are all considered to be isolated from one another. In Central and East Africa, various populations are also fragmented.

Country Occurrence:

Native, Extant (resident): Benin; Botswana; Burkina Faso; Cameroon; Central African Republic; Chad; Congo, The Democratic Republic of the; Ethiopia; India; Kenya; Mozambique; Namibia; Niger; Nigeria; Senegal; Somalia; South Africa; South Sudan; Sudan; Tanzania, United Republic of; Uganda; Zambia; Zimbabwe

Native, Possibly Extant (resident): Gabon

Native, Possibly Extinct: Côte d'Ivoire; Ghana; Guinea; Guinea-Bissau; Mali; Togo

Native, Extinct: Afghanistan; Algeria; Burundi; Congo; Djibouti; Egypt; Eritrea; Eswatini; Gambia; Iran, Islamic Republic of; Iraq; Israel; Jordan; Kuwait; Lebanon; Lesotho; Libya; Mauritania; Morocco; Pakistan; Saudi Arabia; Sierra Leone; Syrian Arab Republic; Tunisia; Türkiye; Western Sahara

Extant & Reintroduced (resident): Malawi; Rwanda

Distribution Map



Legend

RED



Compiled by: African Lion Database. Unpublished Data 2023



The boundaries and names shown and the designations used on this map do no imply any official endorsement, acceptance or opinion by IUCN.

Population

Abundance

For this assessment, we do not aim to provide a new estimate of total Lion numbers. Determining a population number for lions is incredibly challenging as most populations have yet to be surveyed and population numbers that may exist are based on guesses or extrapolations. In addition, some surveys are outdated. For this assessment, to determine a global population number, we used the latest population estimates published in the Guidelines for the Conservation of Lions in Africa (GCLA, Bauer *et al.* 2018), and where possible, updated those figures from the IUCN SSC Cat Specialist Group's African Lion Database (ALD) where more recent surveys have been completed. Caution must be exercised when using these figures and inferring trends based on these data presented in the GCLA due to various data limitations. Considering the difficulty in interpreting Lion numbers. Though our knowledge of the Lion distribution has improved with time, it is still limited at the national, regional, and range-wide scales because reliable data on Lion population trends are missing from large portions of their range, particularly those in West and Central Africa.

The estimate Lion population size in Africa is ~23,000 including subadult and adult lions (Bauer *et al.*, 2018, African Lion Database, unpub. data 2023; Supplementary Information Table 4) and ~670 subadult and adult lions in India (Gujarat Forest Department 2020). The largest proportion of Africa's lions are found in Southern Africa 47.55%, with 46.54% in East Africa, 4.82% Central African and 1.07% in West Africa. Between 2006 and 2018, the Lion population in Africa was estimated to have declined by 25% over 12 years from 33,292 to 25,105 (Bauer *et al.* 2018). In this assessment we estimate a decline of 8% from ~25,105 in 2018 to ~23,000 in 2023. Although in the past decade, Lion populations seem to be increasing in many of their Southern African ranges, there are indications of a general population decline across its total range with the biggest assumed declines in West and Central Africa.

Several subpopulations have been stable, among them the only remaining subpopulation in Asia (surviving in the Gir Forest area of Gujarat, India) and several subpopulations in Southern Africa—especially those in fenced, well-protected reserves. Subpopulations appear to be stable where management is sufficiently funded with fencing being one of several effective conservation management techniques (Packer *et al.* 2013, Lindsey *et al.* 2018, di Minin *et al.* 2021). However, many Lion subpopulations occur in areas where management budgets insufficient (Lindsey *et al.* 2018, Robson *et al.* 2022), leading to local declines and even extinction (e.g., West Africa; Henschel *et al.* 2014). Little is known about Lion subpopulations in Angola, Central African Republic, Democratic Republic of the Congo, Nigeria, Somalia, and South Sudan, but these are assumed to be declining based on the limited data available from these areas and the conservation challenges in these areas (e.g., political instability).

While lions qualify as Vulnerable, it is of great concern that parts of the African population is inferred to have declined at a rate that meets the category for Endangered – particularly in West Africa. Since the sample subpopulations were all monitored, an even greater average rate of decline is likely for unmonitored subpopulations across much of Africa, since lack of monitoring could suggest lack of conservation and mitigation effort.

Bayesian Modelling

A Bayesian state space model to estimate the growth rate- λ of each subpopulation was completed

following the methods in Bauer *et al.* (2015). While this model demonstrates strong support for a Vulnerable listing, it cannot be used as a formal method to which we assess the species as this method is not fully consistent with the IUCN Red List Guidelines.

Data from relatively well-studied Lion subpopulations were used with additional unpublished data provided by contributors (Supplementary Information Table 4). Population estimates were obtained by commonly used scientific research methods including total counts, individual identification, total or sample inventory using calling stations, radio telemetry, photographic databases, and density estimates based on direct observations (Supplementary Information Table 5 and 6). Population estimates were excluded for sites based on extrapolation of densities from other areas, or informed estimates by researchers. The minimum number of surveys per site over the assessment period was two, but some sites were monitored more regularly.

The IUCN Red List Criteria define three generations (or ten years, whatever is longer) as the relevant time span for trend assessment. A Lion generation length of 6.98 years (three generations = 21 years) was used for the modelling (Pacifici *et al.* 2013). Subpopulations were first categorized individually and then according to region. The mean of the regional values was used to determine a continental result for Africa and India (Supplementary Information Table 1 and 6). However, because the two continental results were significantly different, their mean could not be used to estimate a global probability of population trend.

To assess population trends a Bayesian hierarchical state space model was used to estimate the growth rate- λ of each population (Bauer *et al.* 2015). Fifty-six unweighted posterior density distributions of growth rate (one per population) were summed across three sets to provide geographic conservation-relevant estimates of demographic trends. The four African regions defined by the IUCN regional Lion conservation strategies constituted four sets (Bauer *et al.* 2015). The projected probability of decline over T years by 33% and 50% (see supplementary material for formulas and Bauer *et al.* 2015) for each population was estimated (Supplementary Information Tables 1 and 2) without making inferences on true population size N, with T equal to 7 (one generation), 14 (two generations) and 21 years (three generations).

The summed posterior densities of growth rates for regional groups showed that, the West African populations were sharply declining $\lambda = 0.87 \pm 0.25$ (Supplementary Figure S1), Central African populations were slightly increasing $\lambda = 1.02 \pm 0.18$ (Supplementary Figure S2) while East African populations were stable $\lambda = 1 \pm 0.15$ (Supplementary Figure S3). Southern African populations were by contrast, increasing $\lambda = 1.07 \pm 0.17$ (Supplementary Figure S4).

The models estimated that the West African group had the highest probability of declining by one third in three lion generations of 0.74, followed by the Central African group (0.33), the East African group (0.36) and the Southern African group (0.20; Supporting Information Table 1). At a continental African level, the Lion population has a 41% probability of declining by 33% (one third) within three Lion generations, while we estimate that probability to be 2% in India.

Models estimate the probability of meeting the thresholds for lower or higher categories (Near Threatened or Endangered) is lower than 41% and thus lions do not qualify for these categories. The threshold for Endangered under Criterion A is a 50% population size decline over three generations. The

probability of such a decline is estimated to be 72% in West Africa, 29% in Central Africa, 30% in East Africa, 17% in Southern Africa and 2% in India (Table 1). Therefore, only West Africa would qualify as Endangered. The Lion subpopulation in West Africa has been classified as Regionally Critically Endangered under criterion C2a(ii) in 2014 (Henschel *et al.* 2014), which is supported in the current analysis. It is vital that more Lion areas are surveyed rigorously, and that urgent conservation priority should be placed on West Africa. Based on our analysis, lions qualify as Vulnerable, but it is of great concern that parts of the African population is inferred to have declined at a rate that meets the category of Endangered. Since the sample subpopulations were all monitored, an even greater average rate of decline is likely for unmonitored subpopulations across much of Africa, since lack of monitoring could suggest lack of conservation effort. Finally, trends inferred are from a small proportion of Lion populations, given so few populations are subject to regular surveys; there is therefore a chance that they may not be representative of most populations, for which data is lacking (see Figure S6 in the Supplementary Information).

Approach to uncertainty and data limitations

Due to insufficient confidence in earlier or recent species population estimates, they cannot be employed to estimate overall, real-time trends, as such, groupings of scientific time series site estimates have been used as a proxy. Although these data are more numerous for lions than for other big *Panthera* cats, there is still considerable uncertainty inherent in both the data (Bauer *et al.* 2015) and the treatment of it to estimate species population trend.

The difficulties in comparing survey data are recognized. In some cases, survey methods varied between years, and for some surveys accuracy may have been low, but the complete data set shows an obvious trend that is unlikely to be an artefact of methodological insufficiencies. There is inherent bias when using survey data as these often come from well-monitored areas with some element of protection and limited anthropogenic threat pressure (Packer et al. 2013, Bauer et al. 2015). This could bias overall results to a more optimistic state as declining populations do not necessarily have supporting data due to limited monitoring on the ground (See Figure S6 in Supplementary information). For example, the data available for the Burkina Faso component of the W-Arly-Penjari Complex indicates a steady, but slow, increase in population size between 2012 and 2015. However, due to the recent and ongoing violent extremist presence in the area (Lhoest et al. 2022), protected area management is no longer present - offering little protection to species. This is very likely to have resulted in population declines of all wildlife, including lions (as explained in the Threat Section below). However, due to the simple fact that conducting rigorous surveys on the ground is near impossible, population data to support the wellbased assumption that this subpopulation is declining are not available. As a result, it is assumed that a more optimistic view on regional trends is presented here (Bauer et al. 2015). Robust and regular surveys must be carried out in future that promote more reliable assessments of trends.

Fenced Reserves

Another aspect of the assessment that needs to be documented is our treatment of small, fenced reserves in Southern Africa (specifically South Africa, Zimbabwe, and Malawi). Most of the population increases have occurred in these areas where management practices include translocations and reintroductions. It must be noted that South African Reserves that have a contracepted population have not been included in our estimates. In South Africa, there are 50 small, fenced reserves that are represented as one subpopulation that we refer to as South Africa's Managed Metapopulation (J. Selier pers. comm. 2022). Such management decisions should consider the 'type, scale, frequency, and effects

of the suite of management interventions' and could be taxon specific (Hayward *et al.* 2015). Management of lions in the concerned areas aims to mimic natural processes and to retain adaptive potential and follows a nationally coordinated meta-population management approach (Mallon and Stanley Price 2013, Hayward *et al.* 2015). It is further recognized that fences have been documented as effective tools in Lion conservation (Packer *et al.* 2013). Thus, these populations are 'lightly managed' as defined in the IUCN Red List Guidelines (IUCN Standards and Petitions Committee 2022) and that they can therefore be considered "wild" and are therefore included in the assessment.

For further information about this species, see Supplementary Material.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

The African Lion has a broad habitat tolerance, absent only from tropical rainforest and the interior of the Sahara Desert (Nowell and Jackson 1996). There are records of Lion at elevations of more than 4,000 m asl in the Bale Mountains in Ethiopia and on Mount Kilimanjaro in Tanzania; (West and Packer 2013). Although lions drink regularly when water is available, they can obtain their moisture requirements from prey and even plants (such as the Tsama Melon in the Kalahari Desert), and thus can survive in very arid environments.

Lions are the most social of the cats, with related females remaining together in prides, and related and unrelated males forming coalitions competing for tenure over prides. Prides can vary in size and up to 30 individuals have been observed in larger ecosystems, although the average pride size (including males and females) is four to six adults (Smuts 1976). In the Kgalagadi Transfrontier Park (South Africa/Botswana) it was found that the average pride size was 11.3 ± 1.1 individuals for prides in the park; similar in size to other areas (11.8 individuals in Kruger National Park, 12.5 in Etosha National Park (Funston 2011)).

Lions tend to live at higher densities than most other felids, but with a wide variation from 1.5 adults per 100 km² in southern African semi-desert to 55/100 km² in parts of the Serengeti (Sunquist and Sunquist 2002). Pride ranges can vary widely even in the same region: e.g., from 266–4,532 km² in the Kgalagadi Transfrontier Park of South Africa (Funston 2001). Across regions, Lion home ranges can also vary significantly. For example, Lion home ranges in Tarangire National Park in Tanzania can range between 52–616 km² (Laizer *et al.* 2014). In contrast, in more arid environments such as Etosha National Park, home ranges up to 2,075 km² have been recorded (Stander 1991).

Medium- to large-sized ungulates (including antelopes, zebra, and wildebeest) make up large portions of lion's prey base (Hayward and Kerley 2005), but lions will take almost any animal, from rodents to rhinos. Out of the five preferred prey species in Southern Africa (Hayward *et al.* 2007), three historically never occurred in West and Central Africa and Giraffe are rare in that region, leaving only Buffalo but even that species is notably smaller there. Instead, medium sized species such as Kob (*Kobus kob*) are the preferred prey in West and Central Africa (Bodendorfer *et al.* 2006, Bauer *et al.* 2008, Tumenta *et al.* 2013). Some Lion populations have adapted to specialize in unique prey species within their own environments, such as Elephants (*Loxodonta africana*) in the Chobe (Power and Compion 2009) and in Hwange (Loveridge *et al.* 2006), and Cape Fur Seals (*Artocephalus pusillus*) on the Skeleton Coast in Namibia (Stander 2019). Lions will also scavenge, displacing other predators (such as the Spotted

Hyaena, Crocuta Crocuta, and Cheetah, Acinonyx jubatus) from their kills.

In India, Asiatic lions prefer the most mesic and thick canopy forest vegetation available to them in the dry deciduous forests of Gir (Jhala *et al.* 2009). The Gir National Park and Wildlife Sanctuary is surrounded by cultivated areas and inhabited by the pastoralist Maldharis and their livestock (Meena *et al.* 2014). Domestic cattle have historically been a major part of the Asiatic lion's diet, although the Chital Deer (*Axis axis*) is the most common prey species. Mean pride size, measured by the number of adult females, tends to be smaller than for African lions: most Gir prides range between two and eleven adult females (Jhala *et al.* 2009).

Systems: Terrestrial

Use and Trade

Use of Lion bones and body parts and derivatives for traditional medicine

Illegal trade in Lion body parts for medicinal purposes is considered a threat to African Lion subpopulations (according to the regional Lion conservation strategies, which call on countries to prohibit (IUCN 2006a) and control (IUCN 2006b) trade in Lion bone and other parts and products) as well as to the small subpopulation in India's Gir Forest (M. Ventraman pers. comm. 2014). Traditional medicinal practices in Africa and Asia are perceived to be the main uses that Lion body parts and bones are required (Williams *et al.* 2017). Specific parts such as skin, claws, teeth, and bones are the most in demand parts (Williams *et al.* 2017, African Lion Database, unpub. data 2023). However, other parts such as tails, reproductive parts and internal organs are also harvested (African Lion Database, unpub. data 2023).

While there has historically been some level of illegal trade and use of Lion bones and body parts for traditional medicine, this threat has escalated in recent years and has emerged in several countries within the species range (Williams *et al.* 2017; Everatt *et al.* 2019; Coals *et al.* 2020, 2022). In Mozambique the targeted poaching of lions and suspected poaching incidences are high, accounting for 74% and 48% of anthropogenic Lion mortalities in Niassa and Limpopo National Park respectively, with evidence of domestic, regional, and international trade of Lion parts and derivatives (Everatt *et al.* 2019, Mole and Newton 2020). In South Africa, lions within captive facilities are intentionally killed (generally poisoned) for body parts, presumably to sell to international markets.

The increase in the number of lions killed in Mozambique for their parts is of particular concern (African Lion Database, unpub. data 2023) and may cause the Lion subpopulations within the country to decline. However, there is currently little evidence of this threat being a major concern in other areas across their range.

Threats (see Appendix for additional information)

The main threats to lions include continued habitat loss and conversion of safe space. This has led to several subpopulations becoming small and isolated (Bauer *et al.* 2008, 2020). Other significant threats include indiscriminate killing (primarily due to retaliatory or pre-emptive killing to protect human life and livestock), and prey base depletion (Wolf and Ripple 2016). In recent years the targeted poaching for parts (Everatt *et al.* 2019, African Lion Database, unpub. data 2023) and violent extremism/warfare (Lhoest *et al.* 2022) have emerged as significant threats to the species. Furthermore, while trophy

hunting has a net positive impact in some areas, it may, at times, contributed to local population declines in Botswana, Namibia, Tanzania, Zimbabwe (Packer *et al.* 2009, 2011, 2013), Cameroon (Croes *et al.* 2011) and Zambia (Rosenblatt *et al.* 2014). In general, there seem to be an increasing number of lions poached through snaring and targeted poaching in many areas across the species range (e.g., the Greater Kruger, Zambeze Delta, Niassa Reserve, Waza National Park, and WAP complex (African Lion Database, unpub. data. 2023)).

Conflict

The economic impact of stock raiding can be significant. Patterson *et al.* (2004) estimated that each Lion costs ranchers in Kenya living alongside Tsavo East National Park US\$290 per year in livestock losses. Likewise, annual losses of cattle to lions in areas adjacent to Waza National Park in Cameroon comprised only about 3.1% of all livestock losses but were estimated to represent more than 22% of financial losses, amounting to about US\$370 per owner (Bauer, 2003). Generally, economic losses caused by lions are among some of the highest reported in East Africa when compared to other wildlife species (Muriuki et al. 2017). Consequently, lions are persecuted intensely in livestock areas across Africa; their scavenging behaviour makes them particularly vulnerable to poisoned carcasses put out to eliminate predators. Little actual information exists on the number of lions killed as problem animals by local people, even though this is considered the primary threat to their survival outside protected areas. However, some case studies exist. For example, Hazzah et al. (2014) estimated that on average, 12.5 Lions were killed per year between 2003 and 2008 by residents of Olgulului Group Range in Kenya. Implementation of appropriate livestock management measures, coupled with problem animal control measures and mechanisms for compensating livestock losses, are some of the primary responses to resolving human-Lion conflict (Hazzah et al. 2014). For example, Sibanda et al. (2021) studied Lion conflict in three communal areas in northwestern Zimbabwe (~3,306 km²) and recorded 46 lions killed between 2008 and 2017. Following the implementation of livestock protection strategies, livestock losses generally decreased, and the number of lions killed per year declined by 41 % (Sibanda et al. 2021).

Prey depletion

Prey depletion is generally defined as the substantial decline in prey abundance, and its effect on the survival and reproduction of lions is still fairly under-studied (Vinks *et al.* 2021). Generally, prey depletion reduces an area's carrying capacity, which therefore reduces Lion density without necessarily reducing their survival rates (Vinks *et al.* 2021). Lion population density across the species' range is known to track the biomass of principle Lion prey species; large wild herbivores (Hayward *et al.* 2007, van Orsdol 1984). The latter are increasingly under threat from an unsustainable and increasingly commercialized bushmeat trade, leading to collapses in prey populations across large parts of savanna Africa (Lindsey *et al.* 2013). Regional Lion population trends reported in this assessment, are closely mirrored by time series data on main Lion prey species from 78 herbivore populations monitored between 1970 and 2005 in West, Eastern and Southern Africa; while herbivore population sizes increased by 24% in Southern Africa, they declined by 52% in Eastern Africa and by 85% in West (Ripple *et al.* 2015). It is likely that these declines have been even more dramatic since the publication of this study, although precise data is lacking.

Bycatch in snares

Wire snare poaching is widespread throughout much of the species' range. Snares are generally set in an effort for to capture species for bushmeat, although lions are not commonly targeted. However, lions

are often captured in snares intended for other species (Becker *et al.* 2013, Everatt *et al.* 2015, Bauer *et al.* 2020). This threat has the potential to result in severe population declines of all large carnivores if not mitigated accordingly. For example, Becker *et al.* (2013) found that ~11.5% of the adult and subadult lion population and 20% of the adult (>4 years) males within the population were snared at some point (82% were treated and recovered).

Use of Lion bones and body parts and derivatives for traditional medicine

While there has historically been some level of illegal trade and use of Lion bones and body parts for traditional medicine, this threat has escalated in recent years and has emerged in several countries within the species range (Williams *et al.* 2017, Everatt *et al.* 2019, Coals *et al.* 2022). More information on this threat can be found under the Use and Trade section above.

Trophy hunting

Trophy hunting is carried out in several sub-Saharan African countries and is considered an important management tool for conserving wild land, providing financial resources for Lion conservation for both governments and local communities (Holechek and Valdez 2018). However, there is concern that management regimes have not always been sufficient to deter unsustainable offtakes (Packer *et al.* 2006). A sustainable offtake level of one male Lion per 2,000 km² has been recommended (Packer *et al.* 2011), but offtake has been higher in many areas, which suggests that it is potentially a threat (Lindsey *et al.* 2013b) to continued survival of lions in these areas. Trophy hunting can thus be a tool for conservation but also a threat, depending on how it is regulated and managed (Loveridge *et al.* 2007, 2023; Packer *et al.* 2011). Hunter *et al.* (2013) cautioned that regulatory measures which reduce the profitability of Lion trophy hunting could have widespread negative impacts on wildlife-based land use, anti-poaching, and tolerance of lions outside protected areas.

Violent extremism and warfare

There are often unforeseen and dramatic consequences and severe environmental impacts resulting from violent extremism adjacent to protected areas (Bouley *et al.* 2018, Lhoest *et al.* 2022). Several protected areas (e.g., W-Arly-Pendjari complex, Niassa) within Lion range are under pressure from rebel groups or violent extremist organisations. Unsafe areas resulting from such threats, makes conservation action and protected area management challenging. Protected areas which are occupied by such groups generally lack park management, see increased and unmanaged livestock invasion, suffer habitat loss due to increased crop planting and experience increased bushmeat poaching.

This threat needs to be particularly highlighted in the W-Arly-Pendjari complex (Burkina Faso, Niger and Benin). The W-Arly-Pendjari complex has the last remaining stronghold for lions in West and Central Africa. With the WAP being under severe threat from extremist groups in Niger and Burkina Faso, it places significant threat on this vital remaining population of lions. Supporting this claim is the fact that aerial survey reports in W Park in Burkina Faso, which is currently occupied by extremist groups, indicate that the area is devoid of any large mammalian wildlife (Ouindeyama *et al.* 2021, Lhoest *et al.* 2022). While lions may still occur throughout the complex, if the situation in the complex remains unchanged, this population may likely become significantly reduced, if not extinct altogether.

Other

We expect that climate change will likely have a negative impact on the species; however, the extent of this impact is largely unknown.

The lack of sufficient funding to support protected areas with lions poses a significant challenge to their successful conservation (Lindsey *et al.* 2018). It has been estimated that protected areas with lions require between \$1,000 to \$2,000/km² annually to be managed effectively, yet receive, on average, \$200/km² annually (Lindsey *et al.* 2018). Nearly all protected areas in Africa with lions are inadequately funded, with deficits totally \$0.9 to \$2.1 billion.

Conservation Actions (see Appendix for additional information)

Since 1975 *Panthera leo* has been included in CITES Appendix II, and the Endangered Asiatic Lion subspecies *P. leo persica* in CITES Appendix I.

In Africa, lions are present in numerous large and well-managed protected areas (Nicolson *et al.* in prep., Lindsey *et al.* 2018, Loveridge *et al.* 2022), and remain one of the most popular animals on the must-see lists of tourists and visitors to Africa (Nzomo *et al.* 2020). Most range states in East and Southern Africa have an infrastructure which supports wildlife tourism, and in this way, lions generate significant cash revenue for park management and local communities and provide a strong incentive for wildland conservation.

Regional conservation strategies have been developed for lions in West and Central Africa (IUCN 2006a, Funston *et al.* 2023) and Eastern and Southern Africa (IUCN 2006b). However, these are almost 20 years old and need to be reviewed and potentially updated. By setting out common priorities to guide action on both national, community and landscape levels, the regional conservation strategies have the potential for broad and significant improvement of Lion status and management (IUCN 2006a, b; IUCN SSC Cat Specialist Group 2007, 2018; Bauer *et al.* 2020). While all these documents show awareness of the threats and recognition of solutions, the continued decline in Lion range and numbers show that political priority and funding are not sufficient (Lindsey *et al.* 2018, Packer *et al.* 2013).

Key conservation efforts should include effective protected area management including funding (Lindsey *et al.* 2018, 2021; Bauer *et al.* 2020; Robson *et al.* 2022), mitigating anthropogenic causes of mortality such as Lion-human conflict (Bauer *et al.* 2020, Sibanda *et al.* 2021) and snaring (Becker *et al.* 2013), and reducing or mitigating the negative effects of armed conflict (Bauer *et al.* 2020, Lhoest *et al.* 2022).

With the Lion currently listed as Critically Endangered in West Africa and with declining populations within the region, urgent conservation action is required to prevent local extinctions of this subspecies within the region.

Credits

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External Resources

For <u>Supplementary Material</u>, and for <u>Images and External Links to Additional Information</u>, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.5. Forest - Subtropical/Tropical Dry	Resident	Suitable	Yes
2. Savanna -> 2.1. Savanna - Dry	Resident	Suitable	Yes
3. Shrubland -> 3.5. Shrubland - Subtropical/Tropical Dry	Resident	Suitable	Yes
3. Shrubland -> 3.7. Shrubland - Subtropical/Tropical High Altitude	Resident	Marginal	-
4. Grassland -> 4.5. Grassland - Subtropical/Tropical Dry	Resident	Suitable	Yes
4. Grassland -> 4.7. Grassland - Subtropical/Tropical High Altitude	Resident	Suitable	Yes
8. Desert -> 8.1. Desert - Hot	-	Unknown	-
8. Desert -> 8.3. Desert - Cold	-	Unknown	-

Use and Trade

(http://www.iucnredlist.org/technical-documents/classification-schemes)

End Use	Local	National	International
3. Medicine - human & veterinary	Yes	Yes	Yes
10. Wearing apparel, accessories	Yes	No	No
12. Handicrafts, jewellery, etc.	Yes	Yes	Yes
15. Sport hunting/specimen collecting	No	Yes	Yes
16. Establishing ex-situ production *	No	Yes	No

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timi	ing	Scope	Severity
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongo	oing	Whole (>90%)	Rapid declines
Stresse	s:	1. Ecosyste	m stresses -> 1.1. Eco	system conversion
		2. Species	Stresses -> 2.2. Specie	es disturbance
2. Agriculture & aquaculture -> 2.1. Annual & perennial non- timber crops -> 2.1.1. Shifting agriculture	Ongo	oing	Minority (<50%)	Unknown
Stresse	s:	1. Ecosyste	m stresses -> 1.1. Eco	system conversion
		2. Species	Stresses -> 2.2. Specie	es disturbance

2. Agriculture & aquaculture -> 2.1. Annual & perennial non- timber crops -> 2.1.2. Small-holder farming	Ongoir	ng Minority (<50%	წ) Unknown
Stresse	es: 2	l. Ecosystem stresses -> 1.1	. Ecosystem conversion
	-	I. Ecosystem stresses -> 1.2	. Ecosystem degradation
	2	2. Species Stresses -> 2.2. S	pecies disturbance
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.1. Nomadic grazing	Ongoir	ng Minority (<50%	 Negligible declines
Stresse	es: 2	l. Ecosystem stresses -> 1.1	. Ecosystem conversion
	2	1. Ecosystem stresses -> 1.2	2. Ecosystem degradation
	2	2. Species Stresses -> 2.2. S	pecies disturbance
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoir	ng Minority (<50%	 Negligible declines
Stresse	es: 2	I. Ecosystem stresses -> 1.1	. Ecosystem conversion
	1	l. Ecosystem stresses -> 1.2	2. Ecosystem degradation
	2	2. Species Stresses -> 2.2. S	pecies disturbance
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoir	ng Minority (<50%	Slow, significant declines
Stresse	es: 2	2. Species Stresses -> 2.1. S	pecies mortality
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoir	ng Minority (<50%	6) Slow, significant declines
Stresse	es: 2	2. Species Stresses -> 2.1. S	pecies mortality
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoir	ng Minority (<50%	6) Slow, significant declines
Stresse	es: 2	2. Species Stresses -> 2.1. S	pecies mortality
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.5. Motivation Unknown/Unrecorded	Ongoir	ng Minority (<50%	წ) Unknown
Stresse	es: 2	I. Ecosystem stresses -> 1.2	. Ecosystem degradation
	2	2. Species Stresses -> 2.2. S	pecies disturbance
6. Human intrusions & disturbance -> 6.2. War, civil unrest & military exercises	Ongoir	ng Minority (<50%	6) Rapid declines
Stresse	es: 2	l. Ecosystem stresses -> 1.2	2. Ecosystem degradation
	2	2. Species Stresses -> 2.1. S	pecies mortality
	2	2. Species Stresses -> 2.2. S	pecies disturbance
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.4.	Ongoir	ug Unknown	Unknown
Type onknown, on ceorded			

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action in Place

In-place research and monitoring

Action Recovery Plan: No

Systematic monitoring scheme: No

Conservation Action in Place
In-place land/water protection
Conservation sites identified: Yes, over part of range
Percentage of population protected by PAs: 31-40
Area based regional management plan: Unknown
Occurs in at least one protected area: Yes
Invasive species control or prevention: No
In-place species management
Harvest management plan: No
Successfully reintroduced or introduced benignly: Yes
Subject to ex-situ conservation: No
In-place education
Subject to recent education and awareness programmes: Yes
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action Needed	Notes
1. Land/water protection -> 1.1. Site/area protection	-
1. Land/water protection -> 1.2. Resource & habitat protection	-
2. Land/water management -> 2.1. Site/area management	-
2. Land/water management -> 2.3. Habitat & natural process restoration	-
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management	-
3. Species management -> 3.1. Species management -> 3.1.2. Trade management	-
3. Species management -> 3.1. Species management -> 3.1.3. Limiting population growth	-
3. Species management -> 3.2. Species recovery	-
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction	-
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation	-
4. Education & awareness -> 4.2. Training	-

Conservation Action Needed	Notes
4. Education & awareness -> 4.3. Awareness & communications	-
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level	-
5. Law & policy -> 5.1. Legislation -> 5.1.3. Sub-national level	-
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.1. International level	-
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level	-
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level	-

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed	Notes
1. Research -> 1.2. Population size, distribution & trends	-
1. Research -> 1.3. Life history & ecology	-
1. Research -> 1.4. Harvest, use & livelihoods	-
1. Research -> 1.5. Threats	-
1. Research -> 1.6. Actions	-
2. Conservation Planning -> 2.1. Species Action/Recovery Plan	-
2. Conservation Planning -> 2.2. Area-based Management Plan	-
3. Monitoring -> 3.1. Population trends	-
3. Monitoring -> 3.3. Trade trends	-

Additional Data Fields

Distribution
Estimated extent of occurrence (EOO) (km ²): 19263053.79
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): No
Lower elevation limit (m): 0
Upper elevation limit (m): 4,200
Population
Number of mature individuals: 23,000
Continuing decline of mature individuals: Yes
Extreme fluctuations: No

Population

Population severely fragmented: Yes

Continuing decline in subpopulations: No

Extreme fluctuations in subpopulations: No

All individuals in one subpopulation: No

Habitats and Ecology

Continuing decline in area, extent and/or quality of habitat: Yes

Generation Length (years): 6.98

The IUCN Red List Partnership



The IUCN Red List of Threatened Species[™] is produced and managed by the <u>IUCN Global Species</u> <u>Programme</u>, the <u>IUCN Species Survival Commission</u> (SSC) and <u>The IUCN Red List Partnership</u>.

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