Acinonyx jubatus, Cheetah

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NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	❮ VULNERABLE ❯	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Scientific Name: *Acinonyx jubatus* (Schreber, 1775)

Synonym(s):

- *Felis jubata* Schreber, 1775

Regional Assessments:

- Mediterranean

Common Name(s):

- English: Cheetah
- French: Guépard
- Spanish; Castilian: Chita, Guepardo
- Afrikaans: Jagluiperd
- Amharic: Abo Shemane
- Arabic: Fahad Sayad (الفهد الصياد)
- German: Gepard
- Hindi: Cheeta
- Somali: Haramcad
- Swahili: Duma

Taxonomic Notes:

Formerly included in the subfamily Acinonychinae which is a monophyletic group, (e.g., Wozencraft 1993), molecular evidence now clusters the Cheetah with the Puma (*Puma concolor*) and Jaguarundi (*Herpailurus yagouaroundi*) in the tribe Acinonychini, diverging some 6.9 million years ago (Johnson *et al.* 2006, O'Brien and Johnson 2007). A close relationship between these three species is in agreement with earlier studies (Johnson and O'Brien 1997, Bininda-Emonds *et al.* 1999, Mattern and MacLennan 2000). The English name is derived from the Hindi Chita, meaning "spotted one". The generic name *Acinonyx* is a reference to its semi-retractile claws (Caro 1994).

Kitchener *et al.* (2017) recognize four subspecies:

- *Acinonyx jubatus jubatus* (Schreber 1775) distributed across southern and eastern Africa. This subspecies combines two subspecies previously documented by Smithers (1975): *Acinonyx jubatus jubatus* (Schreber 1775) and *Acinonyx jubatus raineyi* (Heller 1913; 9)
- *Acinonyx jubatus soemmeringii* (Fitzinger, 1885) distributed across northeastern Africa
- *Acinonyx jubatus venaticus* (Griffith, 1821) distributed across southwestern Asia and India
- *Acinonyx jubatus hecki* (Hilzheimer, 1913) distributed across western and northwestern Africa

The authors note that further genetic analysis is needed to assess whether these subspecies designations are appropriate, or whether there needs to be further consolidation.

Assessment Information

Red List Category & Criteria: Vulnerable A4b; C1 <u>ver 3.1</u>

Year Published: 2022

Date Assessed: May 17, 2021

Justification:

The Cheetah is assessed as Vulnerable under criterion A4b based on a population size reduction of 37% (21–51%) over three generations (approximately 15 years) between 2017 and 2032 (A4b) and criterion C1 based on a global population size (tentatively estimated at 6,500 mature individuals) and a projected averaged continuing decline (C1).

Data from a comprehensive national assessment in Zimbabwe, the only large area that includes protected and unprotected landscapes with reliable population estimates from two points in time, indicates a decline of 85% over 15 years.

The population projections conducted by Durant *et al.* (2017) show that if Cheetah outside protected areas are subject to high levels of threat, then the global Cheetah population may decline by more than 50% over the next 15 years (three Cheetah generations), and thus the Cheetah may be close to qualifying as EN under criterion A3. High levels of threat are expected on the African continent since human populations in many Cheetah range states are predicted to double over the next few decades, with leading to increased pressures on natural resources (United Nations 2017). Preventing a steep decline in Cheetah populations in the face of an ongoing period of rapid growth in Africa's human population over the next few decades will be the most serious challenge for the conservation of this species.

Given the evidence of ongoing and increasing threats to Cheetah posed by rapid anthropogenic change across the species range, we recommend that the Cheetah 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.

Previously Published Red List Assessments

2015 – Vulnerable (VU)
https://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T219A50649567.en

2008 – Vulnerable (VU)
https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T219A13034574.en

2002 – Vulnerable (VU)

1996 – Vulnerable (VU)

1994 – Vulnerable (V)

1990 – Vulnerable (V)

1988 – Vulnerable (V)

1986 – Vulnerable (V)

Geographic Range

Range Description:

Historically widespread across Africa and southwestern Asia, Cheetah are now known to occur in only 9% of their past distributional range, with their remaining strongholds in Southern and Eastern Africa (Durant *et al.* 2017).

In Eastern Africa Cheetah are known to occur in only 11% of their historical range (615,000 km²; Durant *et al.* 2017), and possibly occur in another 892,658 km² (IUCN/SSC 2007a). Significant Cheetah range occurs in the transboundary areas between northern Tanzania and southern Kenya. Almost the entire southern boundary of Ethiopia is recorded as resident Cheetah range with connectivity into South Sudan and this population likely extends into northern Kenya. Important subpopulations of Cheetah survive elsewhere in Tanzania, Kenya and Ethiopia, as well as in South Sudan and northern Uganda but are notably fragmented across the region. Their status in Eritrea, Djibouti, Somalia and Sudan is unknown.

In southern Africa Cheetah are known to occur in 22% of their historical range (1,325,000 km²), and possibly occur in another 424,000 km² (IUCN/SSC 2015). Most of the Cheetah surviving in this region are in a single transboundary population stretching across Namibia, Botswana, southern Angola, northern South Africa, south-western Mozambique and southern Zambia. Small isolated populations (<100 mature individuals) also survive elsewhere in central Angola, Zambia, Zimbabwe and Mozambique (IUCN/SSC 2015, Durant *et al.* 2015, Weise *et al.* 2017).

Cheetah have declined particularly precipitously across western, central and northern Africa (IUCN SSC 2012, Durant *et al.* 2017, Brugiere *et al.* 2015). The subspecies found in northwest Africa is *A. j. hecki*. Across this region, Cheetah now occur in 9% of their historical range (1,037,000 km²), and possibly occur in another 921,000 km². However, much of this range is within the Sahara, where Cheetah occur at very low densities, estimated as 0.023 individuals per 100 km² (Belbachir *et al.* 2015). There are five known Cheetah subpopulations in this region (IUCN/SSC 2012; Durant *et al.* 2017): south-central Algeria, stretching through to north-eastern Mali, and possibly into western Libya (Belbachir *et al.* 2015); two tiny connected subpopulations around the Termit massif in Niger; the WAP complex of protected areas in northern Benin, south-eastern Burkina Faso and south-western Niger; and south-eastern Chad and north-eastern Central African Republic (CAR). Cheetah have been extirpated from their historical range in Western Sahara, Senegal, Nigeria, Mauritania, Tunisia, Guinea, Ivory Coast, Cameroon, DRC and Ghana (Brugiere *et al.* 2015, Durant *et al.* 2017). The last reliable Cheetah sighting in Cameroon was in the 1970s (de Iongh *et al.* 2011), and no tracks were found in an extensive search of the Benoue Complex in 2007 and 2010, which was their last refuge in the country (Croes *et al.* 2011). Recent extensive surveys for Lion (*Panthera leo*) in the best protected areas in the Democratic Republic of the Congo, Côte d'Ivoire, Guinea, Senegal, Ghana and Nigeria found no evidence of Cheetah (Henschel *et al.* 2014a, b). It is also unlikely any Cheetah survive in Egypt. Reports from hunters suggest that Cheetah may persist in south-western Libya (IUCN SSC 2012), but the status of Cheetah from much of southern Libya, northern Niger, Chad and CAR remains unknown.

In Asia, the Cheetah has been extirpated from nearly all of its range. Its historic range extended from the shores of the Mediterranean and the Arabian Peninsula, north to the northern shores of the Caspian and Aral Seas, and west through Uzbekistan, Turkmenistan, Afghanistan, and Pakistan into

central India (Nowell and Jackson 1996, Habibi 2004, Mallon 2007). Persistence in Pakistan is unlikely (Husain 2001). Habibi (2004) considers it extinct in Afghanistan, although a Cheetah skin of unknown origin was found in a marketplace in western Afghanistan in 2006 (Manati and Nogge 2008). One reason for the extirpation of Cheetah across most of their Asian range is thought to have been the live capture of Cheetah, which were then trained to hunt deer and gazelle as sport for the aristocracy (Divyabhanusingh 1995). Other key causes of the disappearance of Cheetah from the region are likely to have been depletion of wild prey, especially gazelles, the direct killing of Cheetah, and anthropogenic change and fragmentation of their habitat (Mallon 2007). The Asiatic Cheetah (*A. j. venaticus*) is now known to survive only in Iran, where it is Critically Endangered (Farhadinia *et al.* 2017). Even here, the subspecies now occurs across only 36% of its historical range (37,000 km²) within Iran with a predicted further loss of 22% (8,000 km²) of their current habitat, mainly due to declines in prey population and climate change (Khalatbari *et al.* 2018). The Asiatic cheetah population is considered to be divided into three subpopulations: in north-eastern Iran, in central Iran and in Kavir National Park (Khalatbari *et al.* 2017).

Country Occurrence:

Native, Extant (resident): Algeria; Angola; Benin; Botswana; Burkina Faso; Central African Republic; Chad; Ethiopia; Iran, Islamic Republic of; Kenya; Mali; Mozambique; Namibia; Niger; South Africa; Tanzania, United Republic of; Uganda; Zambia; Zimbabwe

Native, Possibly Extant (resident): Djibouti; Libya

Native, Possibly Extinct: Egypt; Eritrea; Morocco; Somalia; South Sudan; Sudan; Togo; Western Sahara

Native, Extinct: Afghanistan; Burundi; Cameroon; Congo, The Democratic Republic of the; Côte d'Ivoire; Eswatini; Ghana; Guinea; Guinea-Bissau; India; Iraq; Israel; Jordan; Kazakhstan; Kuwait; Malawi; Mauritania; Nigeria; Pakistan; Rwanda; Saudi Arabia; Senegal; Sierra Leone; Syrian Arab Republic; Tajikistan; Tunisia; Turkmenistan; Uzbekistan

Distribution Map

Leaflet | Powered by Esri | RJGC, Esri, HERE, Garmin, FAO, NOAA, AAFC, NRCan
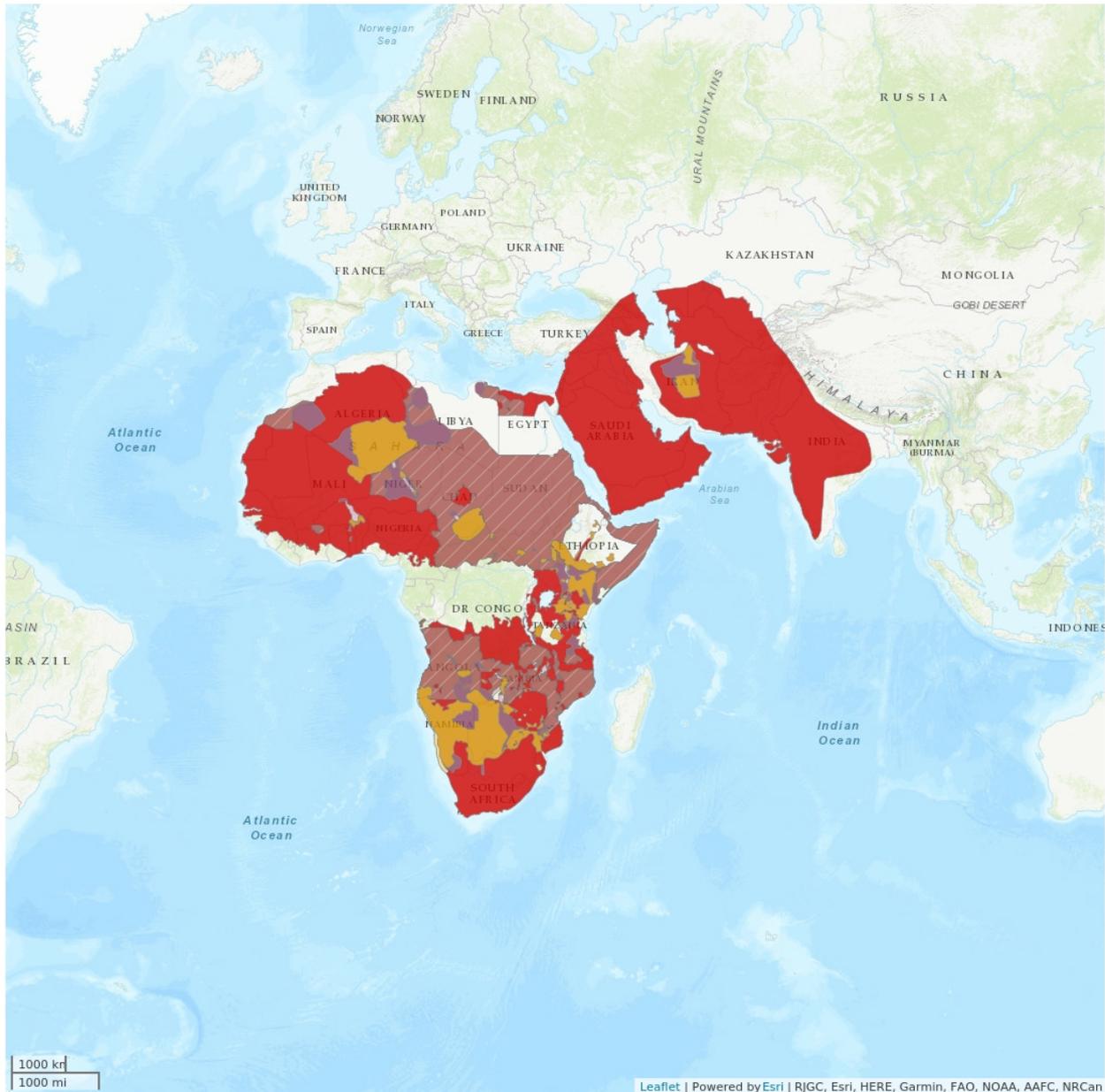
Legend

■ (orange)	EXTANT (RESIDENT)
■ (tan)	EXTANT (PASSAGE)
■ (purple)	POSSIBLY EXTANT (RESIDENT)
■ (pink)	POSSIBLY EXTANT (PASSAGE)
▨ (hatched)	POSSIBLY EXTINCT
■ (red)	EXTINCT

Compiled by:
IUCN SSC Cat Specialist Group 2022

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	< VULNERABLE >	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

Population

In a recent global assessment by Durant *et al.* (2017), the known remaining Cheetah populations were estimated to be confined to 9% of their historical distributional range. These authors estimated the Cheetah population at around 6,517 mature individuals (7,100 adult and adolescent animals) distributed over 3,100,000 km². A recent independent study by Weise *et al.* (2017), using an extensive database of georeferenced sightings, estimated the Cheetah population within the southern African countries of Zimbabwe, South Africa, Namibia and Botswana, at 3,577 adults and adolescents (Weise *et al.* 2017), compared with 4,032 estimated for the same countries by Durant *et al.* (2017).

The population estimates presented here are derived from Durant *et al.* (2017) and Weise *et al.* (2017), except where stated. These estimates are based on expert information from in-depth surveys and monitoring wherever possible. This was particularly the case for the estimates in southern Africa (IUCN SSC 2007a,b, 2012, 2015; Durant *et al.* 2017). Where expert-based information was not available, population estimates were extrapolated by applying density estimates from comparable areas with known density to polygons of resident range as mapped during conservation strategy workshops (see #s 1 to 4) below). Density estimates were conservative, since sites where abundance is unknown may face higher pressures than sites where there is better information on abundance (Durant *et al.* 2017). Density estimates in both studies refer to adults and independent adolescents only, and do not include cubs. Four density estimates were used (below) and resulting figures were then adjusted to represent only the number of mature individuals in the population:

• Well-managed, relatively productive, protected areas (PAs). Density was estimated at one individual per 100 km², which falls on the low end of the range for highly productive, well managed PAs (1.3–2.5 per 100 km², Broekhuis and Gopalaswamy 2016, Marnewick *et al.* 2014, Durant *et al.* 2011). We picked this figure as the referenced estimates appear atypically high, and come from some of the most productive and best managed protected areas in Africa (the Serengeti Mara ecosystem and Kruger National Park). It is unlikely that any other protected areas can achieve densities even at the low end of this range, either because they are less well managed, or because they are less productive.
• Areas that are largely unprotected or are under threat. Density was estimated at 0.25 individuals per 100 km², corresponding to the lower bound on the density range found on Namibian farmlands (range 0.25 to 0.83 per 100 km²; Marker 2002);
• The Sahara. Density was estimated at 0.025 individuals per 100 km², using the only available estimate in this habitat from the Algerian Sahara (Belbachir *et al.* 2015).
• Two subpopulations in West and Central Africa which do not align to categories 1–3. Density was estimated at 0.1 individual per 100 km², consistent with a density higher than that found in the desert, but lower than that found in Namibian farmlands, in line with the elevated pressures and direct threats in these regions due to high rates of habitat encroachment and illegal activities.
The population estimates so derived for Cheetah presented here, including the expert based estimates, should be treated with extreme caution and are provided as an indication only. Density and abundance estimates for Cheetah are imprecise, and a small change in mean density estimation could result in a large overall change in population estimates. Thus, the estimates are extremely tentative and comparisons with previous estimates (which were also very tentative and based on even weaker data) are unreliable. Nonetheless, these recent studies provide the best available information at the global level.

Number of mature individuals in the population was calculated using estimates from the long-term study of individually known cheetahs in the Serengeti (Durant *et al.* 2004). Using a stable age structure model, and assuming 1) half of all 1–2 year olds in a population are independent at 18–24 months; and 2) that there is a 2:1 ratio of adult females to males, we calculate that 8.2% of a population estimate of independent Cheetahs (adults and adolescents) constitutes individuals of 18–24 months. We thus use the equation MI = N - (N*0.082), to calculate the number of mature individuals older than two years (MI) where N is the estimated number of adults and adolescents.

Southern Africa

Southern Africa is a global stronghold for Cheetah, holding a tentative estimate of 3,526 mature individuals distributed across at least 11 subpopulations (from Durant *et al.* 2017, Weise *et al.* 2017). A large centre of distribution comprises the majority of the   regional population, *ca* 3,396 mature individuals, distributed across a large transboundary landscape covering southern Botswana, Namibia, southern Angola, northern South Africa and south-western Mozambique. The   remaining subpopulations in the southern Africa region are much smaller: 60 mature individuals in Kafue National Park, Zambia; 46 in and around Hwange National Park; 42 in Gonarezhou National Park and Save Conservancy; 37 spread across three conservancies in southern Zimbabwe; 18 in Liuwa Plains, Zambia; 11 in the Zambezi valley; nine in Banhine National Park, Mozambique; four in Rhino Conservancy Zimbabwe; 24 in the Moxico region in central Angola; and three in Matusadona, Zimbabwe (Durant *et al.* 2017). The latter subpopulation has decreased substantially after a reintroduction of Cheetah in the mid-1990s and may indicate poor long-term viability of isolated Cheetah populations in small areas (Purchase 1998, Purchase and du Toit 2000, Purchase *et al.* 2006). A large proportion (75%) of the estimated resident range in the   region is outside protected areas, on lands ranched primarily for livestock but also for wild game (IUCN SSC 2015, Purchase *et al.* 2007). Larger competitors, such as Lions and Spotted Hyenas (*Crocuta crocuta*), have been extirpated from much of this range.

For the purposes of this assessment, Cheetah populations are considered to be 'wild' when they are not intensively managed, in line with the   guidelines of IUCN SSC (IUCN Standards and Petitions Subcommittee 2019; see also Redford *et al*. 2011). Intensive management of Cheetah (such as frequent translocation of individuals for genetic management) is necessary in reserves smaller than 1,000 km² that are surrounded by impermeable fencing. There are around 330 Cheetah in an intensively managed free-ranging meta-population distributed across small fenced reserves in South Africa (Buk *et al.* 2018) and, more recently, in Liwonde National Park in Malawi (Dasgupta 2017). These   Cheetah have been excluded from the overall population estimates in line with the IUCN SSC guidelines. However, when such populations are well managed, such as the South African Cheetah meta-population, in ways that allow a wide range of natural behaviours of Cheetah, including hunting, such populations can make a valuable contribution to 'wild' populations by providing individuals for well-planned restorations.

Eastern Africa

The Eastern Africa Cheetah population is estimated at 2,102 mature individuals distributed across 14 subpopulations (from Durant *et al.* 2017). Only one of these subpopulations is estimated to number more   than 200 mature individuals. In descending order of estimated population   size the 15 subpopulations are: 1,250 mature individuals in the Serengeti/Mara/Tsavo/Laikipia landscape in Kenya and northern Tanzania;   184 in the Ruaha landscape in central Tanzania; 175 in a transboundary population through southern Ethiopia, eastern South Sudan and northern Kenya; 135 in Southern National Park in South Sudan; 78 in Badingilo National Park in South Sudan; 62 in Radom National Park

in South Sudan; 55 in the Katavi-Ugalla landscape in Tanzania; 47 in the Maasai steppe in Tanzania; 33 in South Turkana in Kenya; 29 in the Ogaden landscape in Ethiopia; 18 in Blen-Afar Landscape in Ethiopia; 17 in the Kidepo National Park in Uganda and bordering areas in South Sudan; 10 in the Afar landscape in Ethiopia; and seven in the Yangudi Rassa landscape in Ethiopia (recalculated from Durant *et al.* 2017). A substantial proportion (75.4%) of Cheetah range in Eastern Africa is outside protected areas, on lands that are largely occupied by traditional pastoralist communities (Durant *et al.* 2017), where cheetah face elevated threats from retaliatory killings; unsustainable rangeland management leading to a loss of prey; and minimal protection against other illegal killings (e.g. for trade).

Western, Central and Northern Africa

The number of Cheetah in western, central and northern Africa is tentatively estimated at 419 mature individuals distributed across four populations (from Durant *et al.* 2017). These are: 218 mature individuals in Bahr/Salama landscape in Chad and CAR; 175 in the Adrar des Ifhogas / Ahaggar / Tassili N'Ajjer landscape in Algeria and Mali; 23 in the WAP complex in Benin, Niger and Burkina Faso; two in Air et Ténéré connected to another 1–2 mature individuals in the Termit Massif, both in Niger. As in the other regions, the majority of the population (83%) is outside protected areas, on lands that are largely occupied by traditional sedentary and semi-nomadic pastoralist communities (IUCN SSC 2012, Belbachir *et al.* 2015). Many of these areas face unsustainable killing of wild ungulates, particularly close to settlements, and unsustainable management of the desert landscapes, alongside a risk of illegal killing of Cheetahs.

Asia

In Asia, Cheetah are now confined to Iran, and comprise the subspecies *A. j. venaticus*. A recent comprehensive review of available information on Cheetah in Iran has raised concerns of a dangerous ongoing decline in Cheetah numbers, (Farhadinia *et al.* 2017) which confirms that the population size is estimated to be less than 50 mature individuals (Khalatbari *et al.* 2017). The imprisonment in January 2018 of key individuals who have been most active in improving the conservation outlook for Asiatic Cheetah, and the lack of conservation activity since, diminishes hopes of any recovery of this population (Long 2019).

Global population

The total known Cheetah population is therefore tentatively estimated at around 6,517 mature individuals. However, with home ranges documented in excess of 3,000 km² (Marker *et al.* 2008, Weise *et al.* 2015), movements of translocated animals exceeding 1,000 km (Weise *et al.*2015) and densities seldom exceeding two per 100 km², the combination of wide-ranging behaviour and low densities make the estimation of Cheetah population size (and hence threat status) extremely challenging. Moreover, all existing estimates of density and abundance come from either protected areas (e.g. Kruger National Park, Moremi Game Reserve, Serengeti National Park), or from areas where there are active Cheetah conservation organizations working across large areas (e.g. the Namibian farmlands that are the focus of the Cheetah Conservation Fund). Few of these estimates provide the time series data needed to estimate population trends. There are also few reliable estimates of density or abundance from sites where Cheetah populations are most threatened and likely to be in steep decline (the exception being a repeated country-wide survey of the cheetah population in Zimbabwe; van der Meer 2016). As such, quantitative estimates of population trends are largely unknown; however, of 18 populations where trends could be assigned, 14 were assessed to be in decline, three were stable, and only one could have been increasing (Durant *et al.* 2017).

The combination of large home range, low density and biased data (from areas where Cheetah are least threatened), poses a serious challenge to the assessment of threat for this species. This challenge is further exacerbated by the finding that the majority of known Cheetah range (77%) and Cheetah population (67%) are on unprotected lands. Here Cheetah are particularly vulnerable to multiple threats, including increased pressures from habitat loss and fragmentation; widespread human-wildlife conflict; prey loss resulting from overhunting and bushmeat harvesting and illegal trade (IUCN/SSC 2007a, 2012, 2015). Even within PAs, because of edge effects and poor law enforcement, Cheetah remain highly vulnerable to anthropogenic pressures. In these landscapes Cheetah live alongside some of the most marginalized and vulnerable people in the world.

These rural human communities, already under pressure, are expected to grow rapidly over the next three decades (United Nations 2017, Gerland *et al.* 2014), which will place unprecedented pressures on habitats, wildlife and ecosystems. A recent assessment has documented extinction of Cheetah from 11 out of 15 protected areas (PAs) in West and Central Africa (73% of site extinction) (Brugiere *et al.* 2015). In Zimbabwe, Cheetah populations have collapsed by 85% and the species has disappeared from 63% of its distributional range over the last 10–15 years (van der Meer 2018). Moreover, Cheetah have been extirpated from much of Mozambique, Zambia, Tanzania, Zambia, Sudan, Somalia and Angola (IUCN SSC 2007a, 2015), most probably over just the last few decades. It is likely that Cheetah populations in many countries are facing similar steep declines due to rapid land use change and rising intolerance of Cheetah outside PAs (van der Meer 2018), as well as a massive bushmeat trade, which has removed prey from large tracts of Cheetah range (Lindsey *et al.* 2013). This wider context is key to the interpretation of a recent in-depth examination of Cheetah status by Durant *et al.* (2017).

The global population of Cheetah is highly fragmented. Of the 33 populations that still survive, only two have an estimated size of more than 1,000 mature individuals (Durant *et al.* 2017). The analysis by Weise *et al.* (2017) suggests that the largest population of Cheetah in southern Africa is likely to be more fragmented than that depicted in Durant *et al.* (2017). Furthermore, two thirds of populations comprise fewer than 100 mature individuals and, even more worryingly, six populations do not even reach double digits. It is likely that, without urgent conservation intervention, many of the smaller populations will go extinct over the next 1–2 decades.

Previous IUCN threat assessments and problems with trend estimation:
The lack of reliable data on population trends for Cheetah, particularly in past IUCN Red List threat assessments, has led to the use of distributional range as an index of population size. However, because Cheetahs are wide-ranging, distributional range estimates are likely to be weakly correlated with population abundance. This is because an area may appear to be widely occupied by Cheetah through reliable observations, yet the density could be extremely low (Belbachir *et al.* 2015). For example, if well protected and productive, an area of 10,000 km² could support up to 250 individual Cheetah, whereas, if the area is unproductive and/or subject to high levels of anthropogenic pressures, it is likely to hold only 4–20 individuals (Belbachir *et al.* 2015, Weise *et al.* 2018). This problem is further compounded by the fact that current distributional range is delimited using observational records collected over the previous decade; thus older data may mask recent rapid declines.

The problems inherent in the data available on population size and trends for Cheetah, particularly with respect to historic information, means that comparisons of current estimates with previous estimates

to infer population trends are unreliable. In the 2015 IUCN Red List assessment, estimates of past distributional range reduction were 29% over the past 15 years, assuming a constant rate of contraction over the last 100 years. This range collapse, when projected forwards, predicted a further reduction of 28% over the next 15 years (stated as more than 10% in the assessment text). However, it is likely that the observed range collapse has accelerated through time, with the steepest collapse occurring most recently. Durant *et al.* (2017) simulated the global Cheetah population by setting the initial population equal to a rounded estimated population of 7,000 individuals, of which 33% occurs in PAs. Populations were simulated over time under a range of scenarios with growth rates less than replacement outside PAs; with varying rates of movement inside and outside PAs; and with populations stable within PAs (Durant *et al.* 2004, Chauvenet *et al.* 2011). There is a projected decline of a past and inferred decline tentatively estimated at 21–51% between 2008 to 2023 (three generations); a past and inferred decline of 14-38% between 2008 to 2018 (two generations) and a past decline of 8–21% between 2008 to 2013 (one generation; Durant *et al.* 2017). Moreover, simulations showed that declines of more than 50% were likely over the next three Cheetah generations or 15 years (generation data from Durant *et al.* 2004) if the growth rate was 10% less than replacement outside PAs. Such a decline in global population size raises concerns that the Cheetah population could meet the IUCN Red List Category of Endangered under Criterion A3b [a population size reduction of >=50% projected or suspected to be met within the next three generations based on an index of abundance]. Sensitivity analysis showed that growth rates within PAs needed to be 8% or higher to counteract such a decline. Whilst higher growth rates are theoretically possible; in practice, Cheetah within PAs suffer from high levels of predation from other, larger, predators such as lions and spotted hyenas (Laurenson *et al.* 1994, Durant *et al.* 2004). Such predation, combined with limitations imposed by prey availability, prevents high growth rates. In the Serengeti National Park female Cheetahs are only just able to replace themselves (Laurenson 1995, Chauvenet *et al.* 2011).

The results from simulated projections of the global Cheetah population are consistent with regional evidence of recent steep population decline. In Zimbabwe, Cheetah distributional range contracted by 11% per year between 2007 and 2015, while the population has collapsed by 85% over a similar period, from an estimated minimum of 1,520 cheetahs in 1999 to only 150–170 Cheetahs in 2015 (IUCN/SSC 2007b, 2015, van der Meer 2018). Almost all this loss has occurred outside of protected areas (van der Meer 2018).

While Zimbabwe has been subject to recent rapid land use change from wildlife-based land use to agricultural use, which is likely responsible for the steep decline in Cheetah, rapid declines leading to extirpation across large areas have also been observed in western Africa (Brugiere *et al.* 2015). Elsewhere in Africa, predicted rapid growth in human populations (United Nations 2017) and associated pressures on natural resources means that similar patterns of Cheetah population collapse are likely to be repeated across many countries over the coming decades. Durant *et al.* (2017) used their analysis to develop a decision tree to help categorise 'protection reliant' species such as Cheetah, that are dependent on active conservation for their survival, but which have substantial distributional range outside PAs where they are vulnerable to rapid anthropogenic change.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

In Africa, Cheetah are found in a wide range of habitats and ecoregions, ranging from dry forest and

thick scrub through to grassland and hyperarid deserts, such as the Sahara (IUCN SSC 2007a, 2012, 2015; Durant *et al.* 2014, 2017). They are only absent from tropical and montane forest, although there are reports of Cheetah at altitudes of 4,000 m on Mt Kenya (Young and Evans 1993). In Iran, Cheetah habitat consists of desert, much of it with an annual precipitation of less than 100 mm. There, the terrain in which Cheetah are found ranges from plains and saltpans to eroded foothills, and rugged desert ranges that rise to an elevation of up to 2,000-3,000 m (Khalatbari *et al.* 2018), a landscape not dissimilar to the mountains of the Algerian Sahara (Belbachir *et al.* 2015). Cheetah appear to show relatively low habitat selectivity compared with other carnivores (Durant *et al.* 2010a), although there is variation between females of differing reproductive status (Pettorelli *et al.* 2009). Cheetah were reported as relatively rare across the large belt of miombo woodlands in southern Tanzania and northern Mozambique (Myers 1975), and have not been recorded in these habitats in recent years (IUCN 2007a; Durant *et al.* 2017). However, a recent study has indicated that miombo woodlands may be important habitat for Cheetah (Strampelli *et al.* 2021), raising questions about the value of miombo habitats for Cheetah.

Cheetah are the fastest land mammals, and have been documented as reaching speeds up to 103 km per hour (29 meters per second; Sharp 1997). However, in real hunting situations, where Cheetah may be slowed down because of weaving prey and the need to circumvent obstacles, actual speeds may be much lower than this (Wilson *et al.* 2013a, b). Cheetah make use of their high speeds to catch their prey, but they are unable to sustain top speeds for much more than a few hundreds of meters. They take a wide variety of prey, principally small- to mid-sized ungulates, especially gazelle (*Gazella* spp.), kob (*Kobus kob*) and impala (*Aepyceros melampus*). But their prey can range from ground-dwelling birds and small mammals, such as hares, up to large ungulates such as wildebeest (*Connochates taurinus*), kudu (*Tragelaphus strepciseros*) or eland (*Tragelaphus oryx*) (Purchase and du Toit 2000, Broomhall *et al.* 2003, Mills *et al.* 2004, Cooper *et al.* 2007, Hilborn *et al.* 2012). In Iran opportunistic recovery of Cheetah kills and analysis of scat suggests that gazelle, wild sheep *Ovis orientalis*, Persian Ibex *Capra aegagrus* and Cape Hares *Lepus capensis* are key prey species (Khalatbari 2021, Farhadinia *et al.* 2012). Earlier studies using scat suggested that livestock formed an important component of the diet of Asiatic cheetah (Farhadinia *et al.* 2012), however recent genetic analysis found very little evidence of livestock consumption (Khalatbari 2021).

Cheetah, unlike many other African predators, rarely scavenge. In areas with high densities of large carnivore competitors, Cheetah can lose up to around 10% of their kills to kleptoparasitism, particularly to lions and spotted hyaenas (Hunter *et al.* 2007b), and tend not to remain long with their kills, abandoning the carcass once they have eaten their fill (Hunter *et al.* 2007c). They also tend to be primarily active during the day, a strategy that may help to reduce competition (Caro 1994). There is some evidence that nocturnal activity is linked to the lunar cycle (Broekhuis *et al.* 2014), consistent with a hypothesis that the need to use visual cues to avoid competitors may be a key driver of diurnal behaviour. In contrast, in areas where competition is less fierce, such as South African farmland and the Sahara, Cheetah have been recorded as being primarily nocturnal (Marnewick *et al.* 2006, Belbachir *et al.* 2015), although it is difficult to know whether this is due to a lower number of competitors or higher human activity in these areas.

Cheetah have a social organization that is unique among felids (Durant *et al.* 2007, 2010b). Females are solitary or accompanied by dependent young, and males are either solitary or live in stable coalitions of two or three (Caro 1994, Broomhall *et al.* 2003, Marnewick *et al.* 2006). Most coalitions consist of

brothers, but unrelated males may also be members of the group (Caro and Collins 1987). Unlike the coalitions formed by male lions, where a single male from the coalition will guard and mate with a female throughout oestrus, female Cheetah appear to mate with as many males as possible, and show no mate fidelity (Gottelli *et al.* 2007).

In areas where prey is migratory (such as the Serengeti Plains), female Cheetah, and males without territories, follow the herds, with average home ranges of 800 km², while territorial males may hold small territories (average 30 km²) which are centred on areas attractive to females (Durant *et al.*1988, Caro 1994). A similar pattern whereby territorial males have smaller territories than non-territorial males has since been observed on Namibian farmlands, where male territories averaged 379 km² compared with home ranges of non-territorial males of 1,595 km² (Melzheimer *et al.*2018). The same study estimated female Cheetah home ranges to average 650 km² (n=17). Another study on Namibian farmlands found both Cheetah sexes to have very large home ranges (average 1,642 km²); however, intensively used core areas were just 14% of the total home range. A study of a small number of individuals in Kruger National Park found male and female home ranges to be more similar in size, although more data are required to know whether these data are representative (Broomhall *et al.* 2003). It has been hypothesized that the Cheetah's unusual social system and ranging patterns originally evolved as a strategy to remain mobile in the presence of larger and stronger competitors, enabling the species to avoid direct competition in a spatio-temporal heterogeneous landscape (Durant 1998, 2000a,b). This is supported by recent evidence of risk avoidance by Cheetah in Botswana and South Africa (Broekhuis *et al.* 2013, Rostro-Garcia *et al.* 2015).

In the wild, Cheetah have been recorded as living a maximum of 14 years and five months for females and 10 years for males, however females have not been recorded as having cubs beyond 12 years (Durant *et al.* 2010b). Cheetah give birth to their first litter at two years after a three-month gestation (Caro 1994). The cubs are kept in a lair for the first two months of their life, during which time their mother leaves to hunt every morning and returns at dusk (Laurenson 1994). Cheetah cub mortality can be high. In the Serengeti, 95% of cubs died before independence, mostly because of predation (Laurenson 1994, 1995). Most of this mortality happened in the first few months, and mothers were able to conceive quickly after losing their cubs (Laurenson *et al.* 1992). Elsewhere, cub mortality is reported to be lower, although information on survivorship during the denning period is rarely available. In the Kgalagadi Transfrontier Park cub survival from birth to independence was 35.7%, substantially higher than that found in the Serengeti, but most of the mortality could also be ascribed to predation (Mills and Mills 2014). Lions, Spotted Hyaenas and Leopards are key predators of Cheetah cubs, although smaller predators such as Honey Badgers, Jackals and Secretary Birds also play a role (Laurenson 1994, Mills and Mills 2014).

If Cheetah cubs survive, they will stay with their mother for an average of 18 months, after which they will roam with their littermates for a further six months (Caro 1994). After which, females split from their siblings and go on to produce their first litter, while surviving males will stay together for life. Single males may also meet and join up with unrelated males to form a coalition (Caro 1994). In the Serengeti, mean annual mortality for females and males is respectively 0.32 and 0.61 for 1–2-year-olds; and 0.15 and 0.31 for adults (Durant *et al.* 2004). On Namibian farmlands, adult mortality is similar to that in the Serengeti, but mortality of juveniles is much lower, probably due to the lack of other large predators (Marker *et al.* 2003c, Durant *et al.* 2004). It is difficult to discern the causes of mortality, but in the Serengeti adult Cheetah have been killed by Lions; by their prey when hunting; and one

individual died from encephalitis (Durant *et al.* 2010b). Male Cheetah may be killed by other males, probably during territorial disputes (Caro 1994). More recently, several Cheetah have also been killed on the main road passing through the Serengeti (see Threats section).

In comparison with other big cats, Cheetah occur at relatively low densities (10–30% of typical densities for Lions, Leopards, Tigers and Jaguars in prime habitat: Durant *et al.* 2007). The highest density recorded for Cheetah, not including small and intensively managed fenced reserves in South Africa, is in the Serengeti National Park, where densities range up to 2.5 per 100 km² (Durant *et al.* 2011), but Cheetah can congregate seasonally at high densities (Caro 1994, Durant *et al.* 1988, Melzheimer *et al.* 2020), which can give a misleading impression of overall density. Caro (1994) attributes relatively low Cheetah densities in the herbivore rich Serengeti to interspecific competition (especially with larger species such as Lions and Spotted Hyenas that can kill Cheetah cubs), but on Namibian farmlands and in the Sahara where there are no competitors, Cheetah still occur at low densities of 0.25 per 100 km² (Marker 2002) and 0.025 per 100 km² (Belbachir *et al.* 2015), respectively. In such environments, Cheetah may be limited by prey rather than competitors. Clearly, Cheetah can coexist alongside other competitors, and have developed avoidance strategies to minimize the loss of kills and cubs where competitor densities are high (Durant 1998, 2000a,c; Broekhuis *et al.* 2013, Rostro-Garcia *et al.* 2015).

Systems: Terrestrial

Use and Trade

Illegal trade poses a historical and ongoing threat to Cheetah. Live Cheetah are caught and traded illegally into the pet trade and they are also hunted for their skin. Historical capture and trade in live Cheetah were identified as a key cause of their disappearance from much of their range in Asia, and global concerns about a resurgence in an illegal international trade in live Cheetah has been recently addressed at CITES (CITES 2013, Mitchell *et al.* 2017). CITES allows a legal quota for "live specimens and trophy hunting" of Cheetah in Namibia, Zimbabwe and Botswana (CITES 1992). From 2002 to 2011, legal trade in wild Cheetah specimens averaged 153 per year (mainly hunting trophies from Namibia), and 88 for captive-bred live animals (mainly from South Africa) (Nowell 2014). Documentation for illegal trade is more problematic.

Official records show an average of three confiscations of illegally traded live Cheetah reported to CITES per year between 2002–2011 (Nowell 2014), and 13 live Cheetahs over three years between 2015-2018 (CITES 2019), however, this is a substantial underestimate of the real trade. Ongoing territorial disputes between Somalia and Somaliland mean that Somalia does not include records of confiscations in Somaliland (where most confiscations occur) in its official records. A comprehensive study utilizing multiple sources found evidence of 1,884 incidents of trade over the decade between 2010-2019 (Tricorache *et al.* 2021). These incidents were estimated to have involved at least 4,184 cheetahs. This represents nearly 200 incidents per year involving over 400 animals. The majority of individuals traded were traded live (87%), with most of the remaining trade was skins. Trade was detected in 15 cheetah-range states, with the greatest number of traded cheetah recorded in Somalia (42%), Kenya (13%) and Ethiopia (10%). Trade was also detected in 41 non cheetah range states, i.e. transit or destination countries, with the majority in the Gulf, including Saudi Arabia (61%), Kuwait (14%) and UAE (14%). These records indicate an illegal trade that is significantly higher than the official reports submitted to CITES, and suggest a recent rise in confiscations. These reports indicate that the Cheetah trade is

dominated by a live trade from the Horn of Africa and surrounding regions into the Gulf States. The primary means of transport is by boat out of the Somali regions, to the coast of Yemen, and then across Yemeni borders by vehicle (Nowell 2014). A high mortality rate (70%) has been reported from the known outcomes of confiscations of cubs in Somaliland and Ethiopia, and it is likely that many captured cheetah cubs die undetected. Dozens of news articles and hundreds of social media images and videos suggest that private ownership of Cheetah (and other big cats) is popular throughout the Gulf region. However, many of these Cheetah are likely to be kept in inappropriate conditions, and their survivorship is likely to be low. For instance, one study including 61 captive Cheetah in the United Arab Emirates has shown that owners have little idea of a Cheetah dietary needs; diets of pure poultry were contributing to 'Cheetah myelopathy', i.e. ataxia, hind limb paralysis and paresis due to degenerative lesions in the spinal cord (Kaiser *et al.* 2014). These consumer countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE) are Party to CITES and prohibit wild Cheetah imports, however the proliferation of photographs of pet cheetah on social media in these countries, demonstrate that many animals are successfully smuggled into these countries.Because of its proximity to the destination markets in the Gulf States, the Horn of Africa and neighbouring areas is the region where illegal trade in live Cheetah is likely to have the greatest negative impact on wild populations. Countries in this region have registered their concerns about illegal trade in their national Cheetah conservation action plans, and continue to try and address the issue through CITES (e.g. CITES 2013, 2019). Although the exact origin of Cheetah in the trade is unclear, information from interdictions and interviews with traders suggests that the animals are opportunistically collected from ethnic Somali regions, including parts of Ethiopia and Kenya, and occasionally beyond (N. Mitchell, pers. obs.). The Cheetah populations that are the likely source for the live trade are increasingly small and isolated, making them extremely vulnerable to any trade.

The currently known cheetah populations in the Horn of Africa, close to the Somali border, are likely to suffer the strongest impacts of the illegal trade in live animals. These include the Ethiopian populations in Afar (estimated 11 individuals); Blen-Afar (20 individuals); Ogaden (32 individuals); and Yangudi Rassa (8 individuals), all of which are highly vulnerable to the impacts of even the smallest trade. The border population with Kenya and South Sudan is slightly higher, with an estimated 191 individuals, but still remains extremely vulnerable to even low levels of trade. The section of the Kenyan and Tanzanian population closest to the Somali border is also at high risk. Populations in south Turkana in Kenya (36 individuals); Kidepo in Uganda through to southern South Sudan and northwestern Kenya (19 individuals); and the South Sudan populations in Badingilo National Park (85 individuals); Radom National Park (68 individuals); and Southern National Park (147 individuals) are also vulnerable, especially as Cheetahs become increasingly scarce in areas closest to the smuggling routes through Somalia. In total, less than 300 Cheetahs are estimated to remain in the Horn of Africa and its borderlands, with a further 355 Cheetah in South Sudan and northern Kenya likely to become increasingly vulnerable to this trade as populations closest to the destination countries become extirpated.

Cheetah skins are also traded, often alongside Leopard skins, within Africa and to Asia. As most Cheetah subpopulations are small, even a low level of illegal trade could be threatening wild populations.

Range states from North, West and Central Africa also consider illegal trade to be a significant threat. Although there are no known confiscations of Cheetah (live or otherwise) from this region and few

observations of illegal trade and possession (but see Djagoun *et al* 2013), it is likely that Cheetah get absorbed into a widespread illegal market for big cat skins used for traditional ceremonial purposes and médico-magiques. Throughout the region, fakes are abundant and are much more commonly observed than genuine big cat parts and items, which may be indicative of a demand for genuine products. In Sudan, traditional men's shoes (markoob) made of spotted cat fur are sufficiently in demand as luxury items to be considered a threat to Cheetah populations in neighbouring countries (Nowell 2014).

Southern Africa is the only region where there is a legal trade in trophies under CITES Appendix I quota from Namibia, Zimbabwe and Botswana (CITES 1992). South Africa is the only Cheetah range state to have CITES registered commercial captive-breeding operations, and is the world's largest legal exporter of live Cheetah. Cheetah experts suspect that some less reputable facilities in South Africa may be illegally trading, nationally and internationally, in live-captured wild animals using the presence of a legal trade as a cover (Nowell 2014). Researchers have interviewed dozens of observers in recent years – primarily farmers and also conservation officials – who have reported illegal international movement of live-captured wild Cheetah between Botswana, Namibia and South Africa.In Iran there are occasional reports of capture of live Cheetah (Jowkar *et al.* 2008, Anon 2017), however there is no evidence of any systematic trade in live Cheetah or in Cheetah parts. Nonetheless, even a tiny trade could have an impact on this Critically Endangered subpopulation. The Department of Environment (DoE) in Iran has recently increased fines for capturing or killing Cheetah to 25.000 $.

Threats (see Appendix for additional information)

As a wide-ranging carnivore that never attains densities of much more than two individuals per 100 km², Cheetah are particularly vulnerable to habitat loss and fragmentation (IUCN SSC 2007a,b, 2012; Durant *et al.* 2017). Their low density means that Cheetah populations require much larger areas of land to survive than do those of other carnivore species, and hence they are particularly sensitive to these pressures which, together, represent the over-arching threat to Cheetah (IUCN SSC 2007a, b, 2012; Durant 2017).

The majority of Cheetah resident range (77%) and most of the Cheetah population (67%) are found on unprotected land (Durant *et al.* 2017). Cheetah living outside protected areas are often threatened by conflict with livestock and game farmers (Marker *et al.* 2003a, Inskip and Zimmermann 2009, Thorn *et al.* 2013, Dickman *et al.* 2014). While Cheetah tend to prefer wild prey over livestock, they may kill livestock in some circumstances and can be killed by farmers either in retaliation to depredation or to prevent livestock loss (Marker *et al.* 2003a, Dickman *et al.* 2014). Conflict with game farmers is widespread as Cheetah are seen as competitors for valuable game offtake. These conflicts may involve both subsistence pastoralists and commercial ranchers. In many areas Cheetah survival in the face of this conflict is partly due to the fact that they can be difficult to kill. They rarely scavenge (Caro 1994, Durant *et al.* 2010b), hence they are less susceptible to poisoning than are other carnivores such as Hyaena species, Leopards and Lions. There are likely to be complex underlying issues that can significantly exacerbate conflict, including, for example, a history of grievance against government or the establishment of protected areas and external economic or political processes that have reconfigured human-carnivore relations (Durant *et al.* 2022). The multiple threats faced by Cheetah on unprotected lands, combined with evidence of widespread population declines, has resulted in the species being termed 'protection reliant' (Durant *et al.* 2017).

Cheetah are highly efficient hunters, and are able to survive in areas of comparatively low prey density

(Caro 1994, Durant *et al.* 2010b, Belbachir *et al.* 2015). Nevertheless, loss of prey due to hunting, high livestock densities and grazing pressure, and/or habitat conversion will directly impact Cheetah population size. The industrial levels of bushmeat extraction occurring across many areas where Cheetah still occur (Lindsey *et al.* 2013, Ripple *et al.* 2016) has a serious impact on Cheetah population viability. Prey loss can also have serious indirect effects, since predation on livestock may become more frequent where wild prey is depleted (Marker *et al.* 2003b), intensifying conflict with livestock farmers. Cheetah may also become captured in snares set for bushmeat offtake, even though they may not be the primary target (Lindsey *et al.* 2013). While these bycatch effects on Cheetah populations are not well quantified, there are multiple unpublished observations of snared Cheetah (see also Marnewick *et al.* 2009) and snaring may threaten some subpopulations, particularly when subpopulations are small and isolated.

High speed roads also represent a growing threat to Cheetah subpopulations. This is a particular concern where paved roads cross or adjoin major wildlife areas, such as the Nairobi-Mombasa road which traverses Tsavo National Park in Kenya, and the main road that passes through Khar Touran Biosphere reserve in Iran. In Iran, out of 27 known Cheetah mortalities between 2001 and 2016 due to various human-causes, at least 14 were killed on roads through Kalmand, Touran, Bafq and Dareh Anjir protected areas, making it the major cause of anthropogenic mortality (Iranian Cheetah Society 2013, CACP unpublished data). Between 2014 and 2019 six adult Cheetah were hit and killed by cars on the dirt main road through the Serengeti National Park in Tanzania (S. M. Durant and D. Minja, pers. obs.). Additional deaths have also been reported on many other roads, including examples in South Africa, Zambia and Kenya. Such mortality could have a significant impact on population viability, particularly when populations are small and/or isolated.

Unregulated tourism has the capacity to threaten Cheetah populations (Roe *et al.* 1997). Cheetah are undeniably a key attraction for wildlife tourists from Africa; in Amboseli National Park in Kenya tourists spent 12–15% of their total time spent for wildlife viewing observing Cheetah (Roe *et al.* 1997). Large numbers of tourist vehicles or insensitive tourist behaviour can lead to a number of negative effects such as interference with Cheetah hunting, scaring Cheetah away from kills to which they are unlikely to return, and separation of mothers from cubs (Henry 1975, 1980; Burney 1980). Cub mortality due to separation from their mother has been reported in the Serengeti National Park and Mara Reserve. There have even been unconfirmed reports of vehicles running over Cheetah cubs in the Mara Reserve in their scramble to get close-up photographs. In contrast, well-regulated tourism can make important contributions to Cheetah conservation, not only by the revenue it generates, but also by raising awareness and increasing political will for conservation (Roe *et al.* 1997).

Although Cheetah can be affected by infectious disease, notably mange within the Serengeti-Mara ecosystem, (Caro *et al.* 1987, Gakuya *et al.* 2012) and anthrax in Etosha (Turnbull *et al.* 2004), the low density of Cheetah makes it unlikely that infectious disease presents a major threat to free-ranging Cheetah populations.

Cheetah are hunted in some areas for their skins, and also for cultural uses. Additionally, there is a substantial illegal trade in Cheetah cubs as pets to Gulf states (see Use and Trade).

An emerging threat is the increase in resource extraction and extensive infrastructure development, such as mining, oil, pipelines, roads and railways. These developments risk further fragmentation of the

remaining Cheetah subpopulations into smaller and smaller subpopulations, which may no longer be viable. This has been reported to be a particular problem in Iran, especially for the southern subpopulation (Dehghan 2013), but it is a growing problem in Africa as well.

Climate change will probably negatively influence Cheetah across their range, including due to changing patterns of agricultural land conversion. The reduction in land due to rising sea level, large scale movements of human populations and increased variability in rainfall will exacerbate negative impacts of a rapidly rising human population. In Iran, where impacts have been modelled, it is predicted that climate change will force Cheetah to shift to more temperate areas where they might face higher levels of conflict with local people and other large carnivores (Khalatbari *et al.* in 2018).

All the threats identified above play some role in most Cheetah subpopulations across Africa. In Eastern, Southern and Western Africa, habitat loss and fragmentation have been identified as a primary threat (IUCN SSC 2007a, b, 2012, 2015). Because Cheetah occur at low densities, conservation of viable populations requires large scale land management planning, including maintaining connectivity; as most existing protected areas are not large enough to ensure the long-term survival of Cheetah (Durant *et al.* 2010b). In the desert habitats of northern Africa and Iran a depleted wild ungulate prey base is a particular concern (Eslami *et al.* 2017, Durant *et al.* 2014, Belbachir *et al.* 2015). Conflict with livestock farmers due to livestock depredation, either perceived or real, is a widespread and serious problem across most Cheetah range (IUCN SSC 2015, Dickman et al 2018).

While the threats outlined above constitute the proximate causes of Cheetah decline, they are a consequence of many ultimate drivers. These include political constraints such as a lack of land use planning, insecurity and political instability and a lack of awareness or political will to support Cheetah conservation. Many of the range states where Cheetah occur suffer from a lack of capacity and financial resources to support conservation, and there is a lack of incentives for local people to conserve wildlife. Meanwhile, a lack of environmental awareness, rising human populations, and social changes are leading to ever-increasing subdivision of land, land use change and subsequent habitat fragmentation. These underlying drivers must be addressed if the immediate threats are to be reduced. Conserving viable subpopulations of Cheetah is likely to require areas of land far in excess of 10,000 km^2. Fortunately, Cheetah can thrive in anthropogenically modified landscapes under the right circumstances; hence the landscapes that Cheetah require may be protected, unprotected, or a combination. Cheetah also have excellent dispersal abilities (Boast 2014), making it likely to be comparatively easy to maintain gene flow between populations, and to encourage recolonization of suitable unoccupied habitat by conserving connecting habitat (Ahmadi *et al.* 2017). Cheetah survival, ultimately, will depend on political will to combat existing threats and local community support.

Conservation Actions (see Appendix for additional information)

The low density of Cheetah throughout their range, means they require conservation action on a scale that is seldom seen in terrestrial conservation. This includes transboundary cooperation, land use planning across large landscapes to maintain habitat connectivity, and human wildlife conflict mitigation (IUCN SSC 2007a,b, 2012, 2015; Durant *et al.* 2022). Most Cheetah range (77%) is on unprotected lands where their habitat is vulnerable and where they are often persecuted in retaliation for livestock or game depredation (Durant *et al.* 2017).

The species is listed on Appendix I of CITES, Appendix 1 of CMS and is protected under national

legislation throughout most of its extant and some of its former range (Nowell and Jackson 1996; IUCN SSC 2007a, b, 2012). However, a number of countries permit Cheetah to be killed in defense of life and livestock, as part of their problem animal control regulations (Purchase *et al.* 2007). There is very rarely any systematic monitoring of how many animals are killed in this way. Moreover, in some countries the retention of Cheetah parts, such as skin, may be permitted in these operations, which may provide additional incentives for animal removals.

In Africa, nearly all range   states are actively involved with the African Range-Wide Cheetah Conservation Initiative (CCI) (previously known as the Range Wide Conservation Program for Cheetah and African Wild Dogs or RWCP), which   has supported them in the participatory development of regional   strategies and national conservation action plans using the IUCN SSC   strategic planning process (IUCN SSC 2008). Cheetah and Wild Dog are combined in the conservation planning process because of their similar   low densities, large space needs and ecological requirements. This also increases leverage for conservation action by way of delivering impacts for two threatened species for the price of one. There are three   regional strategies in place for Africa covering all Cheetah range: Eastern Africa (IUCN SSC 2007a); Southern Africa (IUCN SSC 2015); and Western, Central and Northern Africa (IUCN SSC 2012). The Southern Africa strategy was developed from a review of the initial strategy developed in 2007 (IUCN SSC 2007b). A similar review of the Eastern   Africa strategy has been postponed due to the COVID-19 pandemic and is planned for 2022.

As well as providing a regional framework, the   regional conservation strategies also provide a framework for national   conservation action planning. They are used within national conservation action planning workshops that allow broad regional commitments to be tailored to the specific policy and legislative environments within each range state. National conservation action plans are in place for most   range states (dates of the initial planning workshop, and subsequent   action plan review, in brackets): Kenya (2007), Botswana (2007, review 2018), Ethiopia (2010), South Sudan (2009), Zambia (2009, review 2018), Zimbabwe (2009. Review 2018), South Africa (2009), Benin (2014), Niger (2012); Chad (2015); Tanzania (2013); Mozambique (2010); Malawi (2011); Namibia (2013); Algeria (2015); Angola (2016); and Burkina Faso (2016). In addition, Cheetah are included in Uganda's Large Carnivore National   Conservation Action Plan (2010). These action plans cover nearly all the 30 Cheetah populations in Africa and 96% of known African Cheetah range. Each national conservation action plan is published by government   wildlife authorities and represents each state's commitment to Cheetah (and wild dog) conservation.

The strategies and action plans   provide a road map for reversing ongoing declines in Cheetah populations   using a holistic approach that addresses both the proximate threats and the ultimate drivers of these threats (see Threats). While there are some differences between individual plans and strategies, they broadly all address objectives to improve national capacity for Cheetah conservation and management; raise awareness of and political commitment to Cheetah conservation; promote human Cheetah coexistence; improve land use planning and reduce habitat fragmentation; improve policy and   legislation; and address Cheetah conservation information needs. Local and national projects and NGOs are critical to this process, as well as governments, and the implementation of the plans and strategies is overseen by three CCI regional coordinators. There are also a number of different projects and/or NGOs established across southern and eastern Africa that are either dedicated specifically to the conservation and research of Cheetah, or to the guild of large carnivores. Many of these projects carry out important site-based conservation activities that benefit Cheetah, and support

for capacity development of national wildlife authorities. The CCI is the only active cheetah conservation program in northern, western or central Africa, but there are important initiatives to safeguard protected areas in this region, including efforts by African Parks to protect the WAP and Zakouma ecosystems.

The recent CITES-CMS Africa Carnivore Initiative, adopted at the 12th Conference of the Parties, provides a range of significant decisions to improve the conservation status of Cheetah, along with the other three focal threatened carnivores (see https://www.cms.int/en/legalinstrument/african-carnivores-initiative).

In Iran, the Asiatic Cheetah is completely protected (Hunter *et al.* 2007a). Currently, the main protected areas for this species are Kavir National Park, Khar Touran National Park, Miandasht Wildlife Refuge, Naybandan Wildlife Refuge, Darband e Ravar Wildlife Refuge, Dareh Anjir Wildlife Refuge, Kamki Bahabad Hunting Prohibited Area and Ariz Hunting Prohibited Area (Khalatbari *et al.* 2017). Additional small protected areas predicted to have an important role in connecting subpopulations should be subjected to more conservation (Ahmadi *et al.* 2017). Management of livestock in Cheetah habitats, recovery of prey population and safeguarding roads are other most urgent conservation measures that should be taken. The UNDP established a programme of work to support conservation of the Asiatic Cheetah in 2001, and a conservation planning workshop took place in 2010, leading to the development of an action plan for the period of 2010 to 2014. Developing a new and updated action plan considering the current circumstances is recommended. UNDP has recently considered stopping their support for this project, meaning that this project may continue only with national budget. Considering limited budgets allocated for conservation projects in Iran, this might be a serious threat to long term conservation of Cheetah in Asia. In 2009, the Afghan Government placed Cheetah on the country's Protected Species List, meaning all hunting and trading of this species within Afghanistan is now illegal, although it is thought to be extinct in the country.

Credits

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External Resources

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

Appendix

Habitats

Habitat	Season	Suitability	Major Importance?
2. Savanna -> 2.1. Savanna - Dry	Resident	Suitable	Yes
3. Shrubland -> 3.5. Shrubland - Subtropical/Tropical Dry	Resident	Suitable	Yes
4. Grassland -> 4.5. Grassland - Subtropical/Tropical Dry	Resident	Suitable	Yes
4. Grassland -> 4.6. Grassland - Subtropical/Tropical Seasonally Wet/Flooded	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.13. Wetlands (inland) - Permanent Inland Deltas	Resident	Suitable	Yes
8. Desert -> 8.1. Desert - Hot	Resident	Suitable	Yes
8. Desert -> 8.2. Desert - Temperate	Resident	Suitable	Yes
8. Desert -> 8.3. Desert - Cold	Resident	Suitable	Yes
14. Artificial/Terrestrial -> 14.2. Artificial/Terrestrial - Pastureland	Resident	Suitable	Yes

Use and Trade

End Use	Local	National	International
10. Wearing apparel, accessories	No	Yes	Yes
12. Handicrafts, jewellery, etc.	No	Yes	Yes
13. Pets/display animals, horticulture	No	Yes	Yes
15. Sport hunting/specimen collecting	No	Yes	Yes
16. Establishing ex-situ production *	No	Yes	Yes
17. Other (free text)	Yes	Yes	Yes

Threats

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion		
		1. Ecosystem stresses -> 1.2. Ecosystem degradation		

1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Minority (50%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.1. Shifting agriculture	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.1. Nomadic grazing	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
3. Energy production & mining -> 3.1. Oil & gas drilling	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
3. Energy production & mining -> 3.2. Mining & quarrying	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6

	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
4. Transportation & service corridors -> 4.2. Utility & service lines	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
6. Human intrusions & disturbance -> 6.1. Recreational activities	Ongoing	Minority (50%)	Negligible declines	Low impact: 4	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
6. Human intrusions & disturbance -> 6.2. War, civil unrest & military exercises	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.1. Species mortality			
		2. Species Stresses -> 2.2. Species disturbance			
7. Natural system modifications -> 7.1. Fire & fire suppression -> 7.1.1. Increase in fire frequency/intensity	Ongoing	Minority (50%)	Negligible declines	Low impact: 4	
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation			
		2. Species Stresses -> 2.2. Species disturbance			

7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.9. Small dams	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.1. Unspecified species	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.2. Droughts	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

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

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: Yes
Systematic monitoring scheme: Yes
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: Yes
Occurs in at least one protected area: Yes
In-place species management
Harvest management plan: Unknown
Successfully reintroduced or introduced benignly: Unknown
Subject to ex-situ conservation: Yes
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
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 -> 3.2. 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
3. Species management -> 3.4. Ex-situ conservation -> 3.4.2. Genome resource bank
4. Education & awareness -> 4.1. Formal education
4. Education & awareness -> 4.2. Training
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level
5. Law & policy -> 5.2. Policies and regulations
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
6. Livelihood, economic & other incentives -> 6.1. Linked enterprises & livelihood alternatives
6. Livelihood, economic & other incentives -> 6.4. Conservation payments
6. Livelihood, economic & other incentives -> 6.5. Non-monetary values

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

Research Needed
1. Research -> 1.1. Taxonomy
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

Research Needed
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
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km²): 3123830
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km²): 27720178
Number of Locations: 33
Continuing decline in number of locations: Yes
Extreme fluctuations in the number of locations: Unknown
Lower elevation limit (m): 0
Upper elevation limit (m): 4,000
Population
Number of mature individuals: 6,517
Continuing decline of mature individuals: Yes
Extreme fluctuations: Unknown
Population severely fragmented: Yes
No. of subpopulations: 33
All individuals in one subpopulation: No
No. of individuals in largest subpopulation: 3396
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 4.9

The IUCN Red List Partnership

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

The IUCN Red List Partners are: ABQ BioPark; Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; Missouri Botanical Garden; NatureServe; Re:wild; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.