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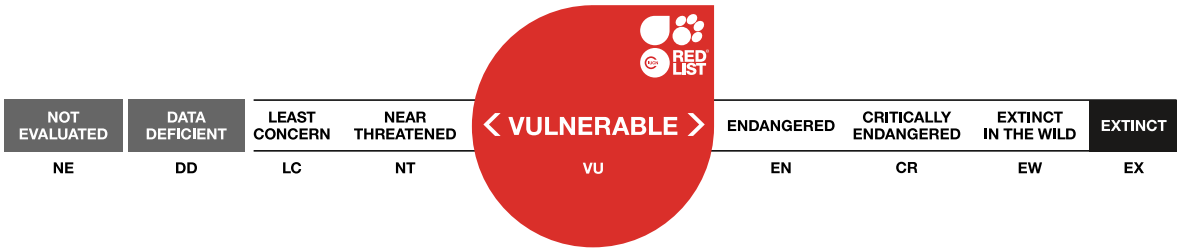
Panthera pardus, Leopard

Amendment version

Assessment by: Stein, A.B. *et al.*



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Scientific Name: *Panthera pardus* (Linnaeus, 1758)

Synonym(s):

- *Felis pardus* Linnaeus, 1758

Regional Assessments:

- Mediterranean

Infra-specific Taxa Assessed:

- Panthera pardus ssp. delacouri
- Panthera pardus ssp. kotiya
- Panthera pardus ssp. melas
- Panthera pardus ssp. nimr
- Panthera pardus ssp. orientalis
- Panthera pardus ssp. saxicolor

Common Name(s):

- English: Leopard
- French: Léopard, Panthère
- Spanish; Castilian: Leopardo, Pantera
- Arabic: Al nimr

Taxonomic Notes:

The taxonomy for *Panthera pardus* is currently under review by the IUCN SSC Cat Specialist Group.

According to genetic analysis, nine subspecies are recognized, with all continental African Leopards attributable to the nominate form (Miththapala *et al.* 1996, Uphyrkina *et al.* 2001). These include:

- *Panthera pardus pardus* (Linnaeus, 1758): Africa
- *Panthera pardus nimr* (Hemprich & Ehrenberg, 1833): Arabia
- *Panthera pardus saxicolor* Pocock, 1927: Southwest Asia
- *Panthera pardus melas* (Cuvier, 1809): Java
- *Panthera pardus kotiya* Deraniyagala, 1956: Sri Lanka
- *Panthera pardus fusca* (Meyer, 1794): Indian sub-continent
- *Panthera pardus delacouri* Pocock, 1930: Southeast Asia into southern China
- *Panthera pardus japonensis* (Gray, 1862): northern China
- *Panthera pardus orientalis* (Schlegel, 1857): Russian Far East, Korean Peninsula and northeastern China

The recognition of *P. p. melas* and *P. p. nimr* was based on very small sample sizes and is considered tentative.

Based on morphological analysis, Khorozyan *et al.* (2006) recognize *P. p. tulliana* (Valenciennes, 1856) in

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western Turkey and *P. p. sindica* (Pocock, 1930) in Pakistan, and possibly also parts of Afghanistan and Iran. They also consider *P. p. ciscaucasica* (Satunin, 1914) as the senior synonym for *P. p. saxicolor*.

Note: Assessments for five of the subspecies (*kotiya, melas, mimr, orientalis* and *saxicolor*) were published in 2008. However, as these have not been reassessed separately as part of the 2015 reassessment of the species as a whole, they are not displayed here, as the information contained in the species account often differs from that in the older subspecies assessments. The 2008 subspecies-level assessments are available on request from the IUCN Red List Unit.

Assessment Information

Red List Category & Criteria: Vulnerable A2cd ver 3.1

Year Published: 2020

Date Assessed: July 11, 2015

Justification:

Leopards are 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. Due to their wide geographic range, secretive nature and habitat tolerance, Leopards are difficult to categorize as a single species. Evidence suggests that Leopard populations have been dramatically reduced due to continued persecution with increased human populations (Thorn *et al.* 2013, Selvan *et al.* 2014), habitat fragmentation (UN 2014), increased illegal wildlife trade (Datta *et al.* 2008), excessive harvesting for ceremonial use of skins (G. Balme pers. comm. 2015), prey base declines (Hatton *et al.* 2001, du Toit 2004, Fusari and Carpaneto 2006, Datta *et al.* 2008, Lindsey *et al.* 2014, Selvan *et al.* 2014) and poorly managed trophy hunting (Balme *et al.* 2009). Throughout North, East and West Africa, Middle East, East and South-east Asia, Leopards have suffered marked reductions and regional extirpations due to poaching for illegal wildlife trade, habitat loss and fragmentation, and prey loss. Human populations have increased by 2.57 percent annually from 1994 to 2014 (UN 2014) driving a 57% increase in the conversion of potential Leopard habitat to agricultural areas from 1975 to 2000 (Brink and Eva 2009). Deforestation in South-east Asia has increased for palm oil and rubber plantations (Sodhi *et al.* 2010, Miettinen *et al.* 2011). These factors were not incorporated in the previous assessment and likely have a substantial impact on suitable Leopard range.

Comparison of the extent of extant range presented in this assessment (8,515,935 km², see map) with that produced by Red List Assessors in 2007 (21,953,435 km²: Henschel *et al.* 2008) yields a range reduction of 61%. However the severity of this reduction is inaccurate due to previous insufficient sampling (the 2016 map is much more detailed in resolution, see Methodology in the Supplementary Material), and the reduction has likely occurred over a longer time scale. Though our knowledge of the Leopard distribution is better today than in 2008, it is still limited at the national, regional and range-wide scales because reliable data on Leopard population trends are missing from large portions of their range. We suspect, however, that at least half of the reduction translates to real and relatively recent range loss. Also in southern Africa, the so called stronghold of the Leopard, there is no evidence to suggest that Leopard populations have remained stable (G. Balme pers. comm. 2015). In Zimbabwe, much Leopard range has disappeared due to the resettlement of private farmland and subsequent loss of prey populations (du Toit 2004). We estimate regional range loss of approximately 21% in southern

Africa. We suspect that suitable Leopard range has been reduced by >30% worldwide in the last three generations (22.3 years). We calculated generation length as 7.42 years (based on the formula presented in Pacifici *et al.* 2013 and data from wild Leopard populations presented in Balme *et al.* 2013).

Leopard population density across the species' range is known to track the biomass of principle Leopard prey species, medium-size and large wild herbivores (Marker and Dickman 2005, Hayward *et al.* 2007). Prey species are increasingly under threat from an unsustainable bushmeat trade, leading to collapses in prey populations across large parts of savanna Africa (Lindsey *et al.* 2013). A commercialized bushmeat trade has caused an estimated 59% average decline in Leopard prey populations across 78 protected areas in West, East and southern Africa between 1970 and 2005 (Craigie *et al.* 2010). Though ungulate populations have increased by 24% in southern Africa, potential prey numbers have declined by 52% in East Africa and 85% in West Africa (Craigie *et al.* 2010). Bushmeat poaching in Mozambique (Hatton *et al.* 2001, Fusari *et al.* 2006) and Zambia (Lindsey *et al.* 2014) has severely reduced Leopard prey (Becker *et al.* 2013) inside and outside of protected areas. Many wildlife areas are suffering from substantial ungulate decline, including Zambian Game Management Areas and National Parks, maintain large mammal populations at 93.7% and 74.1% below estimated carrying capacity, respectively (Lindsey *et al.* 2014). With such reductions to Leopard prey, we infer a >50% loss of Leopard populations across East and West Africa. Through extensive poaching pressure also in Asia many prey species, such as Sambar Deer in Malaysia, are threatened with regional extirpation throughout tropical forest systems (Corbett 2007, Kawanishi *et al.* 2014).

In South-east and East Asia, poaching for Leopard prey and targeted Leopard hunts for the wildlife trade market are taking place. A regional survey found that Leopards in India have been poached at a rate of four individuals per week for the illegal wildlife trade (Raza *et al.* 2012b). Nowell and Pervushina (2012) found the illegal trade of Leopard parts was comparable to that of Tigers in Asian range States and derivative seizures with an average of 3.5 Leopards seizure cases per month in India since 2000. Preliminary data suggest that the illegal trade in Leopard skins for cultural regalia is rampant in southern Africa. It is suggested that 4,500-7,000 Leopards area harvested annually to fuel the demand for Leopards skins by followers of the Nazareth Babtist (Shembe) Church only (Balme unpub. data).

Poorly managed trophy hunting adds to pressure on local Leopard populations. Balme *et al.* (2009) showed that trophy hunting was a key driver of Leopard population decline prior to intervention in northern KwaZulu-Natal. Similarly, Pitman *et al.* (2015) demonstrated that Leopards are over-harvested across much of their range in Limpopo Province, South Africa. The concern about unsustainable trophy hunting has lately increased, e.g. South Africa has banned trophy hunting for 2016. This followed an alert by its CITES Scientific Authority that the number of Leopards in the country was unknown, and that trophy hunting posed a high risk to the survival of the species.

Taken all together, the Leopard meets the A2cd criterion for Vulnerable, based on loss of habitat and prey, and exploitation. These causes of the suspected reduction are not well understood, have not ceased, and are likely to continue, and future decline is anticipated unless conservation efforts are taken.

For further information about this species, see Supplementary Material.

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Previously Published Red List Assessments

2019 – Vulnerable (VU)
https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T15954A160698029.en

2016 – Vulnerable (VU)
https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T15954A50659089.en

2008 – Near Threatened (NT)
https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T15954A5329380.en

2002 – Least Concern (LC)

1996 – Lower Risk/least concern (LR/LC)

1990 – Threatened (T)

1988 – Threatened (T)

1986 – Vulnerable (V)

Geographic Range

Range Description:

Our assessment of Leopard distribution has been divided into two geographic regions: Africa and Asia. In order to describe these regions, we have further divided Leopard distribution into sub-regions to address local population trends. A detailed discussion of the methodology used to produce the 2015 range map can be found in the Supplementary Material.

Leopards in Africa

North Africa: Leopard distribution in North Africa has been restricted by 97% of their former range with only remnant, isolated populations remaining (Durant *et al.* 2014). An adult male Leopard was killed in the Elba region of southeastern Egypt in retaliation for livestock depredation, though evidence of a breeding population is still uncertain (A. Nagy pers. comm. 2014). Continued camera-trapping efforts have failed to capture the presence of Leopard in the Sinai since 1995 (A. Nagy pers. comm. 2015). The presence of Leopards was confirmed in the Ahaggar Mountains of Algeria from the genetic testing of one scat sample in 2005 but no presence has been confirmed since (F. Belbachir pers. comm. 2014). Leopards are thought to be extirpated from Morocco (F. Cuzin pers. comm. 2012).

West Africa: Leopard distribution in West Africa has been dramatically reduced. This reduction is likely due to habitat fragmentation, but also more rigorous survey efforts that have confirmed presence and likely absence across the region (P. Henschel pers. comm. 2014). Leopards have been confirmed in Niger along the southwestern border with Benin and Burkina Faso (P. Henschel pers. comm. 2014) but previous reports in Air and Tenere National Reserves are unconfirmed. Leopards are generally restricted to a few protected areas from Senegal in the west to Nigeria in the east. Leopards have been reported in the south of Senegal including Parc National de Niokolo-Koba. In Sierra Leone, there are small remnant populations near Outamba Kilimi National Park and Gola National Forest as well as the eastern boundary with Guinea/ Liberia. Leopard populations in Liberia have been recorded in Lofa-Mano National Park in the west and Sapo National Park in the east. In Ghana, Leopards are found along the boundary with Côte d'Ivoire and Mole National Park in the north and west (*c.* Burton pers. comm. 2014).

In Benin, Leopard are found along the northern boundary. Leopards are nearly absent from Nigeria.

Central Africa: In the Democratic Republic of the Congo, Leopard range was largely reduced in areas of increased human influence and areas relatively easy to access and therefore open to illegal hunting and bushmeat trade. In Cameroon, Leopards are found in the northern and southern portions of the country. In Gabon, Leopards are found throughout the country with small absent pockets in the southeast and southwest. In the Central African Republic (CAR) Leopards are found in the southwest, central and eastern portions of the country. Leopards are found throughout South Sudan with the exception of the Sudd wetland.

East Africa: The distribution of Leopards in East Africa has been reduced, in particular in Somalia, Kenya, Ethiopia and central Tanzania. There are possible remnant populations in Djibouti, Eritrea, and North Sudan. They are nearly absent from Somalia. Leopards are found throughout southern Ethiopia, parts of Uganda and the west, central and southern portions of Kenya (Z. Davidson pers. comm. 2014, I. Seme pers. comm.2014, G. Yirga pers. comm. 2014). In Tanzania, Leopards are found throughout the Serengeti-Ngorogoro Crater system and to the south and west. It is thought that Leopards are absent from the southeastern boundary of Lake Victoria to Central Tanzania.

Southern Africa: Southern Africa likely has the healthiest Leopard populations of their entire range. It is generally thought that Angola, Zambia, Zimbabwe and Mozambique have declining but healthy Leopard populations outside of human dominated areas (C. Begg pers. comm. 2014, A. Loveridge pers. comm. 2014, P. Schuette pers. comm. 2014). In Namibia, Leopards inhabit most of the country with the exception of the highly populated northern region, the arid southeast farmlands and the desert coast (Stein 2011). Botswana has a continuous Leopard population in the North and West. In South Africa, Leopards are found along the boundaries with Namibia, Botswana, Zimbabwe and Mozambique with dense populations located in the Limpopo region. Leopards are also located in the Cape provinces of South Africa.

Leopards in Asia

Middle East: The main stronghold for the Arabian Leopard (*P. p. nimr*) is the continuous tract of the Dhofar area in southwestern Oman and the Hawf area in northeastern Yemen (Khorozyan *et al.* 2014, Spalton *et al* 2014). There are also small, isolated populations in Saudi Arabia (Zaffar-ul-Islam *et al.* 2014). In 2006, Leopard populations were estimated at eight individuals in Israel's Judean Desert and Negev Highlands respectively, however, they have not been confirmed since (Perez *et al.* 2006). The species is likely extirpated in the Musandam Peninsula of Oman and UAE (J. Spalton pers. comm. 2014, Spalton *et al.* 2014). Leopards are probably extinct in Jordan (Qarqaz and Abu Baker 2006), UAE (Edmonds *et al.* 2006, Spalton *et al.* 2006) and Egypt's Sinai Peninsula (Spalton *et al.* 2006), with the possibility of rare forays from the Negev (Mallon *et al.* 2008).

Southwest Asia and the Caucasus

Recent surveys found that Leopards have a wide distribution in Iran, mostly in the region of the two mountain chains consisting of Alborz running northwest to northeast and Zagros from northwest to the south (Sanei and Zakaria 2011). Their presence is also recorded in Golestan National Park, Iran which is located in the northeastern part of Iran near the border with Turkmenistan (Erfanian *et al.* 2013, Hamidi *et al.* 2014). A few recently confirmed records from Iraq and Turkey are restricted to the mountainous areas of Kurdistan (B. Avgan and H. Raza pers. comms. 2014), where Leopard is known to be scarce.

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There are numerous camera-trap records dated 2013-2014 confirming the presence of a small population in the Zangezur Ridge shared by Armenia and Azerbaijan (B. Avgan and A. Malkhasyan pers. comms. 2014, Voskanyan 2014, Sarukhanova 2014). Two individuals are recorded in Talysh Mountains of southeastern Azerbaijan (Sarukhanova 2014). There is recent camera trapping evidence from Nakhchivan Autonomous Republic, Azerbaijan (Avgan *et al.* 2012). Recently, a Leopard was video-trapped in North Ossetia, Georgia (P. Weinberg pers. comm. 2014). There are no confirmed recent records in Dagestan although Leopards definitely lived here in low numbers in the 1980s and the last confirmed photograph was taken in 2009 (Yarovenko 2010, Y. Yarovenko pers. comm. 2014).

South and Central Asia: There is some indication of its presence in the Babatag and Kugitang mountains of Uzbekistan (N. Marmazinskaya pers. comm. 2014). A confirmed record of Leopard was obtained in Afghanistan in the Bamyan province in 2011 in a camera trap image (Moheb and Bradfield 2014). In Pakistan, Leopards also inhabits broken hilly or mountainous country throughout Waziristan, Baluchistan and Sindh Kohistan in association with acacia scrub forest (Roberts 1997). A recent study using DNA from scats found Leopard presence in northeast Pakistan from the Ayubia National Park (Shehzad *et al.* 2014). Leopards occur widely in the forests of Bhutan and Nepal. Leopards are widespread across India (Athreya *et al.* 2013, Harihar *et al.* 2009) and Sri Lanka (A. Kittle and A. Watson pers. comms. 2014) occurring inside and outside Protected Areas.

Southeast and East Asia: Leopard range has been significantly reduced in southeast and East Asia. The North China Leopard is restricted to small, isolated protected areas in Central China in the Ningxia, northern Hebei, Shanxi, Shaanxi, northern Henan, western Sichuan, southern Qinghai and eastern Tibet regions (Laguardia *et al.* in press). Leopards of southeast Asia have been confirmed in protected areas in Thailand, Myanmar, Malaysia, Cambodia and southern China but are likely absent from Lao PDR and Viet Nam (S. Rostro-Garcia and J.F. Kamler unpubl. data). Some recent information indicates that they are still present in most forested regions of the island of Java, Indonesia but in very low numbers (H. Gunawan and H.A. Wahyudi pers. comms. 2015). In the Russian Far East, Leopards occur in a large area of about 7,000 km² along the eastern slopes of the East Manchurian Mountains on the border with China but their numbers are likely to be very low (Hebblewhite *et al.* 2011).

For further information about this species, see Supplementary Material.

Country Occurrence:

Native, Extant (resident): Afghanistan; Angola; Armenia; Azerbaijan; Bangladesh; Benin; Bhutan; Botswana; Burkina Faso; Burundi; Cambodia; Cameroon; Central African Republic; Chad; China; Congo; Congo, The Democratic Republic of the; Côte d'Ivoire; Djibouti; Egypt; Equatorial Guinea; Eritrea; Eswatini; Ethiopia; Gabon; Ghana; Guinea; Guinea-Bissau; India; Indonesia (Jawa); Iran, Islamic Republic of; Iraq; Kenya; Liberia; Malawi; Malaysia; Mali; Mozambique; Myanmar; Namibia; Nepal; Niger; Nigeria; Oman; Pakistan; Russian Federation; Rwanda; Saudi Arabia; Senegal; Sierra Leone; Somalia; South Africa; South Sudan; Sri Lanka; Sudan; Tanzania, United Republic of; Thailand; Turkey; Turkmenistan; Uganda; Yemen; Zambia; Zimbabwe

Native, Possibly Extinct: Gambia; Israel; Korea, Democratic People's Republic of; Lao People's Democratic Republic; Lesotho; Tajikistan; Viet Nam

Native, Extinct: Hong Kong; Jordan; Korea, Republic of; Kuwait; Lebanon; Mauritania; Morocco; Singapore; Syrian Arab Republic; Togo; Tunisia; United Arab Emirates; Uzbekistan

Native, Presence Uncertain: Algeria; Georgia

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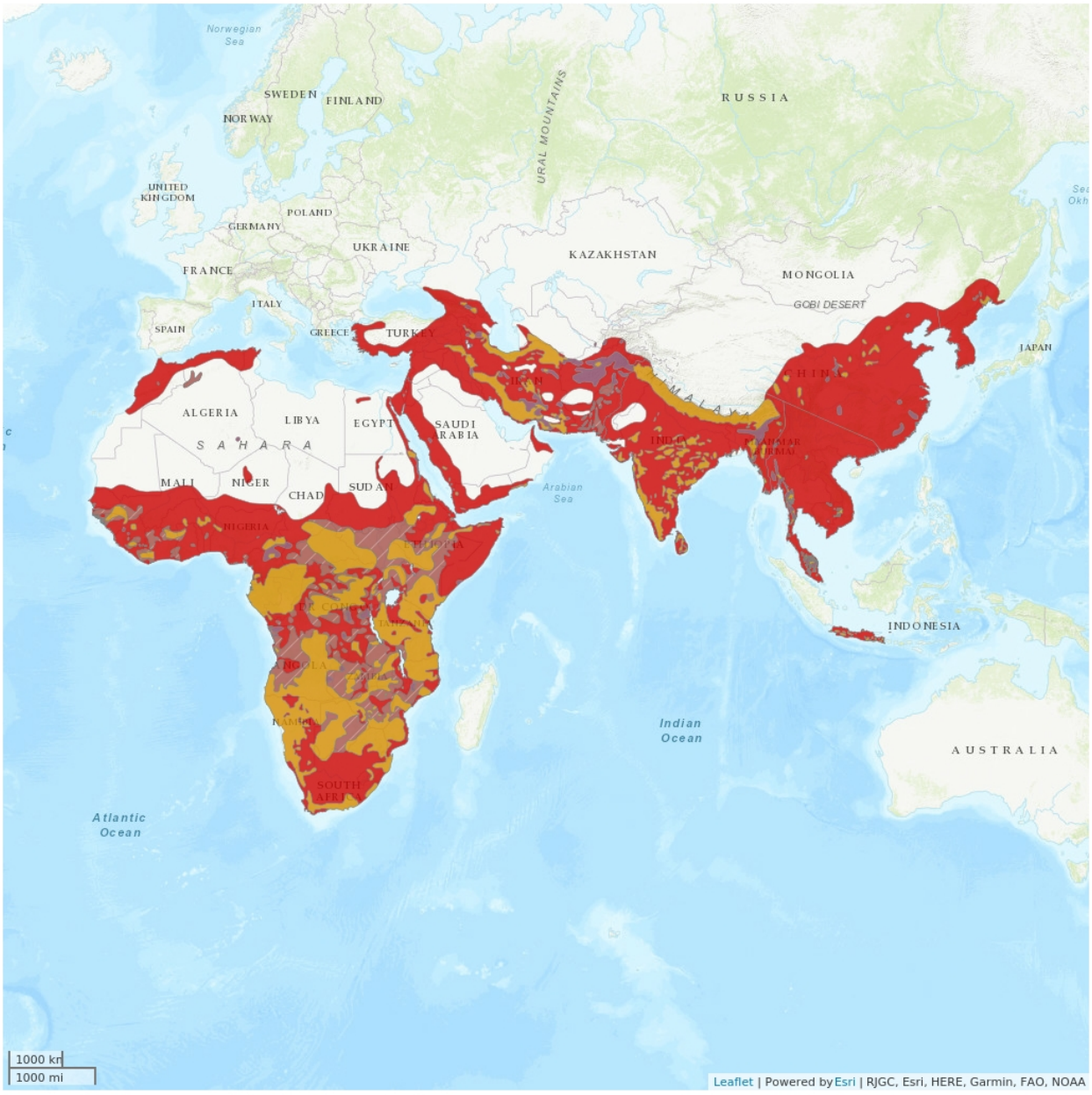
Distribution Map



Legend

- EXTANT (RESIDENT)
- POSSIBLY EXTANT (RESIDENT)
- POSSIBLY EXTINCT
- EXTINCT

Compiled by:
Peter Gerngross 2019

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

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Population

Highly adaptable and widely distributed, Leopards can persist in areas where other large carnivores have been extirpated. However, Leopards are declining throughout most of their range (Jacobson *et al.* in review). There are no robust estimates of the total number of mature individuals range-wide, but several Asian subspecies were assessed as Endangered and Critically Endangered on The IUCN Red List in 2008 and should retain these listings in 2016 based on the following population estimates and a declining trend:

• Amur Leopard (*P. p. orientalis*) - Critically Endangered (CR C2a(ii), D): <60 (Jackson and Nowell 2008, Sugimoto *et al.* 2014, Xiao *et al.* 2014).
• Arabian Leopard (*P. p. nimr*) - Critically Endangered (CR C2a(i)): 45-200 (Mallon *et al.* 2008).
• Javan Leopard (*P. p. melas*) - Critically Endangered (CR C2a(i)): 350-525, with <250 mature breeding adults (Ario *et al.* 2008).
• Sri Lankan Leopard (*P. p. kotiya*) - Endangered (EN C2a(i)): 700-950 (Kittle and Watson 2015).
• Persian Leopard (*P. p. saxicolor*) - Endangered (EN C2a(i)): 800-1,000 (Khorozyan 2008).

[**Note** that although the Red List Categories and Criteria for the subspecies assessments published in 2008 have not changed, the assessments no longer appear on The IUCN Red List as the information they contain may be out-of-date or may contradictory to the information presented here.]

This current (2015) assessment looked at available information on Leopard status on a regional basis (as discussed below). Across the majority of range, leopards have declined substantially (>30%) since the previous assessment as determined by extensive population surveys, expert input and indirect measures supporting our conclusion that Leopards be listed as Vulnerable (criteria A2cd). Over the past three generations (22.3 years) regional Leopard populations in the Middle East, East and South-east Asia, West, Central and East Africa have seen substantial range declines due to habitat fragmentation and forest clearing, prey reductions from the bushmeat trade, illegal harvest for skins and human-wildlife conflict and retaliation for livestock depredation. Leopards have completely disappeared from regions of North Africa where they were recorded in the previous assessment. In India, the Caucasus and the Russian Far-East, Leopards have maintained their populations or increased due to improved survey methods, expanded range or intensive conservation efforts.

AFRICA

There are few reliable data on changes in the Leopard (*P. p. pardus*) status (distribution or abundance) throughout Africa over the last three generations, although there is compelling evidence that subpopulations have likely declined considerably. Robust longitudinal data on 47 Lion (*Panthera leo*) subpopulations—a sympatric large carnivore—demonstrated a 42% decline in abundance across populations in the last three generations (22.3 yrs) (Balme *et al.* 2013, Bauer *et al.* review). Lion population trends decreased in West, Central and East Africa, and increased in Southern Africa. Most of the factors driving Lion population declines (e.g., habitat loss and fragmentation, retaliatory killing due to conflict, poorly managed trophy hunting) also affect Leopards. Indeed, pressure on Leopard populations is likely greater as a larger proportion of their range extends beyond protected areas. The increase in Lion populations in southern Africa was primarily due to the reintroduction of >800 Lions to small, protected reserves in South Africa. Similar reintroductions were not undertaken for Leopards. Fencing of protected areas was proposed as another significant factor contributing to the increase in

Lion numbers in southern Africa (Packer *et al.* 2013). In contrast, fences are far less effective at reducing detrimental edge effects of 'protected' Leopard populations (Balme *et al.* 2010) and again, a far greater proportion of Leopard range falls outside protected areas (Swanepoel *et al.* 2013).

One main factor for Leopard declines in Africa is related to prey declines. Leopard population density across Africa is known to track the biomass of their principle prey species, medium and large-sized wild herbivores (Marker and Dickman 2005, Hayward *et al.* 2007). 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). Time series data from 1970 to 2005 on the main Leopard prey species in 78 protected areas in West, East and Southern Africa, revealed a 59% average decline in population abundance across the three regions. While ungulate and other large mammal populations increased by 24% in southern Africa, they declined by 52% in East Africa and by 85% in West Africa (Craigie *et al.* 2010). Considering the Leopard's dependence on wild prey species within its African range, concomitant Leopard declines in the same order of magnitude (>50%) in West and East Africa can be inferred for the same time frame.

Another main driver of range loss and population decline of Leopards in Africa is habitat loss. Leopards have limited levels of ecological resilience to human-caused habitat fragmentation in Africa, and as a result are more restricted to conservation areas. Although male leopards can successfully traverse fragmented and suboptimal habitat (Fattebert *et al.* 2013), in general Leopards in Africa require large contiguous habitats with low human impacts to reproduce successfully (Balme *et al.* 2010). However, from 1994 to 2014, the human population in Africa increased by 2.57 percent annually (from 0.699 billion to 1.139 billion) (UN 2014), which in conjunction with a 57% increase in agriculture areas (from just over 200 million ha to almost 340 million ha) from 1975 to 2000 and a 21% decrease in natural vegetation in the region (Brink and Eva 2009) likely have negatively impacted the leopard populations. These increases in human population and habitat fragmentation were not accounted for in the previous assessment. As a subspecies *P. p. pardus* potentially qualifies as Vulnerable due to suspected population declines.

Although African Leopards can be regarded as a single genetic grouping, geographically they are subject to different pressures that require area-specific categorizations and conservation status assessments. Therefore, we subdivided the African continent into regional units for more detailed and specific status assessments:

North Africa: Since the previous assessment, remnant populations in Morocco and Algeria are likely extirpated as recent surveys have failed to confirm their presence (F. Cuzin pers. comm. 2012, F. Belbachir pers. comm. 2014). The Egyptian population is considered very small with only a few observed signs in Elba National Park in southeastern Egypt, whereas there has been no recorded sign in Sinai since 1995 (A. Nagy pers. comm. 2015). Therefore, the North African subpopulation potentially qualifies as Critically Endangered on the basis of a very small and declining number of mature individuals, and a full assessment is recommended.

Sub-Saharan Africa: Numbers of sub-Saharan Leopards are declining within large portions of their range, particularly outside of protected areas. The populations within Angola, Zambia, Mozambique, Zimbabwe and South Africa appear to be decreasing from previous estimates with Leopards disappearing from areas with increased human development and areas of intensive conflict with humans (Hatton *et al.*

2001, du Toit 2004, Fusari *et al.* 2006, Lindsey *et al.* 2014). Although urbanization is increasing in sub-Saharan Africa (UN 2013), the majority of the population is rural, and about 60–70% of the population relies on agriculture and livestock for their livelihoods, mostly at a subsistence level. As a result, a large portion of the growing human population is expected to depend directly on expansion of agriculture and livestock grazing to survive. By 2050, the population of sub-Saharan Africa is projected to more than double to >2 billion (UN 2013), and the area of cultivated land is project to increase by 51 million ha (approximately 21 %, Alexandratos and Bruinsma 2012), which likely will contribute to the continued population decline of Leopards in Africa. In the absence of proactive management, populations of Leopards and other large carnivores generally decline in concert with increased human population growth (Woodroffe 2000, Linnell *et al.* 2001). In summary, the combination of widespread habitat loss (21% in sub-Saharan Africa in 25 years) and prey loss inside African protected areas (59% decline) is likely to have caused concomitant Leopard declines of >30% over the last three Leopard generations. The Leopard subpopulation of sub-Saharan Africa potentially qualifies as VU (criterion A2cd).

Additionally, we strongly recommend detailed status assessments for other areas of Africa to address regional needs and requirements (e.g., Henschel *et al.* 2011).

ASIA

Indian Leopard (*P. p. fusca*): The known range of the Indian Leopard has increased compared to the previous assessment, but this is likely due to more intensive surveys conducted in previously unstudied wild and suburban environments. Poaching for wildlife trade is an increasing threat to Indian Leopards (Datta *et al.* 2008). For example, Raza *et al.* (2012b) estimated that four Leopards per week have been poached for illegal wildlife trade over the previous 10 years. Additionally, high conflict is reported in some areas resulting in lethal control of problem individuals (Athreya *et al.* 2013). Continuous decreases in wild prey are negatively impacting Leopard numbers in some regions (Datta *et al.* 2008, Selvan *et al.* 2014), indicating Leopard populations may decline in the future. Moreover, even in well protected areas, the recovery of Tiger numbers often results in lower Leopard numbers (Harihar *et al.* 2011, Mondal *et al.* 2012), as Tigers are known to kill and displace Leopards (McDougal 1988, Odden *et al.* 2010). The first ever scientific national census of Leopards around Tiger habitats in India (except the northeast) in 2014 estimated 7,910 individuals, with a speculated national total of 12,000-14,000 (Bhattacharya 2015). A full assessment is recommended for *P. p. fusca*, as it may potentially qualify as Vulnerable due to a suspected declining population containing fewer than 10,000 mature individuals.

North China Leopard (classically described as the subspecies *P. p. japonensis*): A recent review of Leopard distribution shows a >80% reduction in range considered extant in 2008 (Laguardia *et al.* in press). This subspecies, endemic to China, now occurs only in parts of seven provinces, and the total population is estimated at <500 individuals (Laguardia *et al.* in press), with the number of mature individuals likely less than that. Subpopulations are small (<50 individuals) and fragmented, and occur mainly in isolated nature reserves, indicating subpopulations may not be viable in the long-term. Reasons for their decline include retaliatory killings due to conflict, poaching for wildlife trade, low prey numbers (especially ungulates), and habitat loss and fragmentation (Laguardia *et al.* in press). These threats are expected to continue in the future, indicating that Leopard populations may continue to decline. Therefore, we recommend a full assessment for *P. p. japonensis* or the subpopulation of North China, as it potentially qualifies as Critically Endangered or Endangered due to a small, steeply declining population.

Indochinese Leopard (classically described as the subspecies *P. p. delacouri*): A recent review showed a dramatic reduction of over 80% in range where Leopards are considered extant in South-east Asia compared to 2008 (S. Rostro-García and J. F. Kamler unpubl. data). This subspecies is now likely extinct in Lao PDR, Viet Nam, and Singapore, and only small fragmented populations remain in Cambodia, southeastern China, Malaysia, Myanmar and Thailand, resulting in a total estimated population of <2,500 individuals for all of Southeast Asia (S. Rostro-García and J. F. Kamler unpubl. data). Targeted poaching for wildlife trade is probably the greatest factor that contributed to the recent range collapse of Leopards in South-east Asia. Leopard parts are used as substitutes for Tiger parts for medicinal purposes in China and South-east Asia, and Leopard skins are highly sought after as luxury items (J. F. Kamler pers. obs.). Poachers in South-east Asia can get up to $3,000 for a Leopard carcass (S. Prum and R. Maharjan pers. comms. 2014), and this price likely will continue to increase. Other important factors include depletion of prey base, and habitat loss and fragmentation. Throughout all South-east Asian countries and southeastern China, primate and large (>5 kg) ungulate populations are well below carrying capacity due to over hunting by humans, even within protected areas (Johnson *et al.* 2006, Steinmetz *et al.* 2010, Kawanishi *et al.* 2014), which may hinder recovery of Leopards in the region. Habitat loss and fragmentation are serious threats to Leopards in South-east Asia, particularly because these are closely associated with prey depletion and high levels of human disturbance. The deforestation rate in South-east Asia is the highest of all tropical regions, and the rate is still increasing (Sodhi *et al.* 2010, Miettinen *et al.* 2011). From 2000 to 2010, areas of primary or secondary forests decreased in all Southeast Asian countries, most of which was due to conversion to palm oil and rubber plantations, as the price of these commodities increased 130% and 333%, respectively, during the same period (Wilcove *et al.* 2013). Because <10% of South-east Asian forests are under some form of protection, and prices of luxury wood, palm oil, and rubber are expected to increase, habitat loss in the region is expected to continue (Sodhi *et al.* 2010) and thus likely to have negative impacts on the leopard populations. Therefore, we recommend a full assessment for the Sout-heast Asian Leopard subpopulation (*P. p. delacouri*), as it potentially qualifies as Endangered due to a small declining population.

Other subspecies: Leopards of the Arabian Peninsula (*P. p. nimr*), Java (*P. p. melas*), and Russian Far-East (*P. p. orientalis*) continue to require listing as Critically Endangered due to low population numbers and population fragmentation. Although the population of *P. p. orientalis* may have increased recently, especially on the Chinese side of the border (Xiao *et al.* 2014), the total population remains <60 individuals. With no noted population or range increase, the Sri Lankan Leopard (*P. p. kotiya*) should retain its current status as Endangered. The Leopard of southwestern Asia (*P. p. saxicolor or ciscaucasica*) has been recorded in previously undocumented areas of the Caucasus, such as Georgia and Azerbajian (Sarukhanova 2014, Voskyanyan 2014), however, due to overall low numbers and restricted range, this subspecies should remain listed as Endangered (Khorozyan 2008). See the individual Red List accounts for more details regarding these subspecies.

Note: We acknowledge that additional data could reveal an increase or decrease in population size or range loss of Leopards, thus the status could change for segments of Leopard range as more data are collected.

For further information about this species, see Supplementary Material.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Habitat Types and Range

Leopards occur in the widest range of habitats among any of the Old World Cats (Nowell and Jackson 1996). They are found in the desert and semi-desert regions of southern Africa in Namibia and Botswana. There are remnant populations in the arid regions of North Africa in Egypt, as well as the Arabian Peninsula. They persist in rugged montane regions of southwest Asia in Iran, in a varied range of landscapes in India and in the savanna grasslands of East and southern Africa. Leopards live in mountainous environments up to an altitude of 4,600 m on Mt. Kenya and 5,200 m in the Himalayas. They also thrive in the rainforests of West and Central Africa as well as Sri Lanka and southeast Asia. A remnant Leopard subpopulation also persists in the snowy regions of the Russian Far-East. Leopard subpopulations also occur in suburban and urban environments in India and parts of sub-Saharan Africa.

Leopards have survived outside protected areas in many parts of India since historical times (Daniel 1999) and even today high density of Leopards do occur among high human densities (Singh 2005, Athreya *et al.* 2013), although associated levels of conflict can also be high (Athreya *et al.* 2011). Occupancy survey found that Leopards occupied 174,066 km² of forest habitat in India (Jhalla *et al.* 2008). Despite widespread occurrence they are killed in very large numbers in India (Raza *et al.* 2012b).

Leopards prefer to hunt in areas that provide sufficient cover despite higher prey densities elsewhere when sympatric with larger competitors (Balme *et al.* 2006).

Diet

Leopard diet is related to prey availability and presence of larger competitors. Generally, Leopards prefer medium-sized ungulate prey (10- 40 kgs) where available (Hayward *et al.* 2006). They have a highly varied diet, however, feeding on insects, reptiles, birds and small mammals up to large ungulates. Though the Leopard as a species has the reputation of being a generalist, often individuals will become adept specialists for a particular prey item. These individuals will feed almost exclusively on that prey, occasionally supplementing their diet with other food items when necessary. Where competitors are present Leopards will cache their kills under thick vegetation or hoist their prey into the limbs of a tree. Hoisting behaviour is more often recorded where intraguild competitors density is higher. Male Leopards tend to hoist more often than females, particularly in the dry season when available ground cover is scarce (Stein *et al.* in press). In the absence of larger competitors, leopards feed on larger prey (Ramakrishnan *et al.* 1999, Hayward *et al.* 2006).

In many parts of its range, the importance of domestic animals in their diet is also evident with dogs, goats and cattle forming a large proportion of their diet (Mukherjee *et al.* 2001) sometimes even dominating the prey items in the diet (Athreya *et al.* 2014, Shehzad *et al.* 2014). Dogs have been reported as important prey for Leopards (Edgaonkar and Chellam 2002, Athreya *et al.* 2014). Overall studies on diet of Leopards are very scant across its Asian range.

Home Range Size

Leopard home range size varies with prey availability and habitat structure. Leopards have the largest ranges within arid and semi-arid environs where prey density is low. The largest recorded Leopard ranges include the Central Kalahari (mean = 2,182 km², Bothma *et al.* 1997). The smallest recorded ranges correspond to rainforest habitats in south and southeast Asia. In Thailand, Grassman (1999)

recorded home ranges as small as 8.8 km² for a female and an average 17.7 km² for two adult males. In India three collared Leopards in human dominated landscapes exhibited home range sizes between 8 to 15 km² (Odden *et al.* 2014).

Systems: Terrestrial

Use and Trade

Leopards are targeted for trophy hunting and are illegally hunted for wildlife trade for their skins (used in traditional ceremonies), and bones and other parts (used for medicinal purposes in eastern cultures).

Threats (see Appendix for additional information)

The primary threats to Leopards are anthropogenic. Habitat fragmentation, reduced prey base and conflict with livestock and game farming have reduced Leopard populations throughout most of their range (Nowell and Jackson 1996, Ray *et al.* 2005, Hunter *et al.* 2013). The conversion of forest habitats and savanna systems to agriculture, livestock farming and urban sprawl have significantly reduced Leopard range. Though exceptions exist (Athreya *et al.* 2013), this conversion typically leads to the depletion of natural prey species through poaching thereby reducing the natural prey base in these areas.

Where livestock and game farms have been created, Leopards may feed on these commercially valuable prey causing conflicts with farmers. These farmers may be intolerant to Leopard conflict and kill the Leopards for real or perceived threats to their lives and livelihoods (Stein *et al.* 2010, Athreya *et al.* 2011). Recent reports from northern Iraq suggest unsustainable levels of Leopard removal (Raza *et al.* 2012b).

Leopards are also targets for trophy hunting. If poorly managed, trophy hunting can be detrimental to the population, especially when permits are focused in one geographic area and targeted individuals are in their prime, territorial, reproductively active (Balme *et al.* 2010). Leopard trophy hunting has been reviewed or closed in Namibia, Botswana, and Zambia within the last five years.

In Indo-Malaya and China, Leopards require better protection from illegal trade in skins and bones (Nowell 2007) and recent reports estimate very high levels of Leopard removal at four individuals per week for 10 years (Raza *et al.* 2012b). Leopards are also killed for their skins in traditional ceremonies and other parts for medicinal use in eastern cultures. These trades can have a substantial impact on local Leopard populations.

In the face of changing land-use, prey availability and direct mortality from humans, Leopards have persisted where other large predators have not. Their ability to live within human-dominated landscapes and feed on a variety of prey have given many people the impression that Leopards require little concern, however, recent trends have shown that current threats have substantially reduced Leopard populations throughout West and Central Africa, South-west and South-east Asia and China.

Conservation Actions (see Appendix for additional information)

The Leopard is included in CITES Appendix I. Trade of Leopard skins and products is restricted to 2,560 individuals in 11 countries in sub-Saharan Africa. Recently, the practices within the hunting industry

have been called into question by wildlife researchers and conservationists (Packer *et al.* 2011). In 2010, the government of Namibia conducted an assessment of trophy hunting in response to calls for an increase in permits amid reports of unethical hunting practices. Zambia placed a moratorium on Leopard and Lion hunting in 2013 due to concerns about the conservation status of the populations. In South Africa, Mozambique and Botswana, researchers have developed regional studies of the hunting quota systems that incorporate measures of trophy quality and regulate the geographic distribution of permits. These quota studies integrate previous hunting data to prescribe the number and distribution of hunting permits with local stakeholder participation. In 2014, sport hunting has been banned altogether in Botswana while South Africa suspended trophy hunting of Leopards for the year in 2016.

Regulating trophy hunting will only address a percentage of Leopard mortality; human-Leopard conflict within livestock and game farming communities is likely the greatest source. In many countries of sub-Saharan Africa, farmers are allowed to kill predators that are considered a threat to life and property with permits distributed retroactively. It is likely that a high percentage of Leopards are killed without reporting and therefore the exact numbers of Leopards killed through actual or perceived conflict is unknown. Generally, efforts to calculate mortality through human-wildlife conflict have been considered unreliable. Since the majority of Leopard range is outside of protected areas, conflict mitigation strategies such as livestock husbandry, compensation/ insurance programmes, alterations in trophy hunting permit distribution and public awareness have all been used to assist farmers and increasing tolerance for living with leopards (Balme *et al.* 2009, Stein *et al.* 2010). Where conflict Leopards have been identified, translocation has been tried often with negative results (Weilenmann *et al.* 2010, Athreya *et al.* 2011), however, effective translocation criteria have been developed based on suitable release site characteristics (Weise *et al.* 2015). Namibia and Botswana have promoted wildlife conservation through the devolution of wildlife management and the establishment of benefit sharing initiatives between photographic tour operators, professional hunters and communities through Conservancies and Wildlife Management Areas (WMAs; Jones 1993). These initiatives were modelled after previous efforts such as CAMPFIRE in Zimbabwe.

In North and West Africa, the Middle East and large parts of Asia, Leopards are restricted to protected areas where they are afforded refuge if poaching is not significant. However, many of these protected areas are not large enough to maintain genetically viable populations and will likely require intensive management. In Indo-Malayasia and China, Leopards require increased protection from illegal trade in skins and bones (Nowell 2007). In 2009, Leopards were protected from all hunting and trading within Afghanistan on the country's Protected Species List (Zahler pers. comm. 2014).

Since the previous status update, researchers have undertaken population surveys within protected areas throughout Leopard range. These surveys have improved our understanding of Leopard status with greater resolution and in some cases generated population estimates. We recommend increased population surveys for Leopards, in particular across Central Africa, Angola, South-east Asia and China.

To address the use of Leopard skins for traditional ceremonies, conservationists in South Africa have partnered with textile companies and communities to provide faux-fur alternatives (G. Balme pers. comm. 2014).

Leopard population recovery efforts are currently under way with reintroduction projects in Sochi, Greater Caucasus and the Russian Far East (C. Breitenmoser pers. comm. 2015).

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Authority/Authorities: IUCN SSC Cat Specialist Group (wild cats)

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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

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

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.4. Forest - Temperate	-	Suitable	Yes
1. Forest -> 1.5. Forest - Subtropical/Tropical Dry	-	Suitable	Yes
1. Forest -> 1.6. Forest - Subtropical/Tropical Moist Lowland	-	Suitable	Yes
1. Forest -> 1.7. Forest - Subtropical/Tropical Mangrove Vegetation Above High Tide Level	-	Marginal	-
1. Forest -> 1.8. Forest - Subtropical/Tropical Swamp	-	Marginal	-
1. Forest -> 1.9. Forest - Subtropical/Tropical Moist Montane	-	Suitable	Yes
2. Savanna -> 2.1. Savanna - Dry	-	Suitable	Yes
2. Savanna -> 2.2. Savanna - Moist	-	Suitable	Yes
3. Shrubland -> 3.4. Shrubland - Temperate	-	Suitable	Yes
3. Shrubland -> 3.5. Shrubland - Subtropical/Tropical Dry	-	Suitable	Yes
3. Shrubland -> 3.6. Shrubland - Subtropical/Tropical Moist	-	Suitable	Yes
3. Shrubland -> 3.7. Shrubland - Subtropical/Tropical High Altitude	-	Suitable	Yes
3. Shrubland -> 3.8. Shrubland - Mediterranean-type Shrubby Vegetation	-	Suitable	Yes
4. Grassland -> 4.4. Grassland - Temperate	-	Suitable	Yes
4. Grassland -> 4.5. Grassland - Subtropical/Tropical Dry	-	Suitable	Yes
4. Grassland -> 4.6. Grassland - Subtropical/Tropical Seasonally Wet/Flooded	-	Suitable	Yes
4. Grassland -> 4.7. Grassland - Subtropical/Tropical High Altitude	-	Suitable	Yes
8. Desert -> 8.1. Desert - Hot	-	Suitable	Yes
8. Desert -> 8.2. Desert - Temperate	-	Suitable	Yes

Use and Trade

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

End Use	Local	National	International
Wearing apparel, accessories	Yes	No	No
Sport hunting/specimen collecting	Yes	No	No

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End Use	Local	National	International
Medicine - human & veterinary	No	No	No

Threats

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

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.1. Shifting agriculture	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.2. Wood & pulp plantations -> 2.2.1. Small-holder plantations	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.2. Wood & pulp plantations -> 2.2.2. Agro-industry plantations	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.1. Nomadic grazing	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion		

		1. Ecosystem stresses -> 1.2. Ecosystem degradation		
3. Energy production & mining -> 3.2. Mining & quarrying	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.4. Unintentional effects: (large scale) [harvest]	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
6. Human intrusions & disturbance -> 6.2. War, civil unrest & military exercises	Ongoing	-	-	Low impact: 3
	Stresses:	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	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.11. Dams (size unknown)	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
7. Natural system modifications -> 7.3. Other ecosystem modifications	Ongoing	-	-	Low impact: 3
	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 land/water protection
Occurs in at least one protected area: Yes
In-place species management

Conservation Action in Place
Successfully reintroduced or introduced benignly: Yes
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 -> 3.3. 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
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 -> 5.4.2. 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

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

Research Needed
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
2. Conservation Planning -> 2.3. Harvest & Trade Management Plan
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Lower elevation limit (m): 0
Upper elevation limit (m): 5,200
Population
Population severely fragmented: No
Habitats and Ecology
Generation Length (years): 7.42

Amendment

Amendment reason: This is a slightly updated version of the amended version of the 2015 assessment, which was created for the 2019-3 Red List to update the distribution map for this species. The map was updated based on more recent data available from the Red List assessment for *P. p. delacouri* (Rostro-García *et al*. 2019, not Rostro-García *et al*. 2016 as previously noted). The reference for the more recent subspecies assessment has also been attached.

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