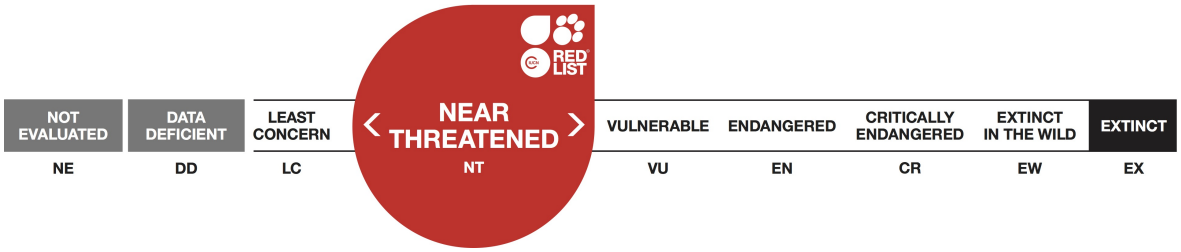
The IUCN Red List of Threatened Species™
ISSN 2307-8235 (online)
IUCN 2008: T18149A50662471

Prionailurus rubiginosus, Rusty-spotted Cat

Assessment by: Mukherjee, S., Duckworth, J.W., Silva, A., Appel, A. & Kittle, A.



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Citation: Mukherjee, S., Duckworth, J.W., Silva, A., Appel, A. & Kittle, A. 2016. *Prionailurus rubiginosus. The IUCN Red List of Threatened Species 2016*: e.T18149A50662471.
http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T18149A50662471.en

Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Taxon Name: *Prionailurus rubiginosus* (I. Geoffroy Saint-Hilaire, 1831)

Common Name(s):

- English: Rusty-spotted Cat
- French: Chat-léopard de l'Inde, Chat rougeâtre, Chat rubigineux
- Spanish: Gato Rojizo, Gato Rubiginosa

Taxonomic Notes:

Taxonomy is currently under review by the IUCN SSC Cat Specialist Group (2014). Placed in *Prionailurus* according to genetic analysis (Johnson *et al.* 2006, O'Brien and Johnson 2007).

Assessment Information

Red List Category & Criteria: Near Threatened ver 3.1

Year Published: 2016

Date Assessed: April 20, 2014

Justification:

The species is listed Near Threatened as it is very close to qualifying for Vulnerable under criterion A3c.

Since the last assessment additional information on the species is now available in the form of new location records (Patel 2006, Patel and Jackson 2005, Vyas *et al.* 2007, Behera 2008, Athreya 2010, Mukherjee *et al.* 2010, Jugal Tiwari *in litt.* 2013, Anonymous 2013, Ramjan Choudhary and Rabin Kadariya *in litt.* 2014, Mali and Srinivasulu 2015) that indicate a larger range than previously known.

A paucity of data on population estimates and the impact of land use changes on the species impedes a more confident assessment. Nevertheless, preliminary analysis on available data suggests that the species is negatively impacted by intensive irrigated agriculture that has fragmented its prime habitat and perhaps also its population in India (see Figure 1 in the Supplemental Material). The analysis also shows that prime habitat for this species occurs in three broad regions within the country, indicative of a fragmented population (Silva *et al.* 2015). These prime regions correspond with dry and moist deciduous forests showing relatively low forest fragmentation according to landuse and land cover maps for India (Roy *et al.* 2012). The absence of any earlier systematic survey makes it difficult to gauge if populations have declined, increased or are stable. However, a future prediction on population decline can be made based on available information on the geographical range of the species, niche model analysis and current change in land use regimes.

Most of the distributional range of the species in India and Nepal lies outside the protected area network and in the deciduous forests of central India which are severely disturbed. The total extent of

http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T18149A50662471.en

prime habitat in India and Nepal is around 25% of the total distributional range within these countries.

The current (2015) Government of India has made provisions for speedy approval of developmental projects in non-protected areas including areas under mining, industrialisation and urbanisation (Mazoomdaar 2015 a,b). Moreover, there are plans for expanding the national area under agriculture by 10% by 2017 (Bhardwaj and Dutta 2014), a development which will continue in the future. Apart from agriculture and industry, parts of the Central Indian landscape within the range of the species are rapidly being converted for establishing solar plants as an alternative source of generating energy since the past few years (Sharma 2015). Since the climate summit of 2015, this is bound to increase given India's strong commitment to reduce its carbon footprint. The impact of this development on persistence of biodiversity remains unclear.

Assuming 10 years as the average life span of the Rusty-spotted Cat in the wild and the Age at First Reproduction (AFR) around 1 year, we estimate the average age of mature individuals (Generation Length - GL) in the current population at around 4 years, using the formula by Pacifici *et al.* (2013): GL = AFR + [z *Rspan], where z (slope) is estimated at 0.3, Rspan (Age at Last Reproduction – AFR). In the next three Rusty-spotted Cat generations, i.e. 12 years, the prime locations where populations are likely to persist are protected areas as these are the only zones remaining close to intact. This translates to 75% of habitat in the current distributional range facing an imminent danger of being converted. As much of this is marginal habitat for the species, a 75% loss of habitat could translate to a decline of around 20-25% (assuming 70-80% of the population resides in prime habitat and a relatively direct relationship between loss of habitat and loss of mature individuals) of the current population over the next three generations. Given the much smaller landmass of Sri Lanka, the mainland population constitutes perhaps 90% or a little more of the global population and therefore has a concomitantly greater contribution to the overall 'average' global change.

Therefore, a future decline of 20-25% over the next three generations is suspected, occurring primarily due to projected habitat loss in central India, with populations stable only in protected areas and little information available about the small proportion of the population found in Sri Lanka.

For further information about this species, see Supplementary Material.

Previously Published Red List Assessments

2008 – Vulnerable (VU) – http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T18149A7673082.en

2002 – Vulnerable (VU)

1996 – Data Deficient (DD)

1994 – Insufficiently Known (K)

1990 – Insufficiently Known (K)

1988 – Insufficiently Known (K)

Geographic Range

Range Description:

The Rusty-spotted Cat was earlier believed to be restricted to India and Sri Lanka but recent photographic records show its presence in Bardia National Park, Nepal (Ramjan Choudhary and Rabin Kadariya *in litt.* 2014), bordering India. Its geographical distribution is as yet not clearly documented but recent locality records suggest it is more widespread than earlier believed (Chakraborty 1978, Phillips 1984, Wright 1984, Miththapala 2006, Athreya 2010, Mukherjee *et al.* 2010, Anwar *et al.* 2012, Raza Kazmi *in litt.* 2012, Jugal Tiwari *in litt.* 2013, Anonymous 2013, Dharmendra Khandal *in litt.* 2013, Pankaj Koparde and Gaurang Gowande *in litt.* 2013, Ramjan Choudhary and Rabin Kadariya *in litt.* 2014, Andrew Kittle *in litt.* 2014). Nevertheless it has a relatively restricted global distribution for a cat and little is known of its ecology or local abundance (Nowell and Jackson 1996, Sunquist and Sunquist 2002). Within India the distribution of this species is similar to, though far more restricted than, the Jungle Cat *Felis chaus* (Mukherjee and Koparde in prep.).

For further information about this species, see Supplementary Material.

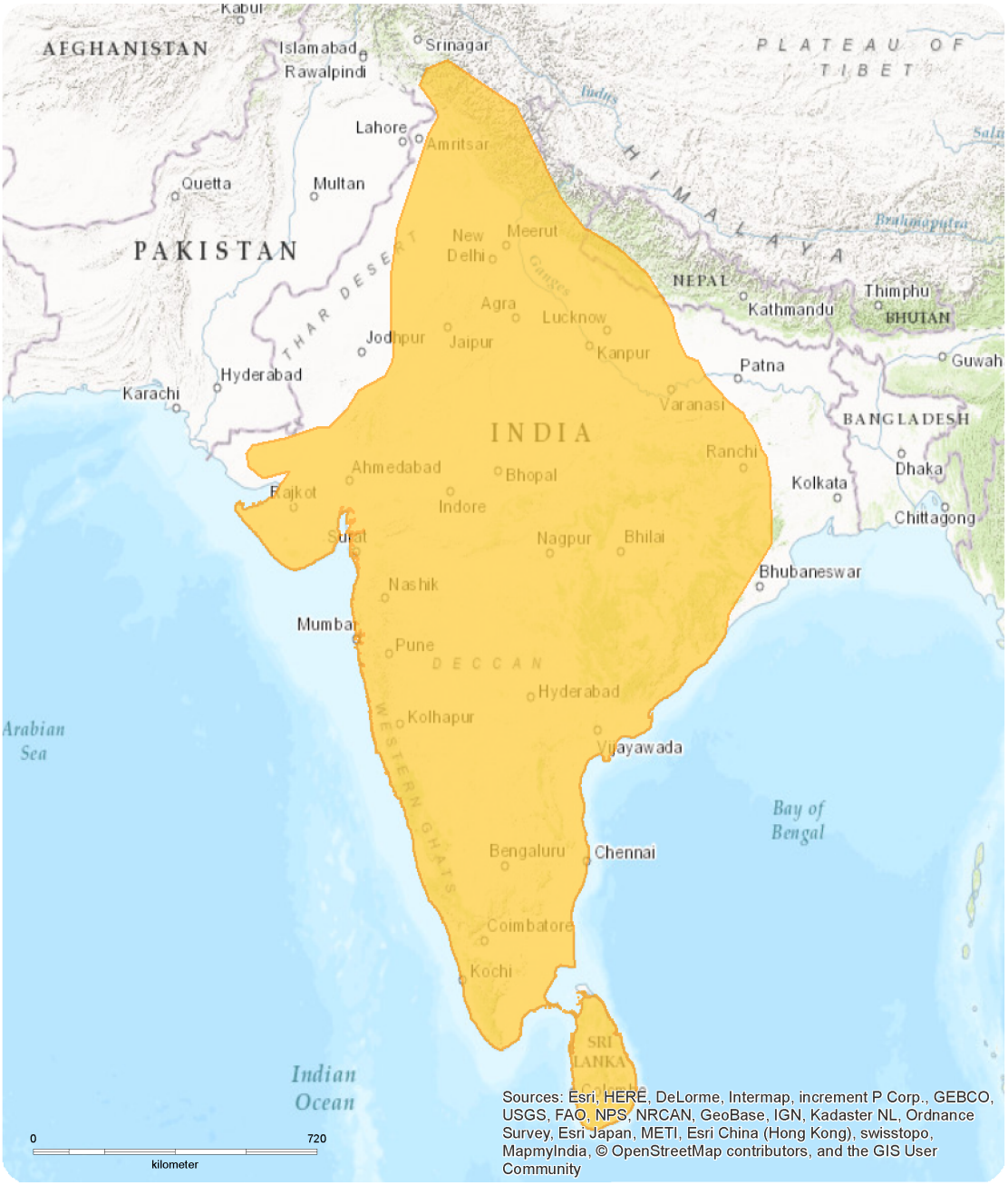
Country Occurrence:

Native: India (Andhra Pradesh, Gujarat, Jammu-Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttaranchal, Uttar Pradesh); Nepal; Sri Lanka

http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T18149A50662471.en

Distribution Map

Prionailurus rubiginosus

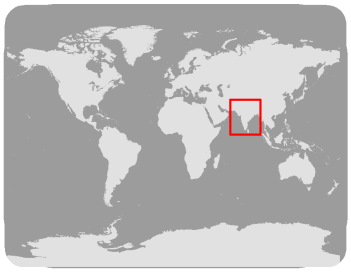


NE | DD | LC | **NT** NEAR THREATENED | VU | EN | CR | EW | EX

Range

Extant (resident)

Compiled by:
Salim Ali Centre for Ornithology and Natural History, Anaikatty, Coimbatore, Tamil Nadu, India



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

Information on this species is not just meagre but also incidental and hence it is difficult to infer, with confidence, its population size, connectivity between populations, threats, and persistence in the future. It appears to be rare almost wherever it occurs (Kunal Patel and Andrew Kittle *in litt.* 2014).

Population trend: the absence of any earlier systematic survey makes it difficult to gauge if populations have declined, increased or are stable. However, the niche model from India (Figure 1 in Supplementary Material) suggests a fragmented population. The analysis also shows that prime habitat for this species occurs in three broad regions within the country (Silva *et al.* 2015). These prime regions correspond with dry and moist deciduous forests showing relatively low forest fragmentation according to landuse and land cover maps for India (Roy *et al.* 2012).

For further information about this species, see Supplementary Material.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Though the species is also found in proximity to human habitation (Worah 1991, Nowell and Jackson 1996, Mukherjee 1998, Nekaris 2003), preliminary results of a study using niche models and known Rusty-spotted Cat locations within India (Figure 1 in Supplementary Material), suggests that at a broad scale this cat's distribution is limited by large contiguous tracts of hostile habitat, specifically intensive, irrigated agriculture (Silva *et al.* 2015). These results were a consensus of four models that incorporated land cover, bioclimatic variables and disturbance measures with 61 location points of the species. The analysis also shows that prime habitat for this species occurs in three broad regions within the country, indicative of a fragmented population (Silva *et al.* 2015). These prime regions correspond with dry and moist deciduous forests showing relatively low forest fragmentation according to landuse and land cover maps for India (Roy *et al.* 2012).

There are recent records of the Rusty-spotted Cat from the Central Highlands of Sri Lanka in small, mostly isolated forest patches (<5 km²) interspersed with tea estates but it is not known if the species occurs in or uses the tea plantation areas (Andrew Kittle *in litt.* 2016).

A few observations suggest that the species preys on rodents (Kunal Patel and Vidya Athreya *in litt.*).

For further information about this species, see Supplementary Material.

Systems: Terrestrial

Threats (see Appendix for additional information)

Habitat loss and the spread of cultivation are serious problems for wildlife in South Asia. The total extent of prime habitat of the Rusty-spotted Cat in India and Nepal is equivalent to around 25% of the range of the species in these countries. These are perhaps the only areas where populations of the species are likely to persist in the future. This translates to 75% of the current habitat in India and Nepal facing an imminent danger of conversion to urban areas, industry, mining and other forms of land use hostile to

Rusty-spotted Cat (Bhardwaj and Dutta 2014, Mazoomdaar 2015 a,b). Apart from agriculture and industry, parts of the Central Indian landscape within the range of the species is rapidly being converted for establishing solar plants as an alternative source of generating energy during the past few years (Sharma 2015). Since the climate summit of 2015, this is bound to increase given India's strong commitment to reduce its carbon footprint. Categorization of certain portions of the species's habitat (scrub, degraded forest) as wasteland facilitates such conversion (Mukherjee and Koparde in prep.).

As much of the distributional range constitutes marginal habitat for the species, this 75% loss of habitat could translate to a decline of around 20-25% (assuming 70-80% of the population resides in prime habitat and a relatively direct relationship between loss of habitat and loss of mature individuals) of the current population over three generations. Given the much smaller landmass of Sri Lanka, the mainland population constitutes perhaps 90% or a little more of the global population

Since much of the species's range is within hugely human-dominated areas undergoing rapid land use change, fragmentation of habitat and disease should be considered as serious threats. There are concerns regarding possible hybridization of Rusty-spotted Cat with domestic cats (Kittle and Watson 2004) but these have yet to be substantiated and measured to determine if this factor is indeed a threat to the species. There is a belief that Rusty-spotted Cats do not get into conflict, unlike Jungle Cats, since they are believed not to prey on poultry (Manakadan and Sivakumar 2006). However, this needs to be backed by research and the threats need to be evaluated across the species's global distribution.

Reflecting the uncertainty of this assessment, the species should be prioritised for research and monitoring.

Conservation Actions **(see Appendix for additional information)**

The Indian population is included on CITES Appendix I, while the Sri Lanka and Nepal populations are included on CITES Appendix II. The species is fully protected over most of its range, with hunting and trade banned in India and Sri Lanka, although domestic trade was largely uncontrolled in Sri Lanka 20 years ago (Nowell and Jackson 1996); no more recent information has been traced. The occurrence of the species in Nepal has only very recently been documented and perhaps it does not figure specifically in conservation laws of the country. It occurs in a number of protected areas, including Yala National Park in Sri Lanka (Nekaris 2003, Kittle and Watson 2004), Wilpattu National Park, Sri Lanka (Andrew Kittle *in litt.* 2016), the Gir National Park (Pathank 1990), Sariska Tiger Reserve (Mukherjee 1998), Ranthambhore Tiger Reserve (Dharmendra Khandal *in litt.*), Kalakad-Mundanthurai Tiger Reserve and Tadoba Andhari Tiger Reserve (Dubey 1999) among many others, in India.

Reflecting the uncertainty of this assessment, the species should be prioritised for research and monitoring, in particular to clarify which of the various potential threats truly are problematic.

Credits

Assessor(s): Mukherjee, S., Duckworth, J.W., Silva, A., Appel, A. & Kittle, A.

Reviewer(s): Nowell, K., Hunter, L., Lanz, T., Breitenmoser-Würsten, C. & Breitenmoser, U.

Contributor(s): Patel, K., Kadariya, R. & Chaudhary, R.

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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 -> 1.5. Forest - Subtropical/Tropical Dry	-	Suitable	Yes
1. Forest -> 1.9. Forest - Subtropical/Tropical Moist Montane	-	Suitable	Yes
2. Savanna -> 2.1. Savanna - Dry	-	Suitable	Yes
3. Shrubland -> 3.5. Shrubland - Subtropical/Tropical Dry	-	Suitable	Yes
4. Grassland -> 4.5. Grassland - Subtropical/Tropical Dry	-	Suitable	Yes
8. Desert -> 8.1. Desert - Hot	-	Suitable	-
14. Artificial/Terrestrial -> 14.2. Artificial/Terrestrial - Pastureland	-	Marginal	-
14. Artificial/Terrestrial -> 14.6. Artificial/Terrestrial - Subtropical/Tropical Heavily Degraded Former Forest	-	Marginal	-

Threats

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

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.2. Commercial & industrial 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 -> 2.1.3. Agro-industry farming	Ongoing	Majority (50-90%)	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 -> 2.1.4. Scale Unknown/Unrecorded	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
3. Energy production & mining -> 3.2. Mining & quarrying	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		

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3. Energy production & mining -> 3.3. Renewable energy	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		
4. Transportation & service corridors -> 4.1. Roads & railroads	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		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Unknown	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
6. Human intrusions & disturbance -> 6.3. Work & other activities	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
7. Natural system modifications -> 7.3. Other ecosystem modifications	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
8. Invasive and other problematic species, genes & diseases -> 8.6. Diseases of unknown cause	Ongoing	Minority (50%)	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality		

Conservation Actions in Place

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

Conservation Actions in Place
In-Place Research, Monitoring and Planning
Action Recovery plan: No
Systematic monitoring scheme: No
In-Place Land/Water Protection and Management
Conservation sites identified: No
Occur in at least one PA: Yes
Percentage of population protected by PAs (0-100): 71-80
In-Place Education
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 Actions Needed
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
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

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 -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated extent of occurrence (EOO) (km^2): 3270934
Continuing decline in extent of occurrence (EOO): No
Extreme fluctuations in extent of occurrence (EOO): No

Distribution
Extreme fluctuations in the number of locations: No
Lower elevation limit (m): 0
Upper elevation limit (m): 2480
Population
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 4
Movement patterns: Not a Migrant

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The IUCN Red List Partners are: BirdLife International; Botanic Gardens Conservation International; Conservation International; Microsoft; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; Wildscreen; and Zoological Society of London.