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PROPOSAL FOR THE INCLUSION OF THE JAGUAR (*Panthera onca*) IN APPENDICES I AND II OF THE CONVENTION*

Summary:

The Governments of the Republic of Costa Rica, the Republic of Argentina, the Plurinational State of Bolivia, the Republic of Paraguay, the Republic of Peru and the Oriental Republic of Uruguay have submitted the attached proposal for the inclusion of the Jaguar (*Panthera onca*) in Appendices I and II of CMS.

*The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CMS Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

PROPOSAL FOR THE INCLUSION OF THE JAGUAR (*Panthera onca*) IN APPENDICES I AND II OF THE CONVENTION

A. PROPOSAL

Inclusion of the jaguar (*Panthera onca*) on CMS Appendices I and II

B. PROPONENT

Costa Rica

Co-proponents: Argentina, Bolivia, Peru. Paraguay and Uruguay

C. STATEMENT OF SUPPORT

1. Taxonomy

1.1 Mammalia Class

1.2 Order Carnivore

1.3 Family Felidae

1.4 Species *Panthera onca* (Linnaeus, 1758)

1.5 Scientific synonyms *Felis onca* (Linnaeus, 1758)

1.6 Common names, in all applicable languages used by the Convention

English: Jaguar

Spanish:

Jaguar, Otorongo, Tigre, Tigre Americano, Tigre mariposo, Tigre Real,

Yaguar, Yaguareté

French: Jaguar

2. General description

The jaguar, *Panthera onca*, is the largest native feline in the Americas and a migratory species from the **United States** to **Argentina** (Quigley et al. 2017) (Section 3). The jaguar is now found in approximately 61% of its almost continuous pre-1900 range between the southern United States and central **Argentina** (Sanderson et al. 2002a, b, Polisar et al. 2014, Zeller 2007). The species is currently almost absent from the **USA** and restricted to the extreme northern limits of **Argentina** and has also been removed in more than 77% of its historic range in Central America (Swank and Teer 1989, Sanderson et al. 2002b, Yackulic et al. 2011, Wultsch et al. 2016).

The IUCN Red List assessment classifies jaguars as Near Threatened due to a 20-25% decline in the last three generations (21 years) (Quigley et al. 2017), largely due to their large subpopulation in the Amazon region and the lack of subspecies that would justify a different classification. De la Torre et al (2018) analysed 34 of the separate subpopulations of jaguar using the IUCN criteria and concluded that, although a large subpopulation persists in the Amazon, 33 of the 34 subpopulations meet the criteria of Endangered or Critically Endangered due to their small size, isolation, poor protection and high human population density in the surrounding areas.

IUCN also noted that the decline in jaguar population is likely to be greater due to difficulties in assessing isolated populations and that as connectivity between jaguar populations continues to decline, the severity of the decline in population is likely to amplify (Quigley et al. 2017).

Optimally, these fragmented jaguar populations can be connected through a series of biological and genetic corridors resulting in connected subpopulations spanning 21 different countries in North, Central and South America (Section 3). In addition, of the 21 countries within the historical range of the jaguar, 13 consider the jaguar to be endangered, 4 vulnerable, 1 almost threatened according to national criteria, and 2 countries have been extirpated.

Jaguar home ranges of 33 km2 -1,359 km2 have been documented (See Annex I). Of these ranges, 26 identified transboundary jaguar populations extend along the borders of more than a dozen countries (see Figure 1). In addition, as jaguar habitat continues to deteriorate or disappear (see Section 4.3), the range of male jaguars is likely to grow as they travel longer distances to find suitable female jaguars and prey that will increase international crossing rates.

Given the large extension of the home ranges of jaguars and the exceptional movements sometimes made by males, jaguars crossing international borders can be expected to be within the following 10 subpopulations (Mexican Pacific; Selva Maya; Mayan Mountains; Honduran Mosquitia; Indio Maíz-Tortuguero; Talamanca; Biogeographic Choco; Sierra Nevada de Santa Marta; Amazonía; Iguazú) which extends over 26 transboundary areas from the **United States** to **Argentina**. There are protected areas in 15 countries that host transboundary jaguar populations.

Laws exist to protect jaguars in virtually all countries of the species' range, but threats persist, especially concerning habitat destruction, loss of migratory corridors and poaching (Section 5).

Despite existing initiatives for jaguar corridor conservation (Rabinowitz and Zeller 2010; Petracca et al. 2017), the challenges of maintaining strong conservation efforts in Jaguar Conservation Units (JCU) can be high and require a set of tools to address direct and indirect threats. Given the importance of maintaining populations in large Jaguar Conservation Units (JCU), additional coordination among jaguar range states is critical for population stability and connectivity across the range.

Inclusion of the jaguar in Appendices I and II would help countries draw attention to endangered subpopulations with transboundary corridors, prioritize corridor management to avoid extinction of more isolated populations, and to coordinate regionally to avoid further isolation of endangered jaguar subpopulations.

3. Migrations

3.1 Types of movement, distance, cyclical and predictable nature of migration.

Jaguars have two main types of movement in the course of their lives: dispersal, which occurs when they are young by establishing their territory, and displacement within their home ranges throughout their lives.

Researchers have identified 26 transboundary jaguar populations, where movement over international borders is probably common (Figure 1).

Fig. 1. Transboundary jaguar populations in the Americas (CMS Party Countries in bold)

Transboundary jaguar populations	**Subpopulation**	**Source**
EUA-México	Pacífico mexicano	McCain et al. 2008 ; Brown et al. 2001 ; Avila et al. 2013 ; USFWS, 2014 ; Grigione et al. 2009 ; King et al. 2008 ; Hatten et al. 2003
México-Guatemala	Maya Forest	De la Torre et al 2018 ; Ceballos et al. 2007 ; Novack, 2003 ; Zeller, 2007; Sanderson et al. 2002
México-Belize	Maya Forest	De la Torre et al 2018 ; Ceballos et al. 2007 ; Harbone et al. 1995 ; Novack, 2003 ; Zeller, 2007 ; Sanderson et al. 2002
Belize-Guatemala	Montañas Maya Mountains	De la Torre et al 2018 ; Kelly, 2003 ; Novack, 2003 ; Zeller, 2007 ; Groff et al. 2013 ; Sanderson et al. 2002
Honduras-Nicaragua	Mosquitia hondureña	De la Torre et al 2018 ; Mora et al. 2010 ; Zeller, 2007 ; Sanderson et al. 2002
Nicaragua**-Costa Rica**	Indio Maíz-Tortuguero	De la Torre et al 2018 ; Zeller, 2007 ; Barquet, 2015 ; Sanderson et al. 2002
Costa Rica-Panamá	Talamanca	De la Torre et al 2018 ; Gonzalez et al 2015 ; Zeller, 2007; Sanderson et al. 2002
Panamá-Colombia	Choco Biogeográfico	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Colombia-**Ecuador**	Choco Biogeográfico	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Colombia-Venezuela	Sierra Nevada de Santa Marta	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Colombia-**Brazil**	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Venezuela**-Brazil**	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Venezuela-Guayana	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Guayana-Surinam	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Guayana-**Brazil**	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Surinam- **French Guayana**	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Surinam-**Brazil**	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002

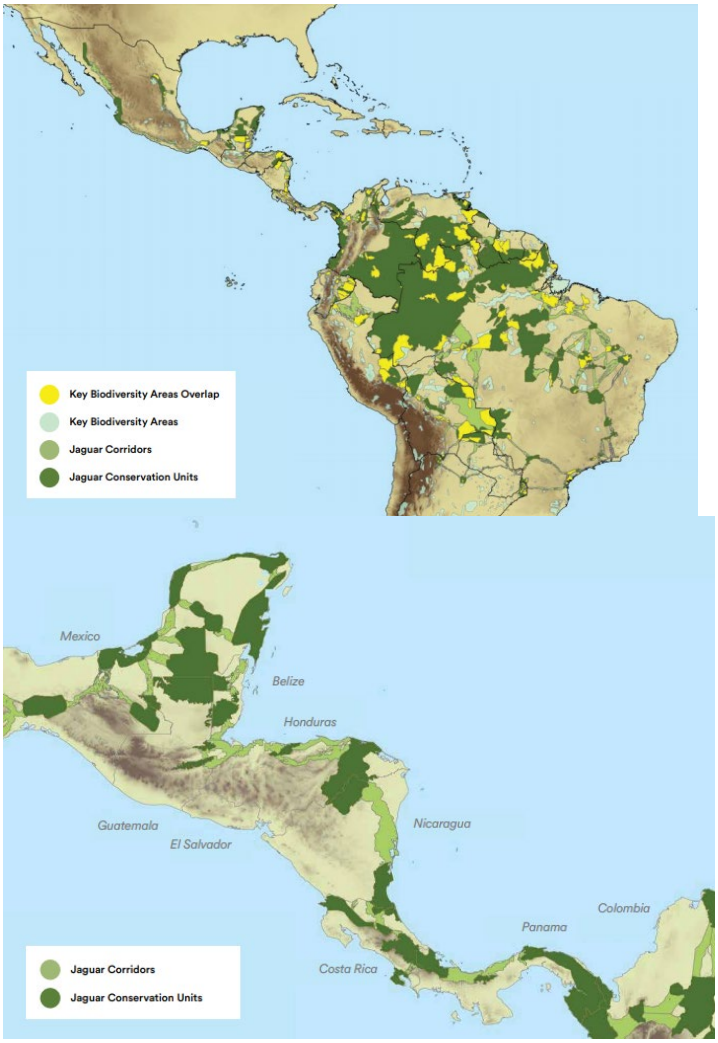
French Guayana-Brazil	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Ecuador-Perú	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Perú-Brasil	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Perú-Bolivia	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Bolivia-Paraguay	Amazonía	De la Torre et al 2018 ; Budowski et al. 2003 ; Romero et al. 2007; Zeller, 2007; Sanderson et al. 2002
Bolivia-Argentina	Amazonía	De la Torre et al 2018 ; Cuyckens et al. 2014 ; Zeller, 2007; Sanderson et al. 2002
Brazil-Bolivia	Amazonía	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002
Brazil-Argentina	Iguaçu	De la Torre et al 2018 ; Paviolo et al. 2006; Paviolo et al. 2008 ; Angelo, 2009 ; Zeller, 2007; Sanderson et al. 2002
Brazil-Paraguay	Iguaçu	De la Torre et al 2018 ; Zeller, 2007; Sanderson et al. 2002

Dispersion

Jaguars are solitary animals that hunt and live alone. As juveniles, jaguar pups remain with their mother for approximately 2 years (Sunquist et al. 2002), and then disperse to find their territory, making trips that can cross international borders.

Rabinowitz et al. (2010) found that 78% of the historical range of the jaguar still potentially allowed movement through the landscape. Through modelling, they were able to predict specific travel and dispersal routes that jaguars can use, covering much of Central and South America (Figure 2). The Jaguar Corridor is an aspirational concept to maintain gene flow between subpopulations to continue that connectivity condition, from **Mexico** to **Argentina**. It is very important to design these potential corridors focused on maintaining connectivity between patches of habitat suitable for the species because the minimum width in which the corridors could be functional for jaguars is 240 meters. (de la Torre et al. 2019). In **Panama**, the Mesoamerican Biological Corridor of the Panamanian Atlantic PAMBC could be the most crucial jaguar corridor linking jaguar populations throughout the Americas (Lynn et al. 2014).

Fig 2.- Jaguar corridors and possible dispersal routes.



Source WCS, Panthera, WWF and UNDP. 2018. Jaguar Conservation RoadMap 2018

Regional cooperation in maintaining connectivity is essential, as small patches of habitat not normally compatible with a single resident jaguar become important. Such corridors greatly increase the ability of individuals to disperse and thus become important landscape features for connectivity and maintenance of isolated populations (Rabinowitz et al. 2010).

While significant geographic barriers, such as the Amazon River, between northern South America and Central America appear to have restricted the flow of historical genes in this species, producing measurable genetic differentiation (Eizirik et al. 2001), none of the many isolated jaguar populations show enough divergent genetic patterns to become their own subspecies, due to the dispersal of the jaguar through these isolated populations (Rabinowitz et al. 2010).

Gender difference from movement patterns has been proposed as an important factor in jaguar dispersal, as there is a tendency for females to settle in more productiveand safer areas generally needed for parental care of offspring (Bernal et al. 2015). Crawshaw et al. (2002) and Crawshaw (1995) documented dispersal distances of 30 and 64 km respectively for male jaguars in different areas of **Brazil** (Rabinowitz et al. 2010). In **Brazil**, a female dispersed 8.4 km while a male dispersed 29.4 km from its birth area (Quigley et al. 2002). One young male dispersed 70 km from the capture area (Nuñez et al. 2002), another jaguar dispersed for three months, a second for eight months before being hunted (Rabinowitz et al. 2010). Leopold (1959) speculated that a jaguar hunted in California in the 1950s had travelled more than 800 km from its point of origin (Sunquist et al. 2002). For a jaguar to reach the U.S. From the

nearest jaguar population centre in **Mexico**, 750 km would be required to travel (Boydeston et al. 2005).

Nomadic Home Range

Jaguars are solitary, except during mating and breeding periods. Jaguars disperse to establish a home range, the size of which depends on body size, prey availability, habitat suitability and access to pairs (de la Torre et al. 2019).

While crossing their range, jaguars, especially those with larger ranges, will cross international boundaries from one side to the other. De la Torre et al. (2018) identified 34 jaguar subpopulations of which 10 distinct subpopulations (Mexican Pacific; Maya Forest; Maya Mountains; Honduran Mosquitia; Indio Maíz-Tortuguero; Talamanca; Biogeographic Choco; Sierra Nevada de Santa Marta; Amazonia; Iguazú) extend over 26 transboundary areas from the **U.S**. to **Argentina** (Figure I).

The size of the home range varies significantly in the jaguar range, which ranges from 33 km2 to 1,359 km2 (Rabinowitz et al. 1986; McCain et al. 2003) (See Annex I). Jaguar conservation requires large units of relatively intact continuous habitat rich in prey or substantial patches of habitat linked by areas of safe passage. In ecosystems such as tropical savannas, as in the Pantanal of Brazil, jaguars use smaller home ranges than in tropical forests (de la Torre et al. 2019). Jaguars inhabiting their most disturbed biome, the Atlantic Forest of **Brazil**, with only 12% of the remaining habitat and a high human population density, have large home ranges and have a greater average distance travelled. Similarly, a jaguar inhabiting the Cerrado, a biome that has lost 50% of its natural area, had the highest home range observed in **Brazil** of 1,268.6 km2 (Morato et al. 2016). The arid environment of the border region of Arizona and Sonora, **Mexico**, contains resources and environmental conditions that are more variable than those of tropical habitats and, therefore, jaguars have larger home ranges and lower densities in borderlands than in rainforest habitat (Mccain et al. 2008).

Males have been documented to have home ranges 2.2-4.2 times larger than females (Tobler et al. 2013b; Cavalcanti et al. 2009; Cullen, 2006; Conde et al. 2010; Chavez, 2010). Movement patterns within these ranges also differ between males and females. Male movement trajectories were proportionally more directional with a greater distance travelled per day compared to female jaguars, probably due to female risk aversion (Morato et al. 2016). The home ranges of males overlap with the home ranges of several females to increase mating opportunities (Schaller et al. 1980; Rabinowitz et al. 1986; Cavalcanti et al. 2009; de la Torre et al. 2019; Conde et al. 2010). Another factor that determines the space for male jaguars is the defence of their territory from other males, who would compete for companions or kill their cubs (de la Torre et al. 2019).

Females' home ranges are determined by the abundance and distribution of prey, which is essential to meet the energy requirements of puppy rearing (Conde et al. 2010). Another factor that determines the use of space in solitary females is the availability of safe havens for pups (Nuñez, 2006). Implementing capture-recapture methodologies revealed different encounter rates due to gender-related movement behaviour and found estimates of the sex ratio of approximately one male to four females (Tobler and Powell, 2013a).

3.2 Proportion of the population that migrates and why it is a significant proportion

Given that many of the planet's major Jaguar Conservation Units extend across international borders, and because of the inherent biological characteristics of large home ranges and dispersal, it is clear that a significant proportion of jaguars will cross international borders and that it is essential to maintain connectivity within and between Jaguar Conservation Units. This event is likely to occur frequently across international borders for many distinct subpopulations (Mexican Pacific; Maya Forest; Maya Mountains; Honduran Mosquitia; Indio Maíz-Tortuguero; Talamanca; Biogeographic Choco; Sierra Nevada de Santa Marta; Amazonia; Iguazú) that extend across 26 transboundary boundaries from the **U.S**. to **Argentina** (see Figure 1). It

should be noted that the large Amazonian Jaguar Conservation Unit extends between **Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname and French Guiana**, nine countries. Jaguar conservation is intrinsically transboundary, and many subpopulations of jaguars and even individual home ranges extend across international borders. There are significant movement possibilities in the Pantanal, Chaco, Amazon regions of southern **Brazi**l, northern **Paraguay** and southeastern **Bolivia**. The entire Isthmus of Central America, linear in its configuration, is a natural corridor, but also a region rich in challenges to overcome. Trap camera surveys have documented transboundary jaguar movements between the **United States** and **Mexico** (McCain et al. 2008), between **Argentina** and **Brazil** (Paviolo et al. 2006), between **Bolivia** and **Paraguay** (Romero et al. 2007), between **Brazil**, **Paraguay** and Argentina (Crawshaw 1995), between **Paraguay** and **Bolivia** (McBride en Romero et al. 2007). Transboundary movement within and between jaguar's subpopulations(de la Torre et al. 2016) is a natural act and what the Jaguar Corridor Concept seeks to retain.

If jaguar habitat continues to deteriorate or disappear, the range of male jaguars may grow as they travel farther to find suitable female jaguars and prey (Annex I and Figure 1), increasing migration distances and international crossing rates. Without adequate conservation of transboundary areas, this will mean high mortality and a decrease in jaguar abundance.

The primary strategy for conserving jaguars is to protect their strengths, maintain strong health populations in strategically located Jaguar Conservation Units worldwide. Optimally, these subpopulations are connected. The Corridor strategy focuses on maintaining genetic integrity throughout its range by preserving genetic connectivity between known populations (Rabinowitz et al. 2010). Given that a significant proportion of the jaguar population regularly crosses transnational borders and is, therefore "migratory" under the CMS convention, preservation and continuity of habitat across international borders are essential to maintain the dispersal and "migration" of jaguars.

4. Biological data (other than migration)

4.1 Distribution (current and historical)

The jaguar is the largest feline in the Americas and the only living representative of the genus Panthera in the New World (Nowell and Jackson, 1996). Historically, it extended from the southwestern **United States** through the Amazon basin to northern **Argentina** (McCain and Childs 2008; Di Bitetti et al.2016). Its occurrence extent (EOO) is estimated at 9.02 million km², with its fortress the Amazon basin rainforest comprising 57% of its total EOO. The jaguar has been virtually eliminated from most of the driest areas of its northernrange: Arizona and New Mexico in the **United States**, and the northern end of the state of Sonora in **Mexico** (Johnson and Van Pelt 2016), as well as northern **Brazil**, the grasslands of **Argentina** and all of **Uruguay** (de Azevedo et al.2016, Di Bitetti et al.2016, Pereira-Garbero and Sappa 2016). In 2002, jaguars were estimated to occupy only about 46% of their historic range (Sanderson et al. 2002). With improved knowledge of the Jaguar range, this percentage is now estimated at 50% (WCS, Panthera, WWF and UNDP 2018; Quigley et al. 2017).

Fig 3. Range of *Panthera onca*.

Source: Panthera 2017. *Panthera onca*. The IUCN Red List of Threatened Species. Version 2019-2

4.2 Population (estimates and trends)

Jaguar populations are declining in range, and the most recent IUCN assessment estimates a 20-25% population decline over the past 21 years (Quigley et al. 2017). However, IUCN notes that this population decline estimate is likely to be conservative due to difficulties in assessing isolated populations and that as connectivity between jaguar populations continues to decline, the severity of the population decline is likely to amplify (Quigley et al. 2017). While the largest sub-population in the Amazon is likely to be in line with IUCN global estimates, in a separate look specifically at these isolated sub-populations, 33 of 34 of them were identified as endangered or critically endangered according to IUCN criteria (de la Torre et al. 2018).

In 2016, Polisar et al. 2014a generated a global abundance estimate of 40,000 to 80,000 individuals with a mean value of 60,000. Other estimates place the world population of jaguars at about 64,000 individuals with the largest subpopulation in the Amazon, comprising about 55,000-57,000 individuals (Goncalves et al. 2013; de la Torre et al. 2018). The Amazon subpopulation represents 89.2% of the total jaguar population, leaving only 10.8% in the rest of the range (de la Torre et al. 2018). A recent estimate (which has been criticized for overestimating populations) puts the world jaguar population at 173,000 individuals (Jędrzejewski et al. 2018) (Annex 3).

Jaguar densities vary considerably from country to country and from habitat to habitat. Jaguars occur at naturally low densities, even in relatively intact areas where hunting pressure is low. Using validated spatial recapture and/or telemetry models, at the upper end there are estimates of 4.4 adults / 100km² in the Peruvian Amazon (Tobler et al. 2013) and 6.6 in the Brazilian Pantanal (Soisalo and Cavalcanti 2006). Both areas are rich in prey in humid habitats. Ramalho (personal communication) has obtained density estimates of 7.35-10.79 jaguars / 100km² in ecotones of dam-rich flooded forest in central **Brazil**. In contrast, Sollman et al. (2011) estimated 0.29 adults per 100 km² in a relatively dry Brazilian Cerrado, a figure possibly related to the enormous estimate of the male home range (Morato et al. 2016). Noss et al. (2012) generated density estimates of 0.39-1.06 jaguars / 100km² at thirteen sampling sites in the Bolivian Chaco. Boron et al. (2016) reported density estimates outside protected areas of 2.52 jaguars / 100km² in **Colombia**'s Magdalena Valley and 1.12 / 100km² in an area dominated by cattle ranching in the Colombian plains. Jędrzejewski et al. (2016) reported density estimates of 4.4 adults / 100km² of a ranch in similar habitat in the Venezuelan plains where hunting was prohibited, and 50% of the ranch was maintained as wild forest. Figel et al. (2016) obtained moderate density estimates of 2.04 jaguars / 100 km² in a study area in Nayarit,

Mexico, where the human population exceeded 50 / km², another reminder that coexistence, though challenging, is feasible. Espinoza (2012) obtained estimates of 1.52, 1.96 and 5.7 jaguars / 100 km² along a gradient of road access/hunting pressure in the Ecuadorian Amazon (Annex 4). Large areas with adequate prey and free from high levels of persecution are prerequisites for effective jaguar conservation.

Recent results show that the jaguar population has decreased abruptly in the last 10 years in the Alto Paraná region of **Brazil** (Paviolo et al. 2006), and it is estimated that the decrease in the subpopulation of jaguars in **Brazil** in the last 27 years was around 30% (Goncalves et al. 2013). There are documented population declines along with habitat loss for many range countries, including **Argentina** (Di Bitetti et al. 2016; Quiroga et al. 2014), **Bolivia** (Romero et al. 2019; Maffei et al. 2016), **Brazil** (Paviolo et al. 2016; de Azevedo et al. 2016; Costa et al. 2005), **Colombia** (Payan et al. 2010, 2013, 2016), **Costa Rica**, (González-Maya et al. 2016; Salom et al. 2007), **Ecuador**, (Mendoza et al. 2017; Espinosa et al. 2016), **Guatemala**, (García-Anleu et al. 2016), **Honduras** (Mora et al. 2016), **Mexico**, (Chávez et al. 2016; Ceballos et al. 2011), **Nicaragu**a, (Díaz-Santos et al. 2016), **Panama**, (Moreno et al. 2016), **Venezuela**, (Hoogesteijn et al. 2016; Jedrzejewski et al. 2016).

4.3 Habitat (brief description and trends)

Jaguars inhabit a variety of environments, including several types of dry tropical forests, tropical rain forests, mountain cloud forests, pine and oak forests, evergreen riparian forests, marshes, mangroves, savannas, scrub, thorn scrub, desert scrub, chaparrals and semi-desert grasslands (Zeller et al. 2007; Brown et al. 2001; Ceballos et al. 2016). They may live in lowlands and mountains, as well as in coastal areas. They show a clear preference for moist habitats and water bodies and are often reported to swim across large rivers to rest in streams (Jedrzejewski et al. 2011; Sunquist et al. 2002). In the Maya Forest of southern **Mexico** / northern **Guatemala**, Conde et al. (2010) found that male and female jaguars preferred the high forest. Scognamillo et al. (2003) found jaguars in Venezuela using habitats (flooded savannas, dry forest and dry savannas with chaparral, semi-deciduous forest, dry grass and evergreen forest) in the same proportion available within their range. They preferred ecotones that were productive for the dams. Arroyo-Arce et al. (2014) conducted occupation models to determine the most important habitat characteristics for jaguars in **Costa Rica**'s Tortuguero National Park. Seventeen out of eighteen jaguar individuals were only detected in coastal habitats where nesting green turtles (*Chelonia mydas*) had become common (Guilder et al. 2015). In **Mexico**'s Lacandon Jungle, De la Torre et al. (2017a) determined that the appropriate habitat was large areas of primary forest over long distances of deforested patches. However, jaguars moved through forest strips as narrow as 240 m. In certain biomes, an intact high forest may appear as essential habitat. However, forest structure may also be related to low hunting pressure and security from conflict and persecution. Jaguars range from dry forests and scrub in the Chaco through mosaics of savannah forests, flooded Amazon forests to mountain slopes, and are therefore flexible when it comes to the structural characteristics of the habitat. Adequate natural prey and freedom from conflicts between humans and jaguars are more important than the exact botanical composition for the functional areas of the corridor.

Jaguars are most frequently found from sea level to 1,200 meters in altitude but have been recorded at 3,800 meters in **Costa Rica**, 2,700 meters in **Bolivia**, 2,100 meters in **Peru** (Sunquist et al. 2002) and 1,800 meters in **Mexico** (Monroy et al 2009). (2019) found that jaguars avoided moving through the peaks of mountain ranges in the tropical forests of southern **Mexico**, as the likelihood of jaguar movement decreased with elevation.

There are strong differences in habitat use between male and female jaguars. Both sexes selected high forests and avoided swamps and secondary growth, but males avoided low forests while females selected low and high forests with similar levels of preference. Female locations suggested a pattern of spatial avoidance among females during the wet season. Home range overlap among males was extensive in both wet and dry seasons, suggesting that males did not maintain exclusive ranges. The overlap between males and females occurred in both wet and dry seasons, and the movements of females were not restricted within the ranges of

individual males (Calvancanti et al. 2009). In addition, males used low-intensity agricultural and livestock land more than females, which represent approximately 9% of the males' habitat. Females avoid areas dominated by humans; male jaguars are more general in their habitat use. These differences in behaviour and environmental preference also lead to different spatial habitat patterns, with the specificity of female habitat leading to a less extensive and more fragmented habitat distribution than for males (Conde et al. 2010). Jaguars prefer to move through forested areas in the tropical forest of southern **Mexico** (de la Torre et al. 2019). Jaguar movements were facilitated by sites with medium to moderate slopes and flat valleys, which is especially plausible if flat areas had been cleared for pasture or livestock, which is a common situation in jaguar habitats (de la Torre et al. 2019). In Sonora, **Mexico**, jaguars move through mountainous corridors to reach the United States (López et al. 2002).

4.4 Biological characteristics

The body size of jaguars is very variable, both continental and local, and there is sexual dimorphism in body size, females are 10-20% smaller than males (Jedrzejewski et al. 2011). Central American jaguars weighed 56.1 and 41.4 kg in males and females respectively, and Amazon jaguars weighed 83.6 kg for males (no data for females) (Jedrzejewski et al. 2011), while Paraguayan and Pantanal jaguars are believed to be the largest. (Seymour, 1989; Hoogesteijn et al. 1996). Hoogesteijn et al. (1996) analyzed body mass and skull measurements of several jaguars from the Venezuelan Plains, the Brazilian Pantanal, the Amazon basin, and Central America. The largest jaguars were from the Llanos (average body mass for males of 104.5 kg and for females of 66.9 kg) and the Pantanal (99.5 and 76.7 kg, respectively). Skull measurements were slightly higher for Pantanal males and significantly higher for Pantanal females.

The powerful jaws, with very large canines, provide the jaguar with the strongest bite of all felines, capable of breaking the skull of a tapir or turtle shell. Jaguars can kill a cow with an ear-to-ear bite, traversing the skull to the brain (Meachen et al. 2009). They have sharp, strong, retractable claws, which they use to grasp and hold prey. Jaguars can live up to 32 years in captivity and up to 13-15 years in nature (Brown et al. 2001; Nowell and Jackson, 1996). Jaguar pups depend on their mothers for more than a year and, when between 15 and 18 months old, often travel independently within their mother's range and kill their own prey. By the time they are 2 years old, they are generally independent (Sunquist et al. 2002).

Females become sexually mature at 2 years, males at 3 years (Hoogesteijn et al. 1996; Seymour, 1989; Nowell and Jackson, 1996; Sunquist et al. 2002). Jaguars have a birth interval of 2 years (Quigley et al. 2002). When in heat, females advertise fertility by odor marking and increased vocalization. Gestation lasts ~ 3 months (Nowell and Jackson, 1996), and 1-4 pups are born, usually two (Rabinowitz and Nottingham, 1986; Sunquist et al. 2002). Puppies are completely weaned at 5-6 months of age (Sunquist et al. 2002). They begin to follow the mother when they are 2-5 months old and begin to travel independently when they are 15-18 months old (Sunquist et al. 2002; Seymour, 1989; Nowell and Jackson, 1996).

4.5 Role of the taxon in its ecosystem

As America's largest feline, the jaguar is the dominant predator. In Iguazú National Park, **Brazil**, jaguars annually eliminate 50% of the available peccaries biomass, and in Jalisco, Mexico, jaguars and pumas kill 23-29% of the deer population annually (Sunquist et al. 2002). Jaguars are opportunistic predators. They can exert a top-down influence on the food chain since they select species in relation to their abundance (Terborgh, 1988). Thus, the number of prey species remains relatively balanced. Since prey species are themselves seed and plant predators, as well as seed dispersers, jaguars affect the structure of the plant community (Terborgh 1988). Jaguars also affect the behaviour of prey species, which will adopt predator evasion behaviours. This predation results in prey species choosing different habitats, food sources, reduced feeding time, which in turn affects plant communities (Miller et al. 2002). When the number of large predators such as the jaguar is reduced, the number of mesopredators increases. This, in turn, can affect populations of smaller prey species, which can affect plant communities (Miller et al. 2002). The absence of jaguars on Barro Colorado Island in **Panama** caused an

excessive abundance of large prey and mesopredators (Miller et al. 2002).

Jaguar diets in homogeneous habitats are more opportunistic than in irregular habitats with clustered prey, where jaguars do not capture all prey found (Carrillo et al. 2009, Emmons 1987, Foster et al. 2010, Weckel et al. 2006) which is related to human-jaguar coexistence. When given the option of selection, jaguars will tend to choose medium and large sized prey (Azevedo 2007a). If cattle are in jaguar habitat, they can be part of that equation (Polisar et al. 2003, Scognamillo et al. 2003). Similarly, unfortunately for jaguars, their preferred prey is also some of the favourite human game species (Novack et al. 2005, Foster et al. 2014), which may result in a reduction in the prey biomass available to jaguars, with presumed direct effects on jaguar densities, movement patterns, and home range sizes.

Jaguars are often considered nocturnal predators. However, the time of day where the jaguars hunted was evenly distributed over the 24-hous, even when examining individual prey species (Cavalcanti 2010). Jaguars consume more than 85 different species of mammals, reptiles, birds and fish (Seymour 1989; Sunquist et al. 2002). Different species of peccaries are preferred prey (Zeller et al. 2007; Crawshaw et al. 2002; Emmons, 1987; Aranda, et al. 1996, 1994). In western **Mexico**, the white-tailed deer was the most representative in the jaguar diet (Núñez et al 2002). Other studies show a preference for armadillos (Weckel et al. 2006; Rabinowitz et al. 1986); large rodents (Taber et al. 1997); sea turtles (Arroyo et al. 2015; Arroyo et al. 2014); caimans (Miranda et al. 2016; da Silveira et al 2010); sloths and iguanas (Bracker et al. 1994) and cattle (de Almeida, 1990; Amit et al. 2013; Castaño et al. 2016). Jaguars appear to be adaptable to the movement and activity patterns of various prey species and easily exploit these species when they are active or vulnerable to predation (Calvacanti et al. 2010). Jaguars live and reproduce throughout the landscape, although at lower densities in fragmented lands where they persist despite using relatively small prey species; although where large wild species have been depleted, livestock may become an increasingly important dietary supplement, particularly for breeding females (Foster et al. 2010).

5. Conservation status and threats.

5.1 IUCN Red List Assessment (if available)

IUCN classifies the jaguar as Near Threatened, due to: "... a suspected 20-25% decline in the last three generations (21 years) in the area of occupation, the extent of occurrence and quality of habitat, along with actual or potential levels of exploitation. Given the inherent difficulty of assessing this species, the ordinarily low density with which it occupies the landscape, and the effects that small population and habitat degradations may have on the species, our minimal assessment of population decline could be a significant underestimate. Since the previous Red List assessment in 2008, threats to jaguars have continued or intensified. The first expert mapping of the jaguar range took place in 2002 (Sanderson et al. 2002), and the resulting map was used for the 2008 Red List assessment. The 2015 mapping exercise also reflects updates to the range recommended by jaguar experts, with sufficient evidence (i.e., footprints, camera traps, sightings of live or dead animals) to ensure inclusion/exclusion from the range. The updated range indicates increasing fragmentation of jaguar populations, particularly in eastern and southeastern **Brazil**, northern **Venezuela** and the Maya Forest (Selva Maya) of **Mexico** and **Guatemala**. Comparing the 2015 jaguar range with the extension of the "known" range of the 2002 exercise, thus controlling the difference in the scope of knowledge, there is a 20.0% decrease in the jaguar range in the last fourteen years (2002-2015), from 8.77 million km² to 7.02 million km². With a more robust range map from which to begin the next assessment, the species will likely qualify for VU in the near future. With a generation duration of 6.84 years, we suspect at least a 20-25% loss in mature individuals in the last 21 years (three generations) because there are documented population declines along with habitat loss for most range countries. Connectivity between jaguar populations is being lost at local and regional scales; isolated populations have fewer individuals and are more prone to local extinctions. The conflict between the jaguar and cattle is a severe threat to the jaguars' survivaland is reported throughout its range. Even in nominally protected areas, jaguars often suffer human impacts such as poaching" (Quigley et al. 2017).

5.2 Equivalent information relevant to the assessment of conservation status

IUCN classifies the jaguar as Near Threatened throughout its range given its wide geographic range, its large subpopulation in the Amazon region, and the lack of subspecies that justify a different classification. However, most jaguar populations are considered endangered or vulnerable at the national level. De la Torre et. al (2018) analyzed 34 subpopulations of jaguars using IUCN criteria and concluded that, although a large subpopulation persists in the Amazon, virtually all others are threatened due to their small size, isolation, poor protection and high human population density (Figures 5 and 6).

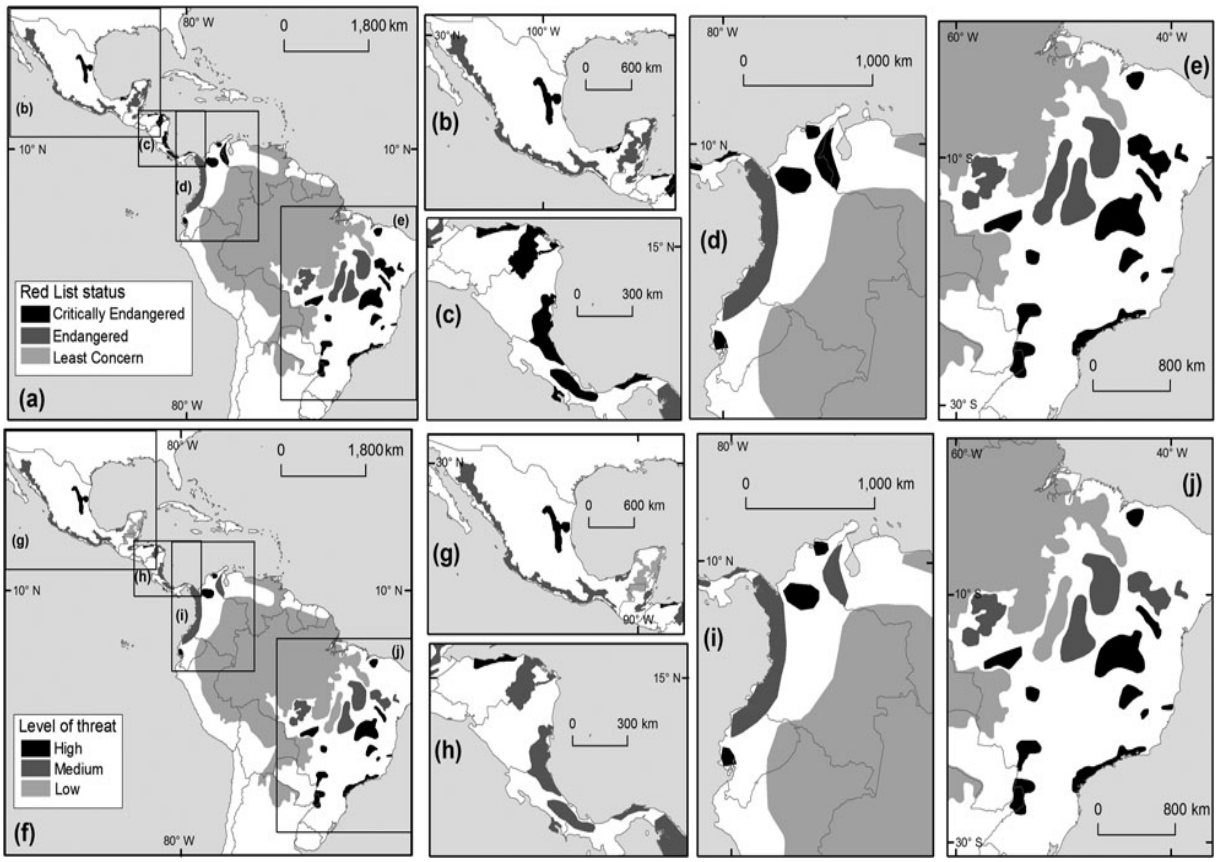
International coordination to ensure that healthier populations can continue to migrate between isolated critically endangered and endangered subpopulations is crucial to their survival.

Fig.- 5 Conservation status of jaguar subpopulations according to IUCN Red List criteria (CMS Parties in bold) (not official IUCN or national red list classifications)

Subpopulation	Countries	IUCN Criteria
Mexican Pacific	Mexico	Endangered
Sierra de Tamaulipas	Mexico	Critically endangered
Mexican Gulf	Mexico	Critically endangered
Maya Forest	Mexico, Guatemala, Belice	Endangered
Maya Mountains	Guatemala, Belice	Endangered
Honduran Caribbean	**Honduras**	Critically endangered
Mosquitia hondureña	**Honduras**, Nicaragua	Critically endangered
Indio-Maíz Tortuguero	Nicaragua, **Costa Rica**	Critically endangered
Talamanca	**Costa Rica, Panamá**	Critically endangered
Osa Peninsula	**Costa Rica**	Critically endangered
Central Panama	**Panama**	Critically endangered
Choco Biogeographic	**Panama**, Colombia, **Ecuador**	Endangered
Paramillo-San Lucas	Colombia	Critically endangered
Sierra Nevada de Santa Marta	Colombia, Venezuela	Critically endangered
Serrania de Perija-Catatumbo	Colombia	Critically endangered
Santa Helena-Guayas	**Ecuador**	Critically endangered
Amazonia	Colombia, **Ecuador**, Venezuela, Guayana, Surinam, **Guayana Francesa, Perú, Brazil, Bolivia, Argentina, Paraguay**	Least concern
Maranhão-Babaçu	**Brazil**	Critically endangered
Nascentes Parnaíba	**Brazil**	Endangered
Boquerião da Onça	**Brazil**	Critically endangered
Serra da Capivara	**Brazil**	Critically endangered
Chapada Diamantina	**Brazil**	Critically endangered
Araguaia	**Brazil**	Endangered
Goiás & Tocantins	**Brazil**	Endangered
Sertão Veredas Perúaçu	**Brazil**	Critically endangered
Mato Grosso	**Brazil**	Endangered
Chapada dos Guimarães	**Brazil**	Critically endangered
Emas	**Brazil**	Critically endangered
Espinhaço de Minas	**Brazil**	Critically endangered
Sooretama	**Brazil**	Critically endangered
Mantiqueira-Rio Doce	**Brazil**	Critically endangered
Pontal do Paranapanema	**Brazil**	Critically endangered
Serra do Mar	**Brazil**	Critically endangered
Iguazú	**Brazil, Argentina, Paraguay**	Critically endangered

Source Modified from: de la Torre et al. 2018

Fig.- 6 Vulnerability level of 34 jaguar subpopulations according to de la Torre et al. (2018)



Conservation status of jaguar subpopulations according to IUCN Red List criteria (a) across the range of species, (b) in **Mexico**, (c) in Central America, (d) in northern South America and (e) in southern Amazonia; and level of vulnerability of subpopulations according to levels of threat (f) throughout the species range, (g) in **Mexico**, (h) in Central America, (i) in northern South America, and (j) in southern Amazonia (de la Torre et al.2018).

5.3 Threats to the population (factors, intensity)

Deforestation

Habitat loss has been associated with a decline in the population of jaguars over much of their range (see Section 4.2) and poses additional problems for jaguars as they migrate to establish new territories or cross their range to find prey or pairs.

In **Brazil**, where a vast majority of the total jaguar population lives (de la Torre et al. 2018), 40% of their original vegetation has been lost, more than half of which occurred in the last 40 years, when the degradation of the Cerrado and Amazon accelerated (Goncalves et al. 2013). **Brazil** continues to lose 0.39% of its natural vegetation per year, implying a projected 10% decline in vegetation over the next 27 years (Goncalves et al. 2013), posing additional risk to jaguar populations. **Brazil** lost approximately 5000 km² of forest per year over the last 5 years (Mongabay, 2016).
In **Honduras**, deforestation for agricultural expansion is occurring at a rate of 5,300 hectares per year from the Caribbean to the western part of the Mosquitia region, resulting in habitat loss, hunting and persecution by jaguar ranchers (Portillo et al. 2011). In **Nicaragua**, the expansion of agriculture and ranching threatens protected natural areas and disrupts jaguar corridors (Petracca et al. 2014). **Paraguay** lost approximately 3,500 km² of forest per year over

the past 5 years (SEAM, 2017).

The Atlantic Forest of South America is one of the most threatened tropical rainforests, as it has been reduced to small forest islands surrounded by agricultural and urban development, which reduces the availability of suitable habitat for jaguars (Paviolo et al. 2008). 80,000 km2 of forest have been converted to soybean plantations in the Brazilian Amazon (Espinoza et al. 2018).

A study from **Mexico** to **Argentina** found that between 2000 and 2012 areas of concentrated jaguar populations, or Jaguar Conservation Units (JCU), are experiencing high rates of deforestation. They found a fragmentation of 37,780 km2 of forest estimated to continue at an increasing rate of 149.2 km2 year, and jaguar corridors lost 45,979 km2 at a decreasing rate of 40.1 km2 year (Olsoy et al. 2016). These rates of forest loss and increased forest fragmentation were generally higher in Central America and the southern end of the jaguar range, where JCU tend to be smaller, suggesting that the long-term viability of some central areas for jaguars may be threatened. Forest loss was greater in the jaguar corridors for protected and unprotected sites, suggesting that human pressure on the remaining forest in the corridors is high regardless of protection status. This finding is alarming, considering that maintaining the connectivity of jaguar populations throughout the range is one of the key objectives for their conservation (Olsoy et al. 2016) (Annex 6).

Hunting

The indiscriminate hunting of jaguars is one of the most serious threats to their survival in all of Latin America (Zeller 2007). From 1950 to the 1970s, in response to the fashion industry's demand for feline fur, intensive jaguar hunting took place throughout South and Central America. This prolonged intensive hunting has been considered one of the main factors responsible for a 50% decline in the jaguar range in the 20th century (Jędrzejewski, et al. 2017). Currently there is no legal hunting in most countries due to the endangered or vulnerable jaguar status, which grants protected species status. However, poaching and retaliation for loss of livestock are widespread throughout Latin America.

There is a domestic market in **Brazil** for jaguar skins as decoration for the home, but parts of the animals have also been shipped abroad (Fraser 2018). Historically, hunting pressure in the tropics has increased due to roads providing access to remote areas and commercial wildlife collection to support human populations (Polisar et al. 2017). In **Venezuela**, subsistence/commercial hunting was the most frequent reason for jaguar mortality caused by humans (51.7%) and was followed by reprisals for livestock predation (38.5%) (Jędrzejewski, et al. 2017). Subsistence hunting of the jaguar also exists in the Colombian region of Chocó (Balaguera et al. 2008). Carvahlo et al. (2010) estimated an annual mortality of 11.7 animals per hunt in the Tapajós-Arapiuns Extractive Reserve in the Brazilian Amazon, which would correspond to 6.5% of the jaguar population in the reserve.

Illegal trafficking

Jaguars have been listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1975, which means that international trade in jaguars or parts of jaguars for commercial purposes is prohibited. However, there is still some illegal trade, and there is evidence that it is increasing in some countries.

Since 2010 there have been records of jaguar slaughter in **Guyana**, supposedly intended to meet Asian demand for handicrafts, meat and traditional medicine (Kerman and Felix 2010). In addition, from August 2014 to February 2015, Bolivian authorities intercepted and confiscated eight postal shipments in Santa Cruz and Cochabamba destined for **China** (CITES 2018b). The packages contained a total of 186 jaguar canines, which implies the poaching of at least 93 jaguars (CITES 2018a). In northern **Bolivia**, where several Chinese companies work, radio ads and flyers have offered between $120 and $150 per tusk, more than the one-month income for many local people (Fraser 2018). Another package of 120 tusks was seized

in **China**, while 38 tusks were confiscated in Lima, **Peru**, in 2015 (Fraser 2018).

A recent report by Reuter et al. 2018 on the illegal jaguar trade in Mesoamerica highlights that jaguar trafficking may be increasing in **Belize, Honduras, Costa Rica** and **Panama**, where there is concern that a structured national and illegal internationaltrade with possible links to Asian markets may be emerging (Reuter et al. 2018; CITES 2018a). The report shows that jaguars die mainly due to conflicts with humans, including livestock losses, which can create informal local markets for jaguar parties and encourage increased retaliation and poaching of jaguars (Reuter et al. 2018; CITES 2018a). **Costa Rica** and **Mexico** proposed that CITES COP 18 adopt a Decision requesting a study on illegal trade in jaguars in range states and international markets (CITES 2018a). Peru has submitted a proposal for CITES COP 18 requesting Parties to adopt a Resolution for comprehensive legislation and enforcement controls aimed at eliminating poaching of jaguars and trade in their parts and derivatives (CITES 2018b). A listing on CMS Appendix I would complement these efforts.

Livestock

Calvacanti et al. (2010) found that cattle ranching also threatens jaguars indirectly, as it is the primary driver of high and rapid deforestation in the Amazon, being the main reason for> 66% of habitat loss in the region. Between 1987 and 2006, an average of 18,000 km2 of primary jaguar habitat was lost in this region each year, mainly from the Amazon agricultural frontier. In the last two decades, **Brazil** has lost larger areas of jaguar habitat than any other country (Calvacanti et al. 2010).

Jaguars that take advantage of livestock are a significantthreat to their survival, as it occurs throughout their range where cattle are raised, with the result that ranchers kill jaguars. In Uruguay, the extinction of the jaguar is the result of the threat they posed to cattle ranching (González et al. 2016; Soutello et al. 2013). In Sonora, **Mexico**, 27 jaguars were hunted in retaliation for the loss of livestock (López et al. 2002).

5.4 Threats especially related to migration

Given the fragmented condition of jaguar distribution, connectivity between populations is paramount to their long-term survival. Bernal et al. (2015) found that connectivity between Central and South American populations is tenuous, pointing to **Colombia** as a critical link for jaguar connectivity. Bernal et al. (2015) also suggest that connectivity between populations in eastern **Brazil** and northern **Argentina** is highly threatened, emphasizing the condition of jaguars in the Atlantic forest. The increase in the size of the home range in lower quality habitats increases the exposure of animals to risk, including increased vehicle collisions and poaching, and results in a situation often described as an ecological trap (Morato et al.2016).

Aquatic canals

Commercial transportation corridors such as the **Panama** Canal potentially disrupt the routes of dispersion and migration of animal species, including the jaguar (Huete et al. 2016). Hydroelectric dams can flood jaguar habitat and prevent dispersal; 79 dams have been projected for the Amazon region that will affect 4 jaguar conservation regions (de Oliveira, 2002). The Alto Paraná River in **Brazil** has also lost important jaguar marsh habitats by hydroelectric dams (Cullen et al. 2013), and in **Mexico**, dams can prevent dispersal in jaguar corridors (Petracca et al. 2014).

Roads

Traditionally, hunters' access has been limited to areas adjacent to rivers. As new roads are developed in the region, a greater proportion of the Amazon will become accessible and, therefore, the proportion of natural areas that function as refuges or wildlife sources will decrease. In addition, as road networks increase, markets become more available to subsistence hunters

who promote commercialization of wildlife and selective hunting of big game species that provide high yields (Espinoza et al. 2018, 2012). In **Ecuador**, Espinosa et al. (2018) demonstrated that facilitating hunters' access to a natural landscape can lead to development-induced impacts on predators and prey that end up reducing jaguar abundance.

Roads are an important but variable restriction on jaguar movement. Female jaguars avoided roads while males did not appear to be affected by them (Conde et al. 2010). These marked sexual differences could respond to the restrictive movement of female jaguars compared to that of males (Schaller et al. 1980), as well as the reduction of female survival and reproductive success near roads, so it is not surprising that roads not only limited habitat for female jaguars, but were also an important factor in fragmenting it. Greater tolerance of males to human-modified landscapes may increase their exposure, e.g., mortality due to direct persecution and hunting, as well as car collisions is considerably greater in males (Conde et al. 2010).

Road construction within the Maya Biosphere Reserve could severely fragment the largest patch of jaguar habitat in Central and North America, which in turn will have strong repercussions on jaguar populations (Conde et al. 2010; Ovando, 2008). Other regional plans, such as Plan Puebla-**Panama**, which was led by **Mexico**, involved the incursion of roads through protected areas to interconnect cities and archaeological centres from **Mexico** to southern **Panama** (Conde, 2008; Conde et al. 2007). Planned roads and their subsequent changes in land use could further reduce and fragment female jaguar habitat and increase the number of jaguar-human conflict zones in the region (Conde et al. 2010).

Fencing

In Calakmul Biosphere Reserve, **Mexico**, a railroad will be built that would divide several important crossing points for jaguars (Benítez et al. 2019). The train project includes the construction of a perimeter fence on both sides of the railway corridor, which will constitute an insurmountable barrier to the movement of wildlife, with negative consequences for the dispersion of populations, especially for the powerful (Benítez et al. 2019) unless mitigations are incorporated as underpasses.

In North America, an 1125 km security fence is being constructed over more than one-third of the **U.S.-Mexico** border (**U.S**. Public Law 109-367) (Flesch et al. 2009). The persistence and recovery of species present in low numbers, such as the jaguar, may depend on transboundary movements (Childs et al. 2008). It is believed that the future of the jaguar in the **U.S**. depends entirely on the species' ability to migrate across this border. Stakeholders are participating in a series of strategies to identify and protect suitable habitat, establishing corridors and reserve areas for these cats (King et al. 2008).

5.5 National and international utilization

In the Caribbean region of **Colombia**, jaguars are traditionally used by locals for ornamental, nutritional and esoteric/religious medicinal purposes, the most commonly used part being fat made into a concentrated paste (27.27%), followed by teeth (18.18%), oil (a by-product processed from fat) and skin; both 13.63% (González et al. 2010). Balaguera et al. (2008) documented the hunting of jaguars for human subsistence by communities in the Colombian Chocó. The meat was sold within the community, and some were sold commercially in the nearest city of Turbo (Department of Antioquia) for about 1.5 dollars / kg. In **Mexico**, jaguar fat is traditionally used for medicinal purposes, baits, herbivore repellents, etc. (García et al. 2010).

6. State of protection and management of species.

6.1 National protection status

The jaguar is now found in 21 countries from the **United States** south to **Argentina**. Of these, 13 countries list it as an endangered species (**United States, Mexico, Guatemala, Honduras,**

Nicaragua, Costa Rica, Panama, Venezuela, Paraguay, Guyana, French Guiana, Suriname and **Argentina**); 4 countries list it as Vulnerable (**Colombia, Brazil, Ecuador** and **Bolivia**); 1 country considers it almost threatened (**Peru**); 2 countries have a hunting ban but no conservation classification as such (**Belize** and **Uruguay**) and it is extinct in 2 countries (**El Salvador** and **Uruguay**) (Figure 7).

Brazil banned trade in cats in 1967, **Venezuela** in 1970, **Chile** in 1972, **Colombia** in 1975 and **Argentina** in 1976 (Rabinowitz, 2014). Hunting was banned in **Mexico** in 1987 (Semarnat 2009).

Fig.- 7 Legal status of Jaguar by country (CMS Party Countries in bold)

Country	Legal Status	Source
USA	Endangered	Endangered Species Act
Mexico	Endangered	Norma Oficial Mexicana NOM-059_SEMARNAT-2010
Belice	Banned hunting	Wildlife Protection Act No. 4. November 25, 1981
Guatemala	Endangered	Category II on Guatemala's List of Endangered Species
Honduras	Endangered	Resolution No. GG-APVS-003-98
El Salvador	Not enlistado (Extinct)	Wildlife Conservation law. Article 6 Literal d y Article 42
Nicaragua	Indefinite hunting banned Endangered	Ministerial Resolution No. 07-01-2016
Costa Rica	Endangered	Wildlife Conservation Law (32633 / 2005)
Panama	Endangered	Resolution Dir. 002-80, MINAM, 2016
Colombia	Vulnerable	Res. 1912 de 2017 Ministry of Environment
Venezuela	Endangered	Decree1486: Endangered species. Official Gazette Nº 36.062. 10/10/1996.
Guayana	Endangered	Kerman et al 2010
Surinam	Endangered	Kerman et al 2010
French Guayana	Endangered	Kerman et al 2010
Brazil	Vulnerable	Portaria 444 de 2014 Ministry of Environment Brazil.
Ecuador	Vulnerable	Resolution No. 105 Ministry of Environment
Perú	Near threatened	Supreme decree N.° 004-2014-MINAGR
Bolivia	Vulnerable	Ministry of Environment and Water 2009
Paraguay	Endangered	Resolution SEAM Nº 263/07
Argentina	Endangered	Res. N.° 1030/04: en Peligro. SAREM 2012
Uruguay	Banned hunting (Extinct)	Official list of tetrapod vertebrate species in Uruguay (ministerial decree mgap 514/001),

6.2 State of international protection

The jaguar was placed on CITES Appendix I in 1975, and there are no export quotas for the species; therefore international trade in the species and its products is not permitted (CITES, 2019a). However, the CITES trade database reports the export of 113 live jaguars for commercial purposes, mainly from facilities bred in captivity from 1980 to 2017, and also the import of 181 skins for commercial purposes from 1976 to 2013 (CITES 2019b). The CITES Secretariat noted this discrepancy and informed the Parties that Resolution Conf. 12.10 (Rev. CoP13) states that Parties should restrict imports of captive-bred specimens of Appendix I species for primarily commercial purposes to those produced by operations included in the CITES Register (CITES, 2006); there are no jaguar captive-breeding facilities registered with CITES.

6.3 Management measures

In the **U.S**., critical habitat was created to support jaguars during dispersal movements and to provide areas for cyclic expansion and contraction of the nearest central area and spawning population in the Northwest Recovery Unit (approximately 210 km (130 miles) south of the **U.S.** and **Mexico** border in Sonora (USFWS 2014).

In 1994, the Wildlife Conservation Society and the Caribbean Conservation Corporation launched the regional conservation project Paseo Pantera, which proposed linking existing protected areas along the Caribbean coast with wildlife corridors. In 1998, the eight heads of state (**Mexico, Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica**, and **Panama**) formally endorsed what is now known as the Mesoamerican Biological Corridor as a framework for protecting biodiversity and maintaining ecosystem services (Bennet, 2004).

In 2004, the Jaguar Panthera Corridor Initiative was launched with the idea of "connecting the dots", extending jaguar conservation and management beyond central protected areas and into the human landscape, creating a genetic corridor that links existing jaguar populations across the full range of species (MacDonald et al. 2010). Since the functioning of these corridors, and the protection of the jaguars that travel along them, depends largely on the goodwill of the local population, the initiative focuses on mitigating conflicts between jaguars and ranchers and continued engagement with farmers, park managers, indigenous groups, teacher schools, mayors and non-governmental organizations (NGOs). The Jaguar Panthera Corridor Initiative is now an official and crucial component of the larger Mesoamerican Biological Corridor Program initiated in 1998 to unite all protected areas in Central America. The Jaguar Corridor Initiative extends beyond Mesoamerica to the south through **Colombia, Guyana** and **Brazil**. An important focus in South America has been on the Brazilian Pantanal, of which 95% is under the management of 2500 private ranches that admit up to 8 million cattle, where the conflict with jaguars is intense. The Panthera Pantanal Project aims to create, as a demonstration to be replicated elsewhere, an extensive protected jaguar corridor within which profitable ranching is integrated with jaguar conservation. The corridors are expected to act as a substitute for an intact landscape by allowing the species in question to naturally exchange genetic material between now isolated fragments of the population. Such constructions should delay the inbreeding of isolated subpopulations and avoid differentiation, while maintaining a full level of genetic variability characteristic of each subpopulation (MacDonald et al. 2010).

In **Brazil**, the Jaguar Conservation Action Plan seeks to reduce the environmental impact of human occupation within priority areas for the conservation of the species; supervise to stop revenge killing and sport hunting; make environmental education programs focused on the jaguar; make conflict mitigation strategies; reduce the number of specimens captured in nature (Goncalves et al. 2013). In **Mexico**, the Ministry of Agriculture and Livestock launched in 2009 a program called "PROGRAN" (Programa de Manejo Sostenible de la Ganadería, Apicultura y Tierras), which included a Livestock Insurance Program for local landowners to minimize the impact of predation by large carnivores (Conde et al. 2010).

Jaguar 2030 is a wide-ranging effort that unites 14 governments of jaguar-ranking countries, non-governmental and intergovernmental organizations, local communities and the private sector around a shared vision for conserving jaguars and their valuable ecosystems. The objective of the Jaguar 2030 roadmap is to strengthen the Jaguar Corridor in range countries, securing 30 priority jaguar landscapes by 2030, stimulating sustainable development, reducing conflict between humans and jaguars in human-dominated landscapes, and increasing the security and connectivity of protected landscape cores, thus meeting globally significant biodiversity objectives. Jaguar range countries and partners unanimously support the shared goal of Jaguar 2030. Agree, with the support of interested organizations, to work together to counter the multiple threats to jaguars, including habitat loss and fragmentation, livestock conflict and increased monitoring of jaguar products: it helps preserve the natural and cultural heritage that jaguars represent for many Latin American cultures (WCS, Panthera, WWF and UNDP. 2018).

6.4 Habitat conservation

De la Torre et al. (2018) estimated that about 38.4% of the species' geographic range is protected. **Brazil** has the highest proportion of protected area (66% of the jaguar range), followed by **Venezuela** (8%), **Peru** (8%), **Bolivia** (5%) and **Colombia** (3%). **Colombia** has 25 jaguar natural parks (Payan et al. 2010). Many of the protected natural areas that host transboundary jaguar populations are located at international borders in at least 15 countries (Annex 7).

Sanderson et al. (2002) defined the most important areas for the conservation of viable jaguar populations, Jaguar Conservation Units or JCU, which have been reviewed by Zeller et al. 2007 (annex 2). These 51 areas cover 44.49 million km², or 49% of the jaguar range according to current estimates and have been classified into types according to jaguar population and prey availability and levels of conservation importance (Annex 5). Of the total 1.9 million square kilometers of Jaguar Conservation Unit (JCU),523,679 km2 or 28% of the JCU area falls within existing protected areas (Annex 8). However, only 1% of the total JCU area was considered effectively protected, 17% was considered partially effective in protecting jaguars and 3% was considered ineffective in protecting jaguars (Zeller et al. 2007).

De la Torre et al. (2019) found that, in the tropical forest of Central America, large tracts of primary forest should be preserved, e.g. their estimates of jaguar home ranges indicated that it is necessary to conserve connected patches of tropical forest of at least 200 km2 to guarantee the annual spatial requirements of a single jaguar female in southern **Mexico**.

The **U.S**. Fish and Wildlife Service has designated critical habitat for the jaguar (*Panthera onca*) approximately 309,263 hectares (764,207 acres) in the counties of Pima, Santa Cruz and Cochise, Arizona, and Hidalgo County, New Mexico (USFWS, 2014). The Jaguar Conservation Program in **Mexico** planned to incorporate 1,000,000 hectares of the species' range under one of several conservation schemes (Semarnat, 2009).

In **Brazil**, the Jaguar Conservation Action Plan has already identified priority areas and dispersal corridors for jaguar conservation in the Caatinga, Cerrado and Atlantic Forest that could maintain a viable population of the species (Goncalves et al. 2013; Desbiez et al. 2012a).

6.5 Population monitoring

Several countries have population monitoring programs for jaguar populations. In **Paraguay**, the Association Guyra-Paraguay has a research program called Proyecto Jaguarete, initiated in 2016. They have a large-scale camera trap project to monitor jaguars in the Chaco to assess the effects of deforestation (Secretaría del Ambiente, 2016). In **Mexico**, the 2009 jaguar recovery program plans to identify critical jaguar recovery sites, particularly in source populations and connectivity areas, through a population density study and national monitoring (Semarnat, 2009). In **Honduras**, the National Plan for Jaguar Conservation seeks to ensure the long-term existence of viable populations, as well as to guarantee connectivity between them, through the recovery and protection of critical habitat areas for jaguars, research and monitoring projects, reducing hunting levels of jaguar species throughout the national territory and especially in the JCU and jaguar corridors (ICF 2011). In **Ecuador**, the Jaguar Conservation Action Plan plans the conservation of jaguar populations and subpopulations throughout their geographic range on both sides of the Andes; integration of jaguar conservation and management strategies and a continuous monitoring program, in the context of adaptive management (Minister of Environment 2014). In **Argentina**, the Action Plan for the Conservation of the Jaguar of the Misiones Green Corridor aims to increase the size of the wild jaguar population through various programs including habitat protection and monitoring and research (SSP, 2011).

7. Effects of the proposed amendment.

7.1 Anticipated benefits of the amendment

The *Panthera onca* needs concerted regional conservation efforts due to the continued loss of range and increasing fragmentation of range, which most severely affects isolated endangered and critically endangered subpopulations. It is important to maintain the integrity of large, medium and small populations throughout their range, the connection between transboundary populations must be maintained or restored, which requires adequate migration corridors for the dispersal of animals. The Jaguar Route 2030 already offers coordination among range countries for jaguar conservation and habitat restoration at the regional level, including vision development across the range, action planning, harmonization of monitoring and assessment protocols, exchange of experiences, etc., and transboundary cooperation among more limited subsets of countries, which primarily involves cooperation at the landscape level within and between JCU and corridors, but can also be extended to protocols and agreements at the national level. The participating Jaguar Range States and CMS Parties, as well as partners, unanimously agree on the shared objective of Jaguar 2030. They agree, with the support of interested organizations, to work together to counter multiple threats to jaguars, including habitat loss and fragmentation, livestock conflicts and others..

Facilitating large-scale transboundary conservation at the landscape level is the central function of the Convention, and jaguar conservation will benefit from the listing of species in Appendices I and II.

The anticipated benefits are:

- Increased global awareness of the conservation status of *Panthera onca*;
- Increased support for ongoing national and regional jaguar conservation programmes;
- Prioritization to address not only habitat problems but also to assist with illegal trade and threats of retaliation leading to the death of jaguars;
- Motivation for jaguar Range States to expand their efforts to assess the local/regional conservation status of shared jaguar populations and consistent transboundary assessments;
- Motivation for research on transboundary jaguar populations;
- Increased awareness of international conservation strategies for regional metapopulations to ensure consistent conservation and management for shared populations;
- Better coordination with ongoing regional efforts and plans, such as the Jaguar Route 2030;
- International monitoring and review of developments in conservation status and conservation measures through the analysis and review of National Reports of the Parties by the Conference of the Parties at each meeting;
- Possibility of agreements (e.g. concerted actions, memoranda of understanding) between range states sharing populations for cooperative implementation of conservation measures and action plans;
- Increased interest of non-Parties to work with CMS Parties on jaguar conservation efforts and even consider becoming a Party to CMS;
- Increased motivation to strengthen and enforce CITES Appendix I listing and any CITES resolution or decision regarding trade, illegal trade, captive breeding and others.

7.2 Potential risks of amendment.

None.

7.3 Intent of the proponent on the development of an Agreement or Concerted Action

Several jaguar range countries and international partners launched the Jaguar Conservation Route 2030 for the Americas in 2018, an informal region- centred initiative to ensure 30 priority jaguar conservation landscapes by 2030. The Route aims to strengthen protection, cooperation and international awareness initiatives for the jaguar, including those that mitigate the human-jaguar conflict, connect and protect jaguar habitats, and stimulate sustainable development opportunities, such as ecotourism, that support the well-being of the communities and indigenous peoples that coexist with this species. Pending further consultations with range countries, it might be possible to develop concerted action reflecting key elements of the Route, and even in the future a regional agreement under the CMS, if the range countries so wish.

8. Range States

The 2017 IUCN Red List assessment listed the following national status of *Panthera onca* (Quigley et al.2017):

Native: **Argentina; Belize Bolivia, Brazil Colombia, Costa Rica, Ecuador, French Guiana Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, United States, Venezuela.**

Regionally extinct: **El Salvador, Uruguay**

CMS Range States: Argentina, Bolivia, Brazil, Costa Rica, Ecuador, French Guiana, Honduras, Panama, Paraguay, Peru, Uruguay.

9. Consultations

10. Additional remarks

11. References

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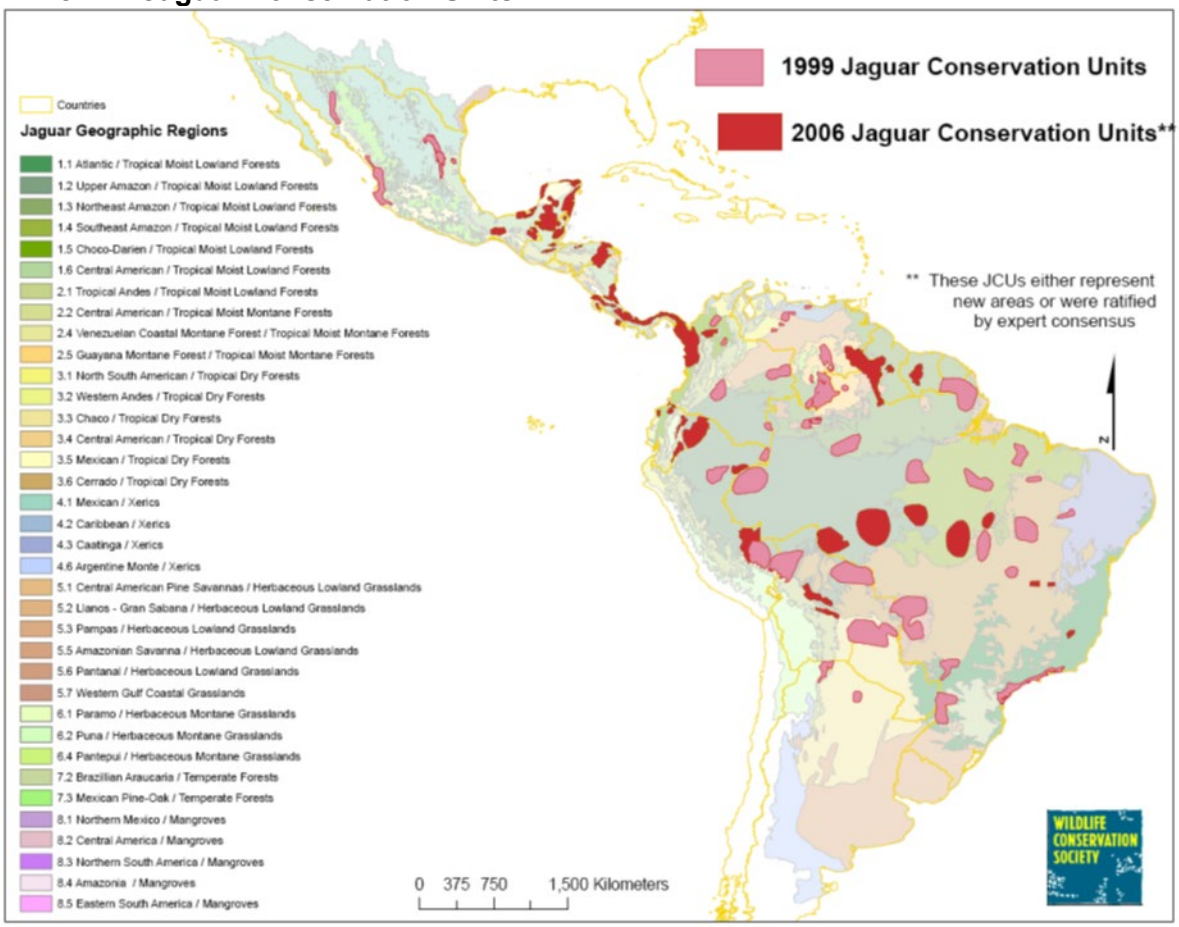
Annex 1.- Home range of male and female jaguars

Country (Region / Season)	Male (Km2)	Female (Km2)	Source
Belize	33.4	10	Rabinowitz et al.1986
Mexico (Chamela, Jalisco, dry season)	55.8	25	Nuñez et al, 2002
Mexico (Chamela, Jalisco dry season)	92.7	51	Nuñez et al, 2002
Venezuela (Plains dry season)	100	80	Scognamillo et al., 2003
Venezuela (Plains wet season)	-	66	Scognamillo et al., 2003
Brazil (Pantanal)	144	52	Morato et al. 2016
Brasil (Pantanal)	154	62.5	Calvacanti et al 2009
Brazil (Pantanal)	163	157	Crawshaw et al. 2002
Venezuela (Hato Piñero)	167	103	Jędrzejewski et al. 2017
Brazil (Amazonas)	211.6	68.4	Morato et al. 2016
Belize (Centro)	264.3	169.3	Figueroa, 2013
Brazil (Atlantic Forests)	462.8	268	Morato et al. 2016
Guatemala (Maya Forest)	535	321	Tobler et al. in prep
Mexico (Lacandona)	544	250	de al Torrre et al 2019
Mexico (Calakmul)	624.95	155.42	Chavez, 2010
Paraguay (Chaco dry season)	727	255	McBride et al. 2018
Paraguay (Chaco wet season)	818	237	McBride et al. 2018
Brazil (Closed)	1,268.6	-	Morato et al. 2016
EUA (Arizona/Sonora)	1,359	-	Mccain et al 2008
Mexico (Sonora)	2,100 (population)		Lopez et al. 2002

Annex 2.- Jaguar Conservation Units



Source Zeller et al. 2007

Annex 3. Jaguar population estimates by country (CMS Party Countries in bold)

Country	**Area**	**Estimated jaguar population**	**Source**
Argentina	Atlantic Forest	non-viable population	Paviolo et al., 2008
Argentina	All the country	314*	Jędrzejewski et al. 2018*
Belize	Chiquibul National Park	38-77	Ceballos et al. 2002
Belize	Rio Bravo	33-67	Ceballos et al. 2002
Belize	All the country	563*	Jędrzejewski et al. 2018*
Bolivia	Kaa-Iya National Park del Gran Chaco	1,000 adults y juveniles	Maffei et al 2004
Bolivia	All the country	12,845*	Jędrzejewski et al. 2018*
Brazil	Closed	Non-viable population	Silveira et al., 2010
Brazil	All the country	86,834*	Jędrzejewski et al. 2018*
Brazil – Argentina - Paraguay	Atlantic transboundary forest Alto Paraná	50	Paviolo et al 2006
Colombia	All the country	16,598*	Jędrzejewski et al. 2018*

Costa Rica	All the country	571*	Jędrzejewski et al. 2018*
Costa Rica	Conservation area Guanacaste	50	Vaughn et al. 2002
Costa Rica	Conservation area Osa	107	Vaughn et al. 2002
Costa Rica - Nicaragua	Transboundary Reserve Si a Paz Colorado-Tortuguero Natjonal Park	200	Vaughn et al. 2002
Costa Rica - Panama	Transboundary reserve La Amistad Park	100	Vaughn et al. 2002
Ecuador	All the country	1,969*	Jędrzejewski et al. 2018*
Guayana Francesa	All the country	1,602*	Jędrzejewski et al. 2018*
Guatemala	Carmelita-Uaxactun-Melchor in el Petén	235-471	Ceballos et al. 2002
Guatemala	Reserve Laguna del Tigre	90-180	Ceballos et al. 2002
Guatemala	Mayan Biosphere Reserve	345	García et al 2016
Guayana	All the country	4356*	Jędrzejewski et al. 2018*
Honduras	Biosphere Reserve Rio Platano	233	Vaughn et al. 2002
Honduras	All the country	1,218*	Jędrzejewski et al. 2018*
Mexico	All the country	5000	Ceballos et al. 2016
Nicaragua	All the country	1,476*	Jędrzejewski et al. 2018*
Panama	All the country	869	Jędrzejewski et al. 2018*
Perú	All the country	22,210*	Jędrzejewski et al. 2018*
Surinam	All the country	3,190*	Jędrzejewski et al. 2018*
Venezuela	All the country	11,592*	Jędrzejewski et al. 2018*

*** Several scientists mistrust the accuracy of these estimates believing it is an overestimate.**

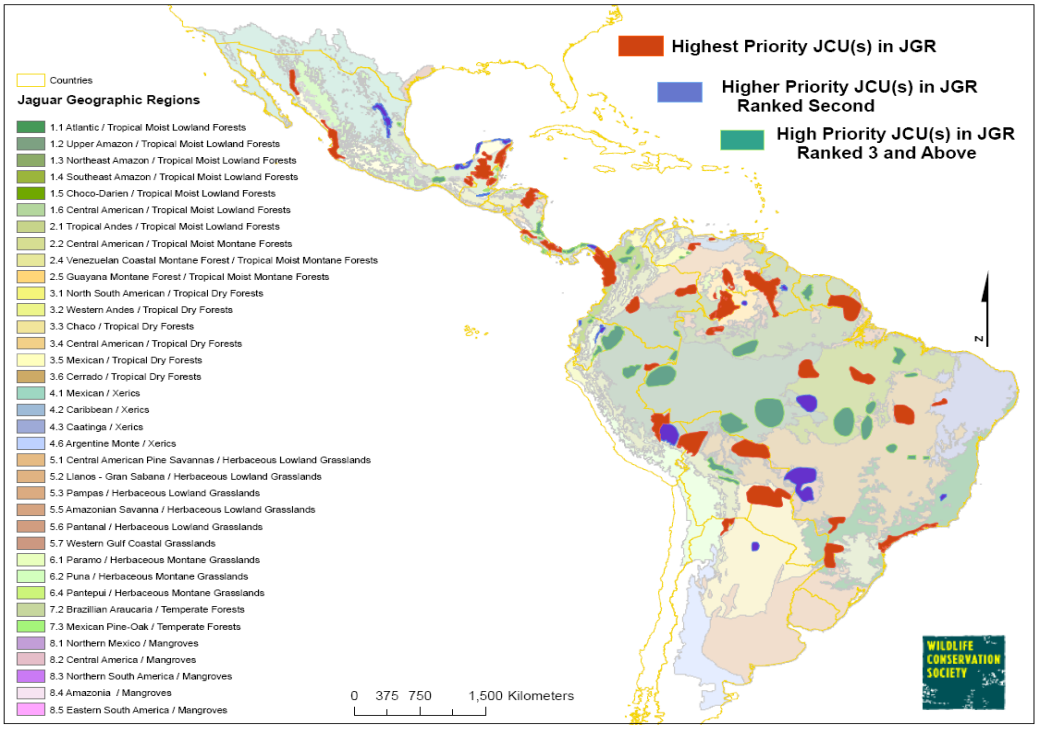
Annex 4. Jaguar densities in America (CMS Party Countries in bold)

Country	Study site	Density ± SE (ind/100 km2)
Argentina	Iguazú	0.5–1.5
Argentina	Urugua-í	0.1
Argentina	Yabotí	0.2
Belize	Cockscomb basin	3.1–8
Belize	Chiquibul	3.5
Belize	Fireburn	1.2
Belize	Gallon Jug Estate	3.3–4.7
Belize	Mountain Pine Ridge	3.3–7.1
Bolivia	Cerro Cortado, Kaa-Iya	1.0–2.0
Bolivia	El Encanto	0.4
Bolivia	Estación Isoso, Kaa-Iya	2.2–3.2
Bolivia	Guanacos, Kaa-Iya	1.1–2.9
Bolivia/Paraguay	Palmar, Kaa-Iya	2.4–2.9
Bolivia	Ravelo, Kaa-Iya	1.2–1.5
Bolivia	Rios Tuichi y Hondo,	0.9
Bolivia	San Miguelito	1.2–3.2
Bolivia	Tucavaca, Kaa-Iya	3.41 ± 1.21
Bolivia	Madidi	2.84 ± 1.78
Bolivia	Chaco	0.39-1.06
Brazil	Cerrado	0.29
Brazil	Parque nacional Emas	2.00
Brazil	Fazenda Santa Fé	2.59 ± 1.03
Brazil	Fazenda Sete	11.0 ± 1.73
Brazil	Moro do Diablo	2.22 ± 1.33
Brazil	Serra da Capivara	2.67 ± 1.06
Brazil	Pantanal	6.6
Brazil	Bosque inundado (varzea) ecotonos Brasil central	7.35-10.79
Colombia	Amacayacu	4.2
Colombia	Valle río Calderón	2.5
Colombia	Valle Magdalena	2.52
Costa Rica	Corcovado	6.98 ± 2.36
Costa Rica	Golfo Dulce / Golfito	2 ± 1.49
Costa Rica	San Cristobal	6.7
Ecuador	Yasuní-Waorani	1.38 ± 0.60
Ecuador	Amazonas	5.7
Guatemala	Carmelita-AFISAP	11.28 ± 3.51
Guatemala	La Gloria-Lechugal	1.54 ± 0.85
Guatemala	Rio Azul	10.5
Guatemala	Tikal	6.63 ± 2.46
Guatemala	Reserva de la biosfera Maya	1.52 ± 0.34
Mexico	Chiapas	0.05
Mexico	Sonora	1.0 ± 1.30
Mexico	Nayarit	2.04
Mexico	Chamela	5.6
Mexico	Calakmul	6.66
Mexico	Yum-Balam	7.4
Nicaragua	Bosawas	3.7
Panamá	Darien	1.8–4.4
Peru	Amazonas	4.4
Peru	Los Amigos	9.6 ± 2.35
Peru	Bahuaja-Sonene, Tambopata	11.4 ± 19.8

Peru	Madre de Dios	4.54 ± 0.83
Venezuela	Llanos	4.4

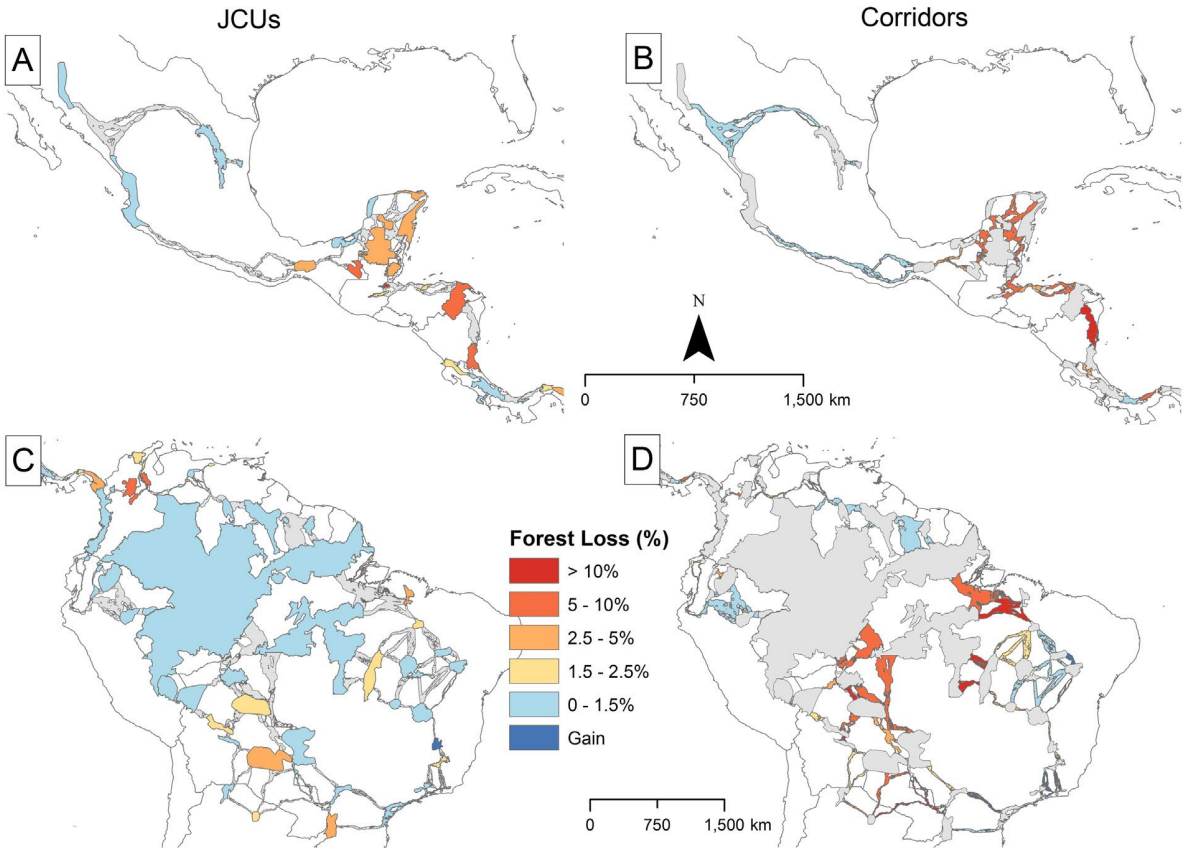
Source: (Tobler et al. 2013 ; Tobler et al. 2018 ; Maffei et al. 2014; Ceballos et al. 2002, 2016 ; Silver et al. 2004; Soisalo and Cavalcanti 2006 ; Ramalho (pers. Comm); Sollman et al. 2011; Noss et al. 2012 ; Jędrzejewski et al. 2016 ; Figel et al. 2016 ; Espinoza (2012)

Annex 5. Conservation Priority of Jaguar Conservation Units



Source: Zeller et al. 2007

Annex 6 Percentage of forest loss (2000-2012) in Jaguar Conservation Units (JCUs)



(A, C) and corridors (B, D) in Central America (A, B) and South America (C, D) with warmer colors indicating more deforestation and cooler colors indicating less deforestation. To distinguish between JCUs and corridors, each is attenuated when focusing on the other.

Source Olsoy et al. 2016

Annex 7 Natural protected areas hosting transboundary jaguar populations (CMS Party Countries in bold)

Protected Natural Area	**Country**	**Border with**	**Source**
Coronado National Forest	EUA	México	King et al, 2008
Reserva de la biósfera Calakmul	México	Guatemala	Ceballos et al. 2002
Reserva de la biósfera Maya	Guatemala	México	Novack et al. 2003
Parque Nacional Chikibul	Belice	Guatemala	Groff et al.2013
Parque Nacional Cerro Azul	**Honduras**	Guatemala	Mora et al. 2010
Reserva de la biósfera Binacional Corazón del Corredor	**Honduras**	Nicaragua	Mora et al. 2010
Reserva de la biósfera Bosawas	Nicaragua	**Honduras**	Petracca et al. 2014
Reserva de la biósfera Indio Maiz	Nicaragua	**Costa Rica**	De la Torre 2018
Humedal Caribe Noroeste	**Costa Rica**	Nicaragua	Barquet, 2015
Parque Internacional La Amistad	**Costa Rica**	**Panamá**	Gonzalez 2007
Parque Internacional La Amistad	**Panamá**	**Costa Rica**	Vaughan et al. 2002
Parque Nacional Darien	**Panamá**	Colombia	Moreno 2008
Parque Nacional Los Katios Natural	Colombia	**Panamá**	Payán et al. 2010
Parque Nacional La Paya Natural	Colombia	**Ecuador**	Payán et al. 2010
Parque Nacional Rio Pure Natural	Colombia	**Brasil**	Payán et al. 2010

Parque Nacional El Tuparro Natural	Colombia	Venezuela	Payán et al. 2010
Parque Nacional Cuyabeno	**Ecuador**	Colombia	Espinoza et al 2016
Reserva de la biósfera Yasuni	**Ecuador**	**Perú**	Espinoza, 2012
Parque Nacional Sierra del Divisor	**Perú**	**Brasil**	Quintana et al. 2009
Parque Nacional Pico de Neblina	**Brasil**	Venezuela	Rylands et al 2005
Parque Nacional do Cabo Orange	**Brasil**	**Guayana Francesa**	Goncalves et al. 2013
Parque Nacional Serra do Divisor	**Brasil**	**Perú**	Rylands et al 2005
Parque Nacional do Iguaçu	**Brasil**	**Argentina**	Goncalves et al. 2013
Parque Nacional do Pantanal Matogrossense	**Brasil**	**Paraguay**	Goncalves et al. 2013
Parque Nacional do Pantanal Matogrossense	**Brasil**	**Bolivia**	Goncalves et al. 2013
Parque Nacional Noel Kempff	**Bolivia**	**Brasil**	Maffei et al 2015
Parque Nacional Gran Chaco	**Bolivia**	**Paraguay**	Romero et al. 2007
Tariquía National Reserve	**Bolivia**	**Argentina**	Cuyckens et al. 2014
Parque Nacional Iguazu	**Argentina**	**Brasil**	Urban, 2016
Parque Nacional Baritú	**Argentina**	**Bolivia**	Cuyckens et al. 2014
Reserva de la biósfera Yaboti	**Paraguay**	**Brasil**	Paviolo et al 2006
Reserva de la biósfera Chaco Reserva de la biósfera	**Paraguay**	**Bolivia**	Romero et al. 2007

Annex 8 Jaguar Conservation Units covered by protected areas