

A photograph of a Mexican jaguar standing in a river, looking towards the camera with its mouth open. The jaguar has a golden-brown coat with dark, irregular spots. It is surrounded by lush green vegetation and trees. The water in the river is calm, reflecting the surrounding greenery.

The Mexican jaguar Symbol of biodiversity

**Gerardo Ceballos, daniela
Medellín, rebeCa CalanoCe, MarCo
a. Huerta Compilers**



The Mexican jaguar, a symbol of biodiversity and conservation

**Gerardo Ceballos, daniela
Medellín, rebeCa CalanoCe,
MarCo a. Huerta** Compilers

Marcela Aguayo, Horacio Bárcenas,
Mario Buil, Juan Cruzado,
Antonio de la Torre, Michelle Dorantes,
Luis Fueyo, José González M.,
Óscar Moctezuma, Daen Morales,
Jonathan Morales, Marco Antonio Lazcano,
Víctor H. Luja, Yamel Rubio, Fernando Ruiz,
María Zamudio, Heliot Zarza



Lord of the Night

The clear winter nights in the jungle of southeastern Mexico are incredibly cold. This morning, recalls Gerardo Ceballos, the damp cold woke me up at two in the morning. The darkness is intense, so it takes me time to adjust and see – or guess – strange shapes in the gloom. I am so exhausted that I have the impression that this season of fieldwork on jaguar ecology and conservation would have started months ago, instead of just last week. The noises of the jungle share the small cot where I slept. I hear a symphony of frogs and crickets. An owl howls incessantly.

Our camp is located on the edge of a waterhole, in the heart of the jungles of Calakmul, one of the last refuges of many species of tropical flora and fauna in Mexico. In 1989, the government of Mexico issued a decree for the creation of the Calakmul Biosphere Reserve, which covers 773,000 hectares. This jungle still has a large population of jaguars, a species that has disappeared from most of the territory of Mexico.

I leave the tent and contemplate the sky full of innumerable stars, as old as the universe itself. The first rays of sunlight announce the morning. As the day progresses, the jungle awakens. We let the dogs loose. Suddenly, their howls announce that they have found a jaguar trail and they run out in a frenzy. I feel my heart jump out of my chest. We walk for more than three exhausting hours and when everything seems to indicate that we have lost them, we hear them howling in the distance. They don't run anymore. They have managed to get the jaguar to climb a tree! We have a huge specimen! The rifle is prepared with the dart

tranquilizer and a few minutes later the jaguar is on the ground. We measure your body, weigh and take blood samples, determine your sex, and assess your overall physical condition.

Under the shade of an immense mahogany, we gazed in amazement, in silence, at the imposing jaguar. Her deep, mysterious yellow eyes watch us closely, she has slowly recovered from the effects of the tranquilizer. He listens, sniffs and watches her very carefully. Maybe we're the first human beings he's ever seen. Try to understand what's going on. They have already taken the dogs; their howls are now distant. Suddenly he rises completely recovered and jumps over the trunk of a large fallen tree without making the slightest sound, despite the fact that the ground is covered with dry leaves. Unchanging, it gives us one last look before disappearing, majestically, into the jungle. It's a scene that's hard to forget. At that moment I ask myself: what will be its future? I can't imagine the world without this and many other endangered species. Their survival depends on us and paradoxically, ours will only be possible with theirs.

The jaguar is in danger of extinction. Its over-long-term experience will depend on the responses we give to the challenge of its conservation. This is the story of the collective effort of a group of individuals and institutions who have taken an interest in launching a crusade for their conservation.

Modified text by Ceballos, G. 2010. The felines of America. Telmex, Mexico.





A roar in extinction

The jaguar is in danger of extinction, the roar of the great lord of animals and nature has been dying down since the beginning of the twentieth century. Some time ago, the jaguar kingdom covered a vast territory in the tropical and subtropical regions of the American continent, from the south of the United States of America to the north of Argentina. Little by little, the deforestation of millions of hectares of jungles and other tropical environments to establish crop fields, pastures for livestock, cities, towns and road infrastructure, indiscriminate hunting as well as the introduction of diseases by domestic animals, among other factors, are threats that have led to the loss of their territory and their populations. In Mexico, large tracts of rainforests and other tropical environments have been destroyed in a few decades. For example, the exuberant rainforests of the Gulf of Mexico slope covered more than 22 million hectares and extended from San Luis Potosí to Chiapas. Today they have been reduced to about a million hectares fragmented into islands, surrounded by a sea of pastures, crops and populations.

It is estimated that more than half a million jaguars populated The continent at the beginning of the sixteenth century. Much has changed since then and it is now estimated that there are around 173,000 individuals, mostly in the Brazilian Amazon. In Mexico it is estimated that there are 5,300 individuals, with the largest population inhabiting the Yucatan Peninsula.



CULTURE AND BIOLOGY



The importance of the jaguar for pre-Hispanic cultures was reflected in sculptures and paintings in various archaeological sites; today it is still a fundamental element in the arts, oral and written narrative and in festivities with symbolic elements associated with the powerful feline.





Cultural Significance in Mexico

From the worldview of pre-Columbian cultures, the jaguar has played an important role as one of the most notable and revered deities of the ancient world. His image is represented in all artistic manifestations such as painting, sculpture, codices and stelae. An image that, without a doubt, has survived the passage of time to the present day. It has also received different names in different languages: *ocelotl*, *tepeyóllotl* and *tecuanli* in Nahuatl, *balam* in Maya, and *jaguar* or *tigre* in Spanish. The first Spaniards who arrived on the American continent called it *tigre*, a name that has lasted to this day in popular knowledge.

The image of the jaguar symbolized various aspects for each culture. He was associated with bravery and power, with the night and the underworld, with the fertility of the earth, and even with life and death in a duality.



- For the Olmecs, felines played such a primordial role in their worldview that they have been considered "the jaguar people".
- Among pre-Hispanic peoples, the union of symbolic features of animals and humans made it possible to combine physical qualities and supernatural attributes to represent powerful gods, rulers, priests, warriors and brave hunters.
- The colorful skin of the jaguar was not only representative of an emblematic garment of rulers in various periods of pre-Hispanic times, but was also worn by brave warriors.
- The jaguar is one of the most reiterated plastic manifestations in the art of the cultures of the Altiplano region, despite the fact that its distribution did not reach the center of the country.



Biological importance

The jaguar is the largest predator in the tropical regions of the Americas. Although much of its ecological function in the ecosystems where it lives is not yet known in depth, the available information indicates its great relevance in the proper functioning of these ecosystems. Being a top predator, the jaguar helps regulate the populations of its prey such as deer, peccaries and other herbivorous mammals. In this way, it contributes to the ecological balance.

It is a keystone species for the conservation of the natural ecosystems in which it lives in Mexico and Latin America. Protecting viable populations in the long term requires that areas of enormous extensions be preserved. This implies that their protection favors the conservation of the entire ecosystem and the numerous species that inhabit it. That is why it is known as an umbrella species, that is, this term refers to those species whose well-being and conservation directly affect a large number of other species in their habitat.

Since jaguars live in a wide variety of habitats, from tropical forests to temperate forests and semi-arid shrublands, their conservation implies the protection of these environments, which are home to a high percentage of Mexico's biological diversity, including an immense number of endemic and endangered species.











Conserving jaguars is therefore an effective strategy to protect biodiversity while also supporting the sustainable development of regions that depend on these ecosystems for their social and economic well-being.



Types of natural vegetation and land use in the jaguar's range

Pacific Ocean

Gulf of Mexico

-  Mountain cloud forests
-  Temperate forests
-  Tropical deciduous forests
-  Evergreen tropical forests
-  Xerophilous shrublands
-  Grasslands
-  Wetlands
-  Agricultural use Historical
-  distribution
-  Jaguar Biological Corridors

The jaguar is distributed in about 40% of the national territory, most of it in tropical environments.



Where does the jaguar live?

The jaguar is distributed in Mexico along the slopes of the Pacific, from Sonora to Chiapas, and in the Gulf of Mexico from Nuevo León and Tamaulipas to the Yucatan Peninsula; from sea level to 1 500 meters above sea level, however, there are isolated records at higher altitudes. It

currently inhabits about 40% of its historical distribution. However, in the last two decades they have begun to be recorded in regions where it had already disappeared, such as the Sierra Fría in Aguascalientes and the Sierra Gorda in Querétaro and Guanajuato. It has also been documented that

it can survive in disturbed regions with a dominance of crops or pastures for livestock, and even in the vicinity of urban areas such as Cancun in Quintana Roo. It is a species that mainly inhabits tropical environments, such as humid forests, dry forests , mangroves and wetlands. However, its wide ecological tolerance allows it to survive in the north

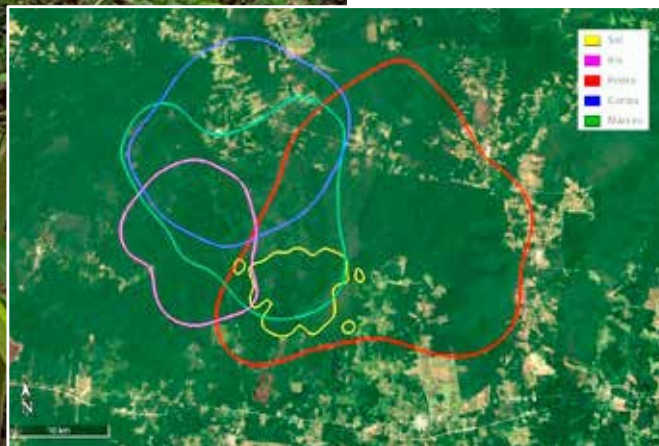
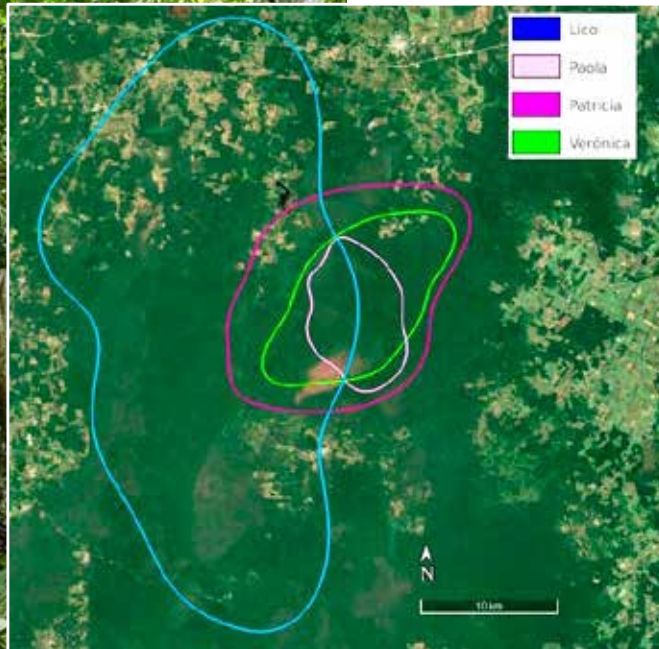
of the country in subtropical regions, especially in arid and semi-arid shrublands. It is much less present in the Sierra Madre del Sur in Guerrero, where there are abundant forests of oaks and pines, as well as in the surrounding regions where tropical regions come into contact with the mountains.





Areas of activity

The jaguar is a feline with crepuscular and nocturnal habits, so it is not easy to observe it in the wild. To study their habits, advances in technology have been used, placing telemetry collars on individuals that are captured in the wild. These collars broadcast the position of the jaguar to a satellite, which in turn relays the data to a computer. Thanks to this, it has been determined that a jaguar can move on average 12 km per day, reaching up to 20 km in search of food and shelter, as well as it has been observed that the areas of activity differ between males and females. In the region of Calakmul, Campeche, male jaguars have an average area of activity of 450 km², and can reach up to 700 km². As for females, their average area of activity is 170 km², with ranges ranging from 60 to 350 km², space necessary to keep and feed their young. These gender differences are due to the fact that males travel greater distances to search for food and protect the group of females within their territory, while females adjust their movements mainly according to the abundance and availability of prey.



In the figures from the research in Calakmul, Campeche, it is clear that the areas of activity of the males are more extensive than those of the females; in the same way it is very evident that the activity is concentrated in the areas with jungle, which are surrounded by pastures for cattle.



Dams

The jaguar is the most formidable predator in the American tropics and feeds on a wide variety of vertebrates. Their diet is composed of dozens of species of mammals, birds, reptiles and fish, although the main prey changes depending on the environment and geographical location. In general, mammals occupy more than 70% of their diet, which ranges from small opossums to deer.

The most important prey in Mexico are the collared and white-lipped peccary (*Dicotyles tajacu* and *Tayassu pecari*), the white-tailed deer (*Odocoileus virginianus*), the temazate deer (*Mazama pandora* and *M. temama*), the coati (*Nasua narica*), the sereque (*Dasyprocta punctata*), the armadillo (*Dasypus novemcinctus*), hocophasons (*Crax rubra*) and other birds, crocodiles (*Crocodylus* sp.), green iguana (*Iguana iguana*) and sea turtles (*Lepidochelys olivacea*, *Chelonia mydas*).

Opposite page, top to bottom, left to right, gray fox (*Urocyon cinereoargenteus*); swamp crocodile (*Crocodylus moreletii*); white-lipped peccary (*Tayassu pecari*); iguana (*Iguana iguana*).

Above, sereque (*Dasyprocta punctata*); below, hocofaisán (*Crax rubra*).







THREATS



Main Threats

Jaguar populations have disappeared or declined in a considerable part of their historical distribution. As Aldo Leopold mentions in his famous book *Fauna Silvestre de México* (1959) "as a result of constant persecution, jaguars have become scarce in the tropical areas most dedicated to agriculture".

The main threats to the survival of the jaguar are the following:

- Habitat loss and fragmentation.
- Agriculture and livestock.
- Hunting for the predation of livestock and other domestic animals.
- Illegal hunting for trophies and trafficking.
- Road (roads and trains) and urban infrastructure.
- Infectious diseases transmitted by dogs and other animals.

Due to these causes, the distribution and populations of the jaguar in Mexico have declined dramatically in the last 50 years. Currently, the Jaguars are in danger of extinction in Mexico. The main problem is the destruction and fragmentation of their habitat due to the advance of agricultural, livestock, forestry and urban frontiers, which include road infrastructure, such as roads and railways.

Dozens of jaguars are killed each year by poachers, who hunt them as trophies, to trade their skins, skulls and tusks, or capture the young to keep as pets. In addition to this, the jaguar comes into conflict with humans both in urban communities, such as the coast of Quintana Roo, and rural communities in other areas, preying on domestic animals such as cows, sheep and dogs, for which they are hunted or poisoned in retaliation. Domestic animals pose an additional threat to the jaguar as they can transmit diseases such as distemper, which are lethal to these felines. Only with enormous political will and participation of the various sectors of society will it be able to survive the following decades, which are looming like a strong storm.

Habitat destruction

The jungles and tropical forests of southeastern Mexico are characterized by their high biological diversity. A wide variety of plant and animal species can be found in them, including the largest populations of the jaguar. These environments dominated the landscape forming a large forest massif that extended from the south of Tamaulipas to the Yucatan Peninsula on the slope of the Gulf and, along the Pacific coast, from Sonora to Chiapas. This changed with agricultural, timber, industrial and urban development in the twentieth century. In the middle of that century, the colonization of the forestlands in the southeast of the country was promoted, opening a new chapter in the history of the tropical forests of the region. The colonization of "unproductive" lands in the humid tropics intensified in the 1970s and with it the natural landscape changed dramatically, with the conversion of millions of hectares of natural environments to crop fields and pastures. For example, of the more than 22 million hectares of high forests that stretched from Veracruz to Chiapas, there are currently less than one million hectares, scattered and with little connectivity. The largest forest massifs of jungles are located in the southwest of the Yucatan Peninsula, in the region of Los Chimalapas in Oaxaca and in the region of La Lacandona in Chiapas. Currently, about 200,000 hectares of natural environments are lost annually in Mexico. In the Yucatan Peninsula, which is the region with the most jaguars in the country, 60,000 hectares disappear every year.



CCK

Livestock conflict, illegal hunting and trafficking

Hunting is one of the main problems that threaten the long-term survival of the jaguar. There are three main causes for hunting them: retaliation for the predation of cattle and dogs, hunting for a trophy and for illegal trafficking. The transformation of the natural landscape has increased contact between domestic livestock and jaguars, and this is perceived by local people as a threat, so they are illegally persecuted and hunted, especially after jaguar attacks on domestic animals. These attacks are largely due to the fact that the destruction of natural environments and the hunting of wild animals for human consumption by local villagers has caused the availability of jaguar prey to decrease. It is imperative to develop alternative livestock management measures that are feasible for farmers to carry out in order to resolve the conflict. Some livestock management recommendations are: 1. Synchronize the birth season and isolate females to safe places in the pasture; 2. Keep the young and juveniles away from the edge of the paddock; 3. Keeping livestock under a system of enclosures or rotation of pastures; 4. To apply livestock insurance at the state or national level; 5. Protect the jaguar's natural prey from hunting.

Although the magnitude of the problem is unknown, The hunt for skins and skulls as trophies persists. This occurs either incidentally, that is, if a person finds a jaguar and decides to hunt it to save the skin, or in an organized way. In

In this sense, the last large seizure of jaguar skins hunted as trophies was made in 2001, where more than 25 skins were seized from a taxidermist in Chetumal, Quintana Roo.

A problem that has been increasing and that may become one of the most important causes for the disappearance of the jaguar in Mexico is illegal trafficking. It is increasingly common for skins, skulls, fangs and claws to be offered for sale on social networks. In addition, it is very likely that this illegal trafficking is fuelling the large traffickers who supply the demand for these products to China and other Asian countries in the belief that they have medicinal properties. This is one of the most urgent problems to address.

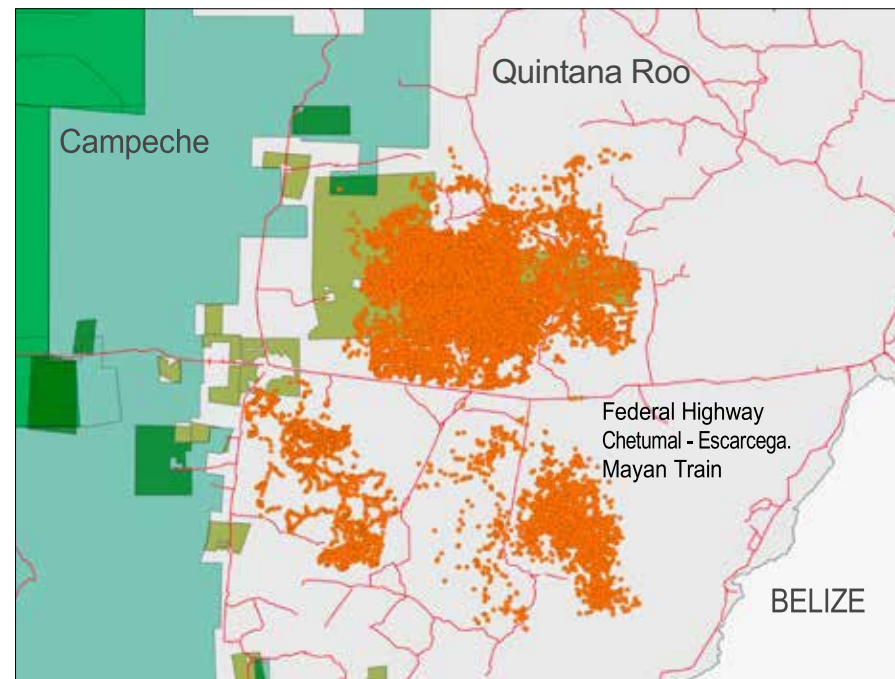
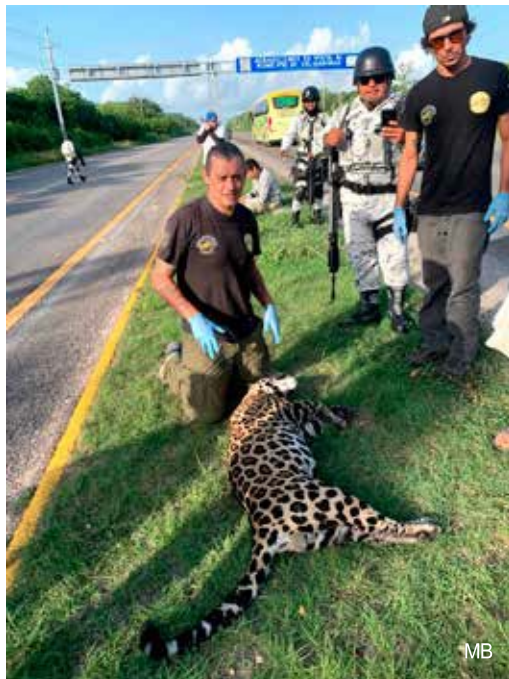




The increase in subdivisions in the jungles of the coast of Quintana Roo has left jaguars confined to isolated patches of jungle, such as this specimen near Playa del Carmen. The ANCJ has achieved the coexistence of jaguars and humans by implementing appropriate management practices.

Roads represent an important mortality factor for jaguars, such as this one run over on the Cancun - Tulum federal highway.

This figure shows the effect of roads on jaguar movements. Data from jaguars with telemetry collars shows that they never crossed federal highway 186 Chetumal - Escarcega between 2018 and 2024.



Infrastructure

Infrastructure works are essential for the economic and social development of a country, as they facilitate transportation, improve access to basic services and encourage investment. However, this expansion is commonly carried out without adequately considering the environmental impact it may cause. The construction of roads, trains, dams and urbanizations can fragment ecosystems, interrupt migratory routes and alter natural habitats, putting the biodiversity of the areas where they are implemented at risk.

Habitat fragmentation is one of the most important effects of these works, as they pose a direct threat to keystone species such as the jaguar, altering and limiting their movement, a situation that in the long term can lead to a decline in their populations. In addition, the loss of natural areas also affects other species that depend on these ecosystems for survival, creating a domino effect that affects the environment in general. It is therefore crucial to find a balance between human development and biodiversity conservation to ensure a sustainable future.

To maintain the connectivity of the landscape and reduce the fragmentation of the jaguar habitat, the ANCJ has proposed the implementation of wildlife crossings in road infrastructure works.







CONSERVATION



Jaguar conservation depends on coordinated efforts between local people, society, academia, private initiative, and the federal and state governments



National Conservation Strategy

Currently, Mexico has the technology and solid scientific knowledge to be able to promote solid conservation actions to save the jaguar from extinction. The National Alliance for the Conservation of the Jaguar has developed a National Jaguar Conservation Strategy, which identifies objectives, goals and concrete actions at the national level for the conservation of the species. The strategy has been developed by experts in biology, ecology, veterinary, conservation, and economic, social, and political aspects, who collaborate with universities, social organizations, the federal government, and the private sector. The National Jaguar Conservation Strategy contemplates the following guiding principles for the implementation of the Jaguar Conservation Strategy:

To give the conservation of the species:

1. Biological corridors and priority areas for jaguar conservation.
2. Monitoring of the jaguar and its prey.
3. Protocol for the care of jaguars and other felines.
4. Jaguar-human conflict.
5. Road and urban infrastructure.
6. Public policies and legal framework.
7. Community management.
8. Environmental education, communication and dissemination.
9. International cooperation.

The strategy must be a guiding axis that dictates the actions and goals in the short, medium and long term, as well as the mechanisms to carry them out, in order to work systematically and in a coordinated manner between civil society, rural communities, civil associations, universities, private initiative and the different agencies of the federal government (Ministry of the Environment, Ministry of Communications and Transportation, Ministry of Agriculture and Rural Development, National Commission of Natural Protected Areas, National Forestry Commission and the Federal Attorney for Environmental Protection) and state governments.

The implementation of the National Jaguar Conservation Strategy has made it possible to make solid progress in the conservation of this emblematic feline. Their populations have increased significantly over the past two decades despite the enormous problems facing the country. This shows that well-articulated conservation policies and actions are the basis for the harmonization of conservation and development, and are a hope for maintaining the jaguar and Mexico's biological diversity in the long term.



*The jaguar population in Mexico has increased:
4,000 in 2010
4,800 in 2018
5,300 in 2024!*

A great conservation success story



The mottle pattern of each jaguar helps to identify them at the individual level, this pattern is unique, like fingerprints in humans.

To study activity patterns, the jaguar is captured, anesthetized, its health status assessed, and a satellite telemetry collar is placed on it.

The National Jaguar Census

One of the fundamental elements in establishing conservation measures is to estimate the jaguar population in a systematic way, which makes it possible to assess whether the population is stable, increasing or decreasing. The ANCI has set a strong precedent in this regard, as it has carried out the only censuses at the national level. It is the largest effort to date made worldwide to determine the size and current situation of jaguar populations in a country. This places Mexico at the forefront as a leader in the development of conservation strategies for this feline.

To carry them out, five priority ecoregions were established for the conservation of the species: 1. Northwest (Sonora, Sinaloa). 2. Central Northeast (Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, Hidalgo, Puebla), 3. Central Pacific (Nayarit, Jalisco, Colima, Michoacán). 4. South Pacific (Guerrero, Oaxaca, Chiapas, Tabasco). 5. Yucatan Peninsula (Campeche, Quintana Roo and Yucatan). These ecoregions maintain similar environmental (such as climate) and biological (such as vegetation type) characteristics, but they can contrast greatly with each other. These differences largely determine the densities and size of jaguar populations.

To carry out the National Jaguar Censuses, sampling sites were selected in each ecoregion. In each site, camera traps were placed, which are automatically triggered by a motion sensor as a jaguar or any other animal passes, which remained active for several months. At the end of the sampling, the photos and videos were reviewed to determine the number of jaguars present. This information was analyzed with complex statistical models to determine the number of jaguars in the country. Each census required the participation of a considerable number of people.

The censuses have been carried out in 2010, 2018 and 2024. The results are very encouraging, as estimates indicate that the number of jaguars has increased from 4,000 in 2010 to 5,300 in 2024. The largest population is found in the Yucatan Peninsula, but there are jaguars throughout the national territory. The results indicate that solid and articulated conservation actions and policies allow for success stories in conservation. This is also a wake-up call to redouble efforts to reduce deforestation rates, more efficiently protect protected natural areas and biological corridors, and efficiently combat illegal hunting and trafficking. The future of jaguars in Mexico will depend on that.

Biological corridors for the jaguar and protected natural areas

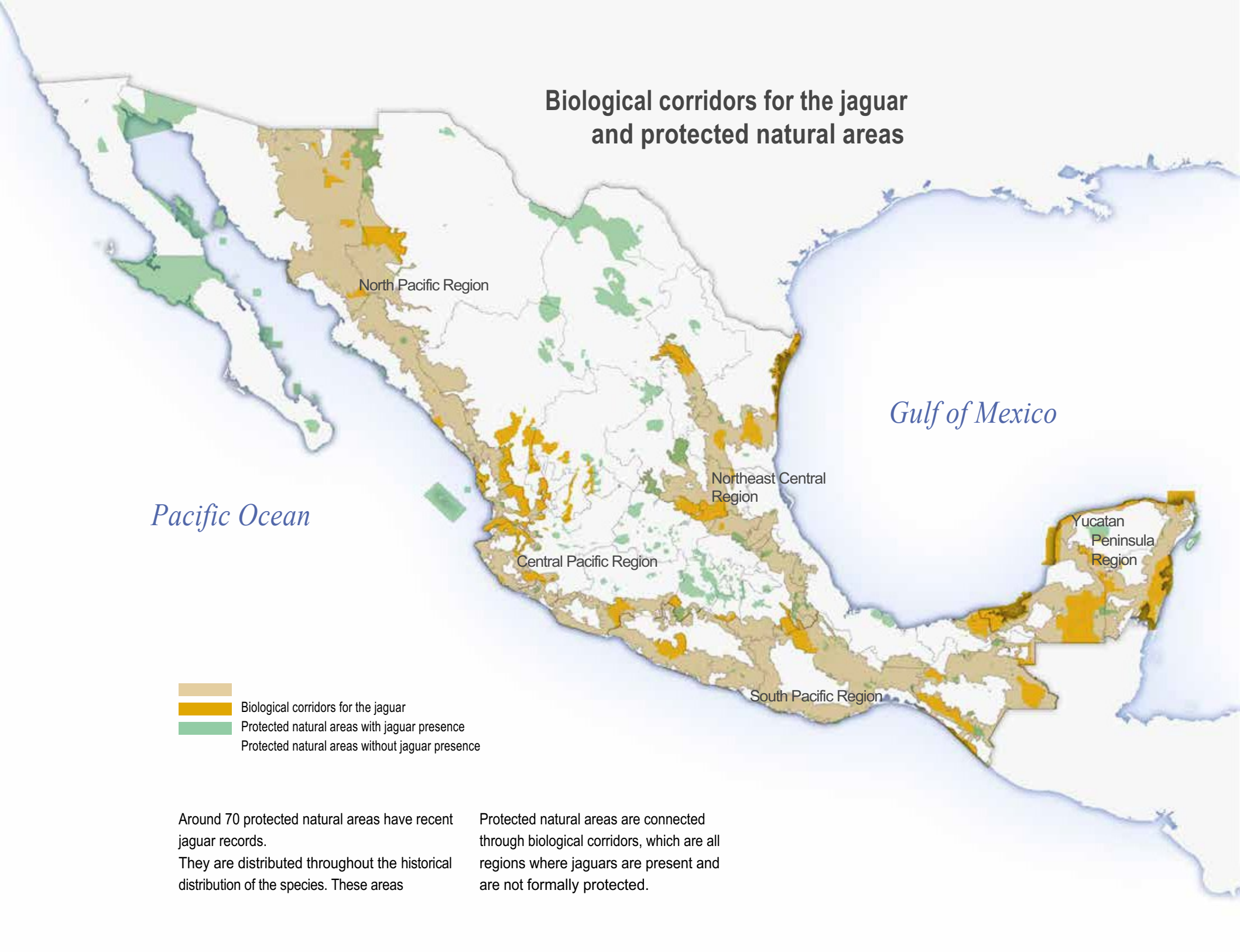
Pacific Ocean

Gulf of Mexico

- Biological corridors for the jaguar
- Protected natural areas with jaguar presence
- Protected natural areas without jaguar presence

Around 70 protected natural areas have recent jaguar records. They are distributed throughout the historical distribution of the species. These areas

Protected natural areas are connected through biological corridors, which are all regions where jaguars are present and are not formally protected.



Protected natural areas



Natural protected areas (NPAs) represent the most important conservation strategy for jaguars, biodiversity and natural environments in the country.

About 12% (91 million ha) of the national territory is protected in more than 200 federal PNAs distributed throughout the national territory. The jaguar is represented in more than 70 of these NPAs and in about 30 ADVCS (Areas Voluntarily Designated for Conservation) in rural communities, which together represent 17% of the jaguar's distribution area in Mexico.

The public policies and work of the next two decades will define the future of the PNAs and Mexico's biological diversity. That is why a fundamental strategy of the federal government, supported by rural communities, civil society, private initiative and state governments, will be to continue strengthening the protection, management and conservation of NPAs, with adequate financing, personnel, infrastructure and management plans. The decree of protected natural areas in the areas identified as priorities for the conservation of the jaguar should continue, as far as possible. However, given that the largest area of the jaguar's distribution area is outside the NPA, the figure of "biological habitat" should be established in environmental legislation as a type of protected natural area, and that the conservation and development policies of the countryside of secretariats such as the Ministry of the Environment and Natural Resources and the Ministry of Agriculture and Rural Development should be aligned in these spaces.

The future of protected natural areas and corridors
Biological resources largely represent the future of the jaguar, biological diversity and human societies in Mexico. Hence the importance of its conservation.

New areas Natural Protected

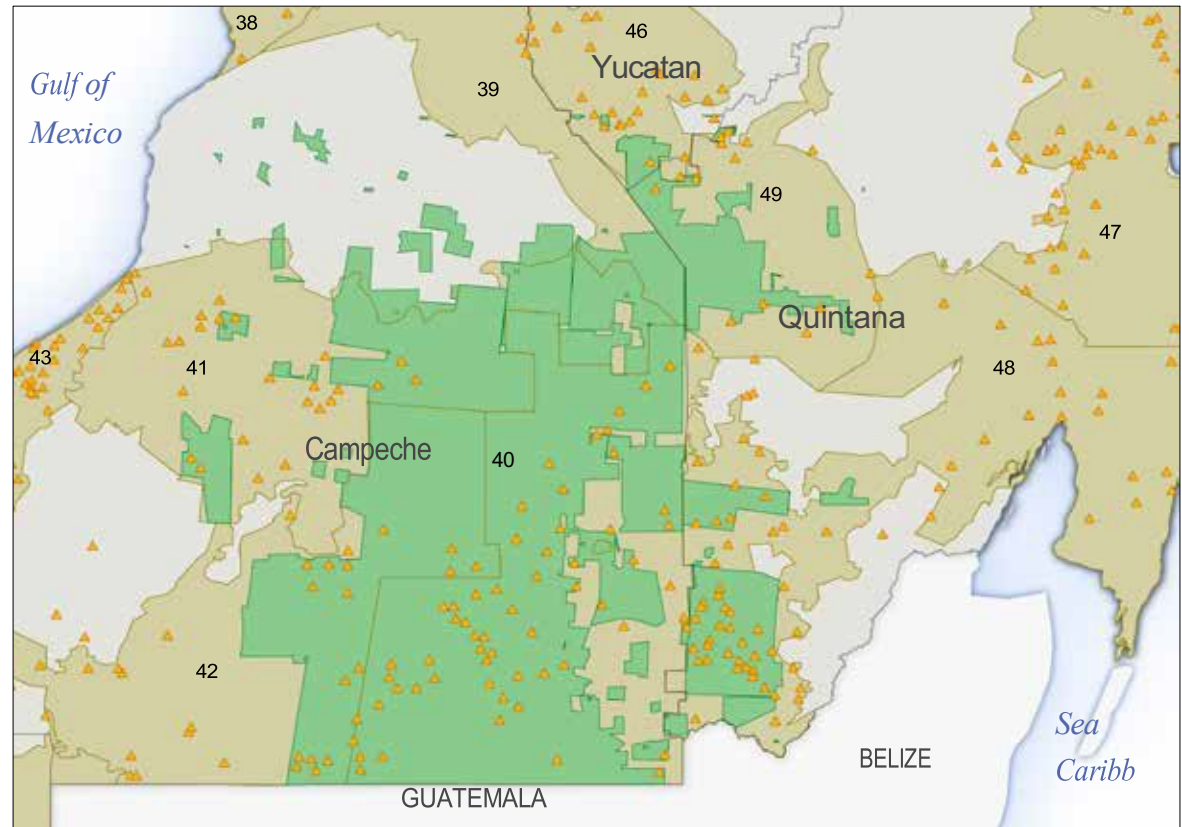
The ANCJ has worked in key sites for jaguar conservation, such as biological corridors and protected natural areas. After the second National Jaguar Census in 2018, the creation of new NPAs in strategic areas was proposed, collaborating with the National Commission of Natural Protected Areas (CONANP). CONANP decreed several of these reserves in 2023. The project to consolidate protected areas in the region known as Gran Calakmul stands out for its extension and because it maintains the largest jaguar population in Mexico. The proposal included the expansion of the core area of the Calakmul Biosphere Reserve, as well as the decree and recategorization of the state reserves of Balam Kú and Balam Kin as federal NPAs, which strengthened the conservation of the region. The project also involved the incorporation of Voluntary Conservation Areas (ADVCs) of the ejidos and local communities. In total, Gran Calakmul protects more than 1.5 million hectares.

areas of forests and constitutes the largest forest massif such in the north of South America.

Other of the new ANPs decreed in 2023 in which the Alliance collaborated with CONANP are ADVC of Santa María and San Miguel Chimalapa

(Oaxaca), Cordon Grande (Guerrero) and Las Cuevas del Jaguar (Sinaloa); the Tecuani Biosphere Reserve (Guerrero) and the Sierra de Tacuichamona State Reserve (Sinaloa). See opposite page.

Greater Calakmul Region, Campeche and Quintana Roo



Gran Calakmul

▲ Jaguar Records

Biological corridors for the jaguar

38. Petenes – Celestún
39. Calkiní – Bala'an K'aax

40. Calakmul – Bala'an K'aax

41. Balam Kin – Champotón

42. Balam Kú – Laguna de Términos

43. Pantanos de Centla – Laguna de Términos

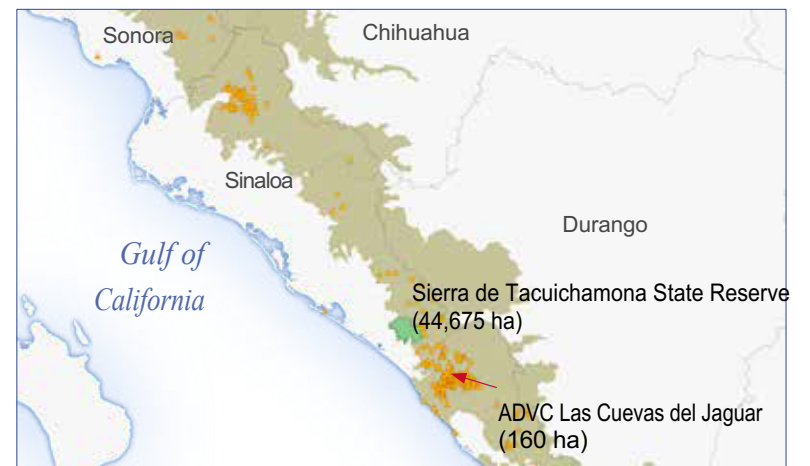
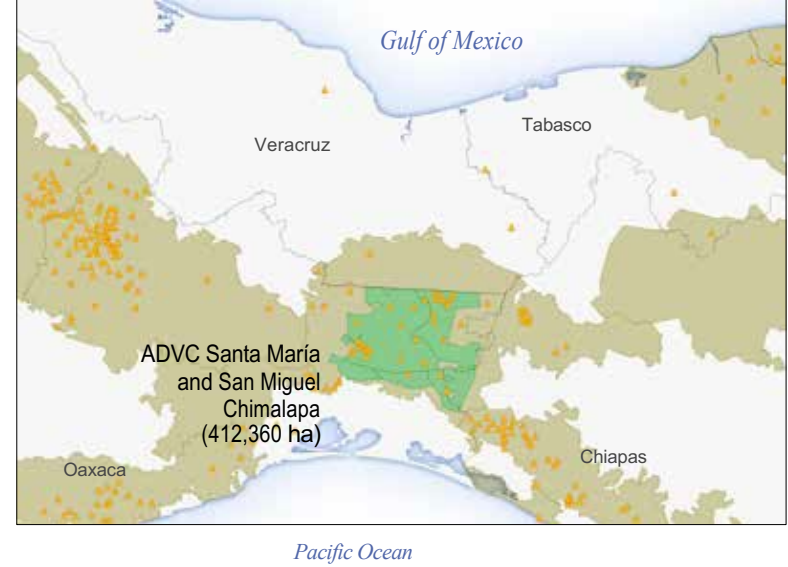
46. Ticul – Bala'an K'aax

47. Yum Balam – Sian Ka'an

48. Calakmul – Sian Ka'an

49. José María Morelos – Bala'an K'aax

- The area of the core zone of the Calakmul Biosphere Reserve increased.
- Balam Kin (115,658 ha) was decreed as Flora and Fauna Protection Areas.
- Balam Kú (463,441 ha) was decreed as a Biosphere Reserve.
- Seven Areas Voluntarily Designated for Conservation (54,946 ha) were incorporated.





The simplest wildlife crossings are signs that indicate where the animals pass (top left).

Most wildlife crossings are drains (top right) or tunnels (bottom left) specially designed for wildlife to pass under road structures.

Elevated wildlife crossings (bottom right) are a solution when road structures are already built, making it technically impossible to build tunnels.

UAN/RECOZ/JSP

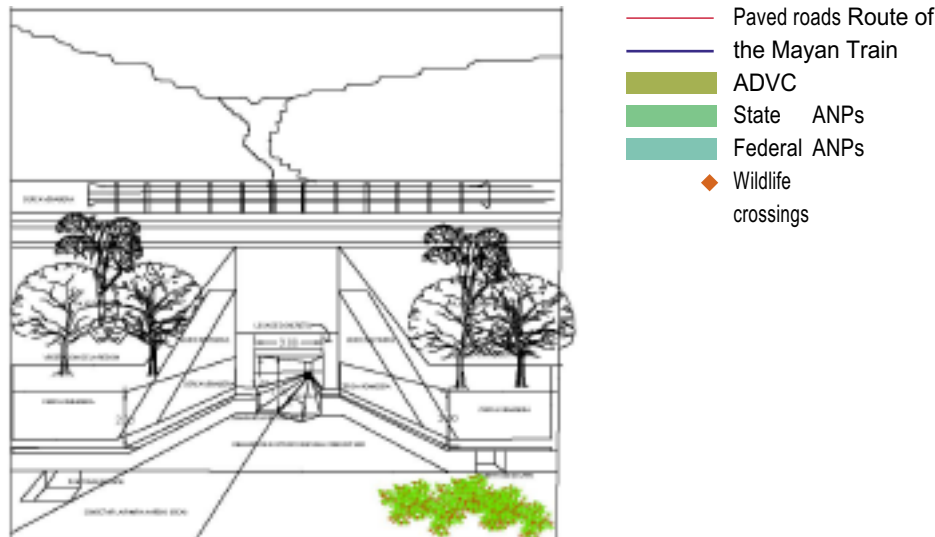


Montan Wildlife Department



ABC

Wildlife crossings



A key measure to mitigate the negative impacts of habitat fragmentation caused by roads and railways is the construction of wildlife crossings at strategic sites. Wildlife crossings are man-made structures in the form of bridges or tunnels specifically designed to reduce landscape fragmentation, maintain the connectivity of wildlife populations and allow them to cross roads safely, thereby reducing the risk of being run over.

There are five main types of wildlife crossings. The simplest are simply signs that indicate where the animals cross. The other four types of wildlife crossings are structures that cross roads or tracks either above as bridges or underground as tunnels and drains. Although it has been spread in public opinion that the best passages for terrestrial fauna are bridges, this is not entirely correct. The effectiveness of wildlife crossings depends on the animals for which they are to be built, the type of habitat and the construction site. For example, the wildlife crossings such as hanging bridges are the only ones that work for mammals of arboreal habits.

In Mexico, wildlife crossings are a mitigation measure that is beginning to be used more frequently to reduce the impacts of road infrastructure. The National Alliance for the Conservation of the Jaguar successfully proposed the construction of wildlife crossings on the Maya Train and collaborated with the design and identification of critical sites for the construction of this type of structure, proposing more than 300 crossings.

Challenges and perspectives for jaguar conservation

Increasing the jaguar population should be the fundamental objective of the conservation of the species. Estimates of its population show that there has been an increase of about 25% in 15 years. This is good news, although it indicates, on the other hand, that if this increase continues, it will take 30 more years to double the population that existed in 2010 (4,000 jaguars). In this sense, the ANCJ has postulated that an adequate challenge would be to double the jaguar population in the next 15 or 20 years.

To achieve this objective, it is necessary to address priority issues, among which are the following:

- i. To strengthen scientific research on the biology and ecology of the jaguar related to aspects of its conservation.
- ii. Determine the detailed impact of major threats to the jaguar, such as habitat destruction and fragmentation.
- iii. Develop a robust strategy to end illegal jaguar hunting and trafficking. For example, it is imperative to stop the offer on social networks such as Facebook.
- iv. Consolidate the protection, management and conservation of protected natural areas with adequate financing, personnel, infrastructure and management plans.
- v. Decree as protected natural areas the areas identified as priorities for the conservation of the jaguar.

- vi. Define and establish in environmental legislation the figure of "biological corridor" as a type of protected natural area.
- vii. Align the conservation and development policies of the countryside of ministries such as the Ministry of Agriculture and Rural Development and the Ministry of the Environment and Natural Resources in the management of biological corridors.
- viii. Maintain and increase the program of payment for environmental services and tax incentives in natural protected areas and priority biological corridors for the jaguar.
- ix. Establish a program with the Ministry of Communications and Transportation, the Ministry of Environment and Natural Resources, and the Ministry of Defense to mitigate the impact of road infrastructure (roads and trains) in the regions where the jaguar lives.
- x. Continue with an ambitious campaign of environmental education, awareness and dissemination of the importance of the jaguar and its conservation.

The implementation of a national conservation strategy that addresses these and other priority issues, involving rural people, other sectors of society, private initiative and government, will be the key to long-term jaguar conservation. This is a noble objective that entails the conservation of the jaguar and biological diversity, protects environmental services and generates well-being and social justice.

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Rosalba beceRRa

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