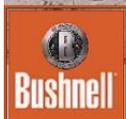


Achieving jaguar conservation and local communities' well-being in the Southwest Amazon Jaguar Priority Landscape



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1. INTRODUCTION

The jaguar (*Panthera onca*) is the largest and most iconic feline in the Americas and the third largest cat in the world after tigers and lions. Jaguars, as apex predators, keep prey populations under control and help to maintain healthy, functioning animal and plant communities. Given their crucial role in the ecosystems in which they live, a jaguar-focused conservation strategy can serve as an effective umbrella for many other co-occurring species.

Over the past 50 years the jaguars have lost over half of their original habitat, and several populations are considered critically endangered. The only large intact blocks of habitat remain in the Amazon rainforest; the Amazon biome holds approximately about 5.3 million km² of tropical rainforest comprising multiple ecosystem services of vital importance to the benefit of mankind as regulation, provision, cultural context and supporting services, where preservation of biodiversity is one of the key components. Several studies have shown that the Amazon supports high densities of jaguars, only surpassed by the Pantanal of Brazil. However, the Amazon is a patchwork of land use types including small scale agriculture, agroforestry, logging concessions, indigenous territories, and a variety of different types of protected areas that in different ways have a determined effect on jaguars' populations and their prey.

The Southwest Amazon Landscape (SWA) is part of the wider border region of Madre de Dios and Ucayali (Peru), Acre (Brazil), Pando and north of La Paz Department (Bolivia). This region is one of the 15 prioritised landscapes in the WWF Jaguar Strategy¹ and holds 31M ha of a well-established network of protected areas, Indigenous lands, and areas with forest-based economies. The moist forests of the SWA are widely recognized as one of the most biologically diverse and intact primary forest ecosystems in the world². It is also part of the Carrasco/Amboro/Isiboro/Madidi Jaguar Conservation Unit (JCU) and is important to maintain connectivity between central Amazon populations and the Southern parts of the jaguar range. As part of the Amazon, this region is of global priority due to the crucial ecosystem services it provides, such as global climate regulation. Nearly one third of its forests are owned and/or managed by communities, whose livelihoods depend on non-timber forest products (NTFP), particularly Brazil nuts, açai palms and other amazonian fruits.

In that sense, we emphasise the need of assessing an integrated landscape management that can contribute to the mutual alignment of productivity and conservation aims by the transformation of global land and resource use toward sustainability. By ensuring good productivity practices and finding new ways to manage natural resources we will be able to secure the full range of ecosystem goods and services potentially provided. In that sense, WWF proposes to secure key sites within the Southwest Amazon Jaguar Priority Landscape by using this integrated approach of effectively managed areas and productive zones, thus ensuring stable jaguar populations and the well-being of local communities coexisting with them. This project focuses on identifying the most important human-jaguar conflict areas across the different types of land use: Protected Areas, forest concessions and agricultural and cattle lands; as well as the characterization of human-jaguar conflict

¹ [Jaguar Strategy 2020-2030. WWF 2020.](#)

² [The Global 200: Priority Ecoregions for Global Conservation. Olson and Dinerstein 2002.](#)

in the different types of land use, towards the development of appropriate mitigation and prevention measures.

2. METHODOLOGY

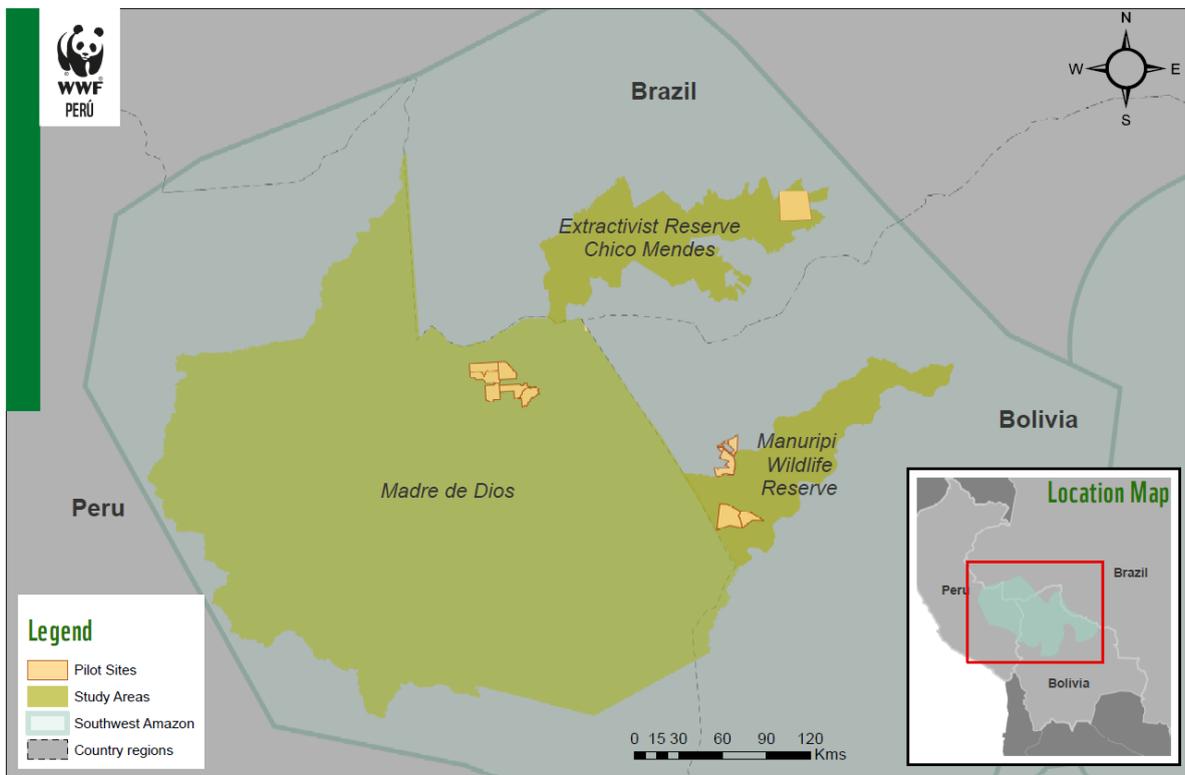
2.1. Study area

The present study was focused on three pilot areas comprising the Southwest Amazon Landscape (SWA) and representing each country involved: Madre de Dios region, for Peru; Manuripi Wildlife Reserve for Bolivia; and Reserva Extrativista Chico Mendes for Brazil (Map 1).

The Madre de Dios Region is located in the southeastern region of Peru and it has an approximate surface area of 85,873.22 km², which represents 6.7% of the national territory and 15.4% of the Amazon region. Politically, the region is divided into three provinces (Tambopata, Manu and Tahuamanu) and eleven districts. The province of Tambopata, with its capital Puerto Maldonado, concentrates the main economic, social and financial activities and road and service infrastructure. Within the heterogeneity of economic activities developed in the region, three economic fronts can be distinguished today: the extractive front, made up of gold mining, timber extraction, chestnut and non-timber forest products extraction; the agricultural front, which includes migratory agriculture and extensive cattle ranching; and the conservation front, encompassing the natural resource-based economy, ecotourism companies, oil fields, bioinvestment initiatives and the group of protected natural areas. This region currently boasts the highest population growth rate in the region, with a population characterised by being relatively fluctuating and heterogeneous, and composed of native communities and migrants from the Peruvian Andes.

The Manuripi Reserve is home to 10 communities of which the communities of Holanda and Villa Florida were chosen as pilot sites. Villa Florida is a community of peasant origin, with a population of approximately 170 people living in an area of 30,403.58 ha, whose main economic activity is the harvesting of chestnuts on family plots, complemented by the harvesting of acai. At the same time, the Manuripi Reserve Management Plan establishes a buffer zone outside of the protected area, within which there are several communities, including the community of Holanda, which has an area of 21179.55 ha. Both communities are within the range of action of both ACEAA - Conservación Amazónica and the priority sites for jaguar conservation in the southwestern Amazon proposed by WWF, thus strengthening a coordinated work between partners.

The Chico Mendes Extractive Reserve is strategically located near the border with Peru and Bolivia and its classification by Brazilian law allows for its occupation by traditional communities, which amplifies some risks to both people and jaguars. For generations, forest workers in this area have made a living extracting latex from rubber trees. In fact, the reserve is named after the rubber tapper who was killed for opposing the deforestation of this part of the Brazilian state of Acre to create pasture for cattle. And like much of the Amazonian territory, the Chico Mendes Extractive Reserve has been under great pressure from deforestation and forest fires, many of which are caused by the irregular expansion of cattle ranching. Currently, this activity is the main driver of deforestation in the reserve, and in 2020 it registered the highest rate of forest loss of any protected area in Brazil.



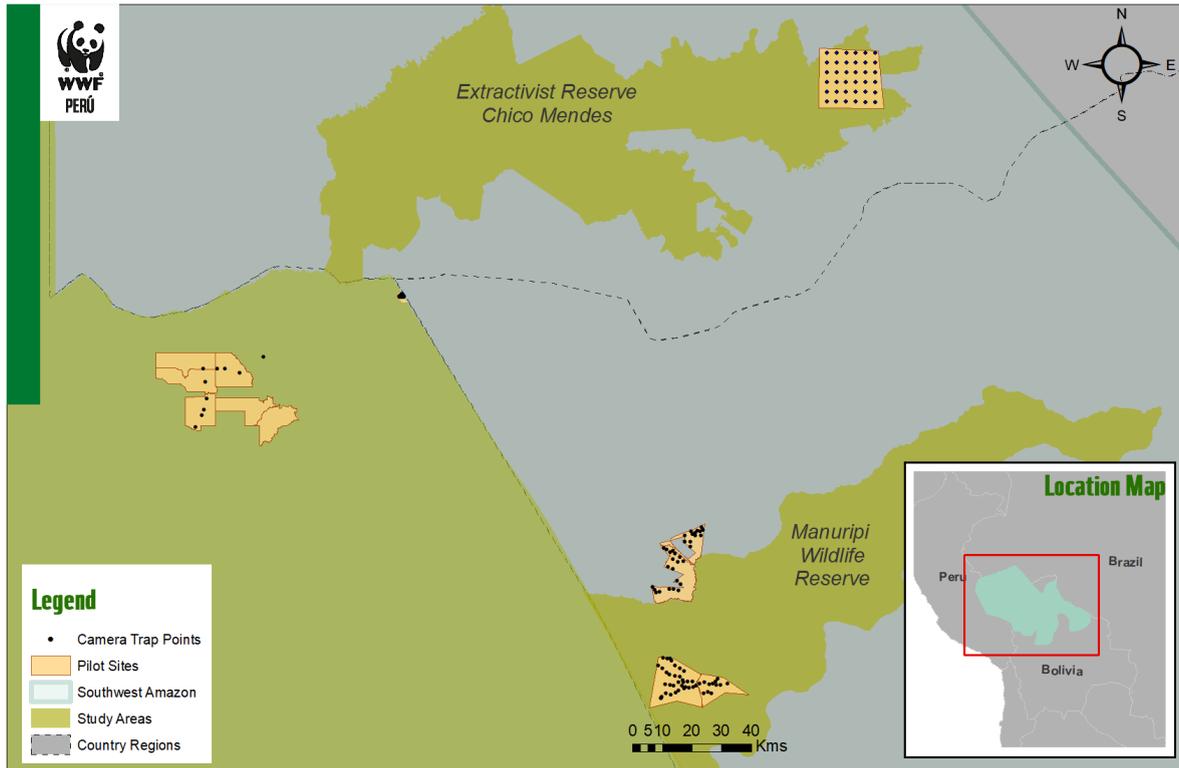
Map 1. Southwest amazon landscape pilot areas.



Figure 1. a) Panoramic view of Maderacre Forestry Concession; b) Tahuamanu livestock farm near to forest edge; c) Manuripi community member harvesting Brazil Nut; d) Manuripi Wildlife Reserve landscape ; e) Extractivist Chico Mendes Reserve landscape ; f) Cattle ranching in Chico Mendes Reserve

2.2. Camera Trap Study

In order to characterise interactions regarding each land use type in the southwest Amazon landscape, 223 camera traps were set up in the three pilot sites, distributed in livestock farms (4%), forestry concessions (9%), non-timber and Brazil nut lands (54%) and extractive resource management land (32%), with a sampling effort that varied between ~40 and 120 days. Photos and videos collected were processed manually identifying jaguar registers and systematising data in Microsoft office package.



Map 2. Camera trap sample units in pilot areas of Southwest Amazon Landscape



Figure 2. a) Road system in Maderacre Forestry Concession; b) Crawling test for the camera trap installation in Manuripi reserve; c) Camera trap set up in Manuripi reserve d) Camera trap set up in forest patches near livestock farm.

2.3. Conflict Surveys

Since there is no documented information on conflicts between people and wildlife generated for this landscape, an exploratory qualitative study was applied to collect in-depth data. For this, a semi-structured qualitative interview was used in the selected localities, based on Zimmerman, 2014³ and adjusted according to each pilot site context. In Madre de Dios, conflict surveys were collected in collaboration with San Diego Zoo Alliance, and consisted of 57 questions organised within 6 main sections: 1) socio-demographic information, 2) Attitudes Toward Wildlife Species, 3) Hunting and Bushmeat Consumption, 4) Logging, 5) Domestic Animals and livestock, and 6) Conflict with Wildlife from Forest.

On the other hand, Manuripi reserve surveys were done in cooperation with ACEEA, with a format consisting of 47 questions comprised in 15 sections, highlighting two main variables: 1) perception of the damage caused by the jaguar to domestic animals and the threat to people's safety, and b) the perception of the jaguar's importance and role in the environment. Socioeconomic characterization was built on each community's annual socio economic calendar which allowed for a better understanding of activities time investment, identifying activities that could imply higher possibilities of jaguar interactions (e.g. collection of chestnuts or harvesting of acai fruits, among others).

In total, 175 surveys were carried out between Perú and Bolivia. In Madre de Dios (Perú) 125 surveys (71.4%) from 22 sectors alongside Tambopata and Tahuamanu provinces were interviewed. For Manuripi reserve (Bolivia), 50 people were interviewed (28.6%) 30 from Villa Florida and 20 from Holanda communities. Information was systematised using Microsoft office package.

3. RESULTS

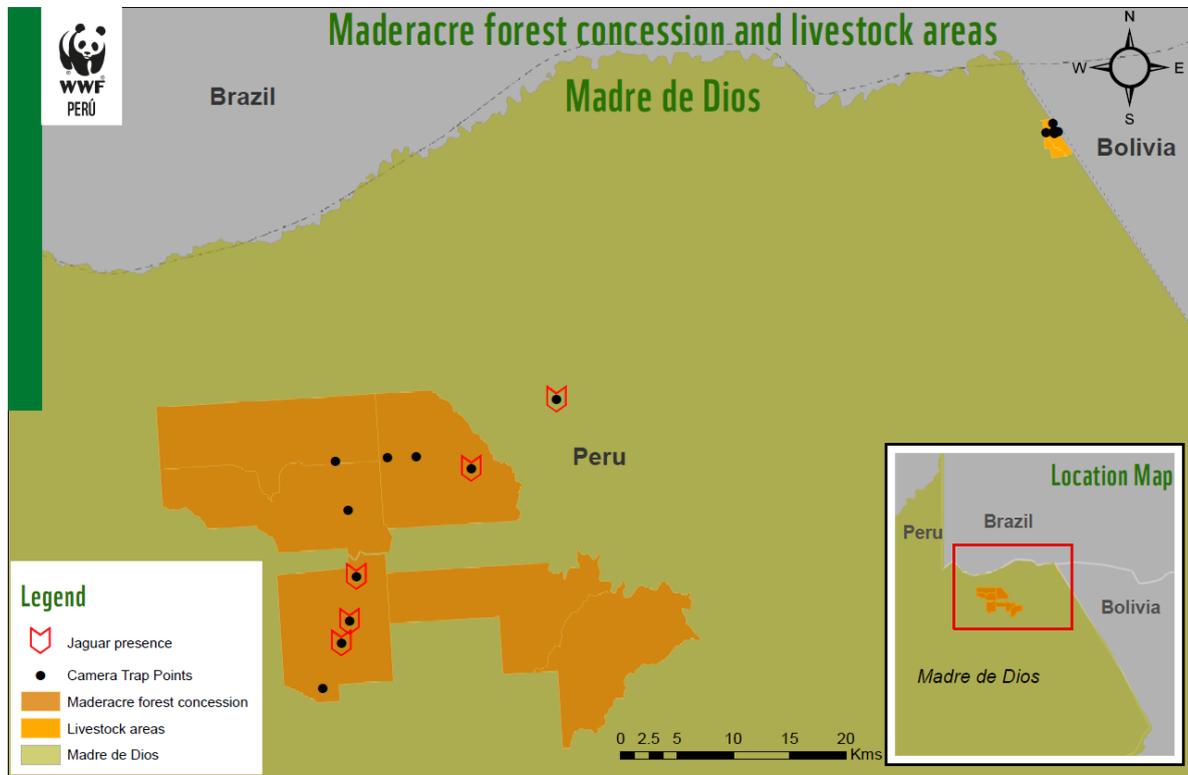
3.1. Jaguar presence

The overall camera traps recorded 109 jaguar observations at 29 stations for the pilot sites in the Southwest Amazon landscape. In Madre de Dios, 39 observations were recorded in 4 stations, all located in Maderacre forest concession (map 4). There were no records of jaguars at the points located near the cattle ranches; however, there were records of other smaller felines such as ocelots and margays, which also have conflicts with the community members for feeding on chickens or hens. Although these domestic animals do not have the same economic value as cattle, they do have an impact on people's wellbeing because they are an important source of food for families.

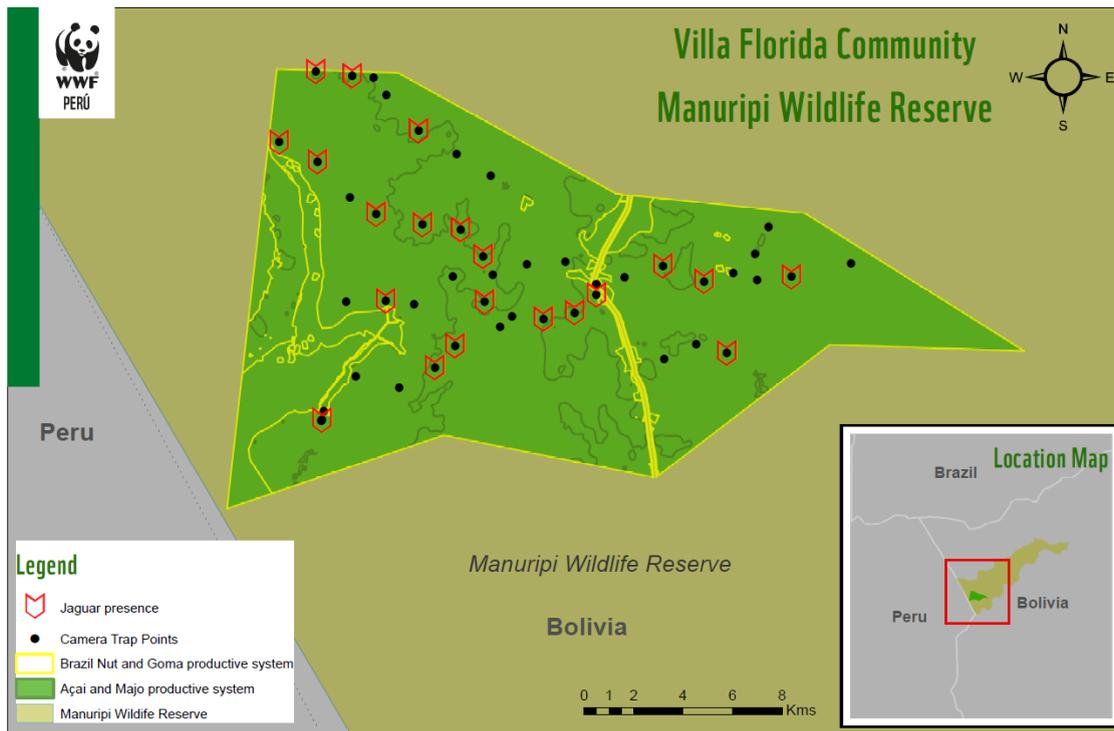
Regarding the Manuripi Reserve, 57 jaguar observations were obtained in 21 stations, of which 52 observations were in the Villa Florida community (map 5) and only 5 in Holanda community (map 6). Although fewer cameras were installed in Holanda in compared to Villa Florida, the proportion of jaguar presence is much higher in Villa Florida, whose members main economic activity is non-timber extraction (Brazil nut/sai); than in Holanda, whose members main economic activity is based on timber and non-timber extraction (Brazil nut).

³ [Jaguars and people. A range-wide analysis of human-wildlife conflict. Zimmerman, 2014.](#)

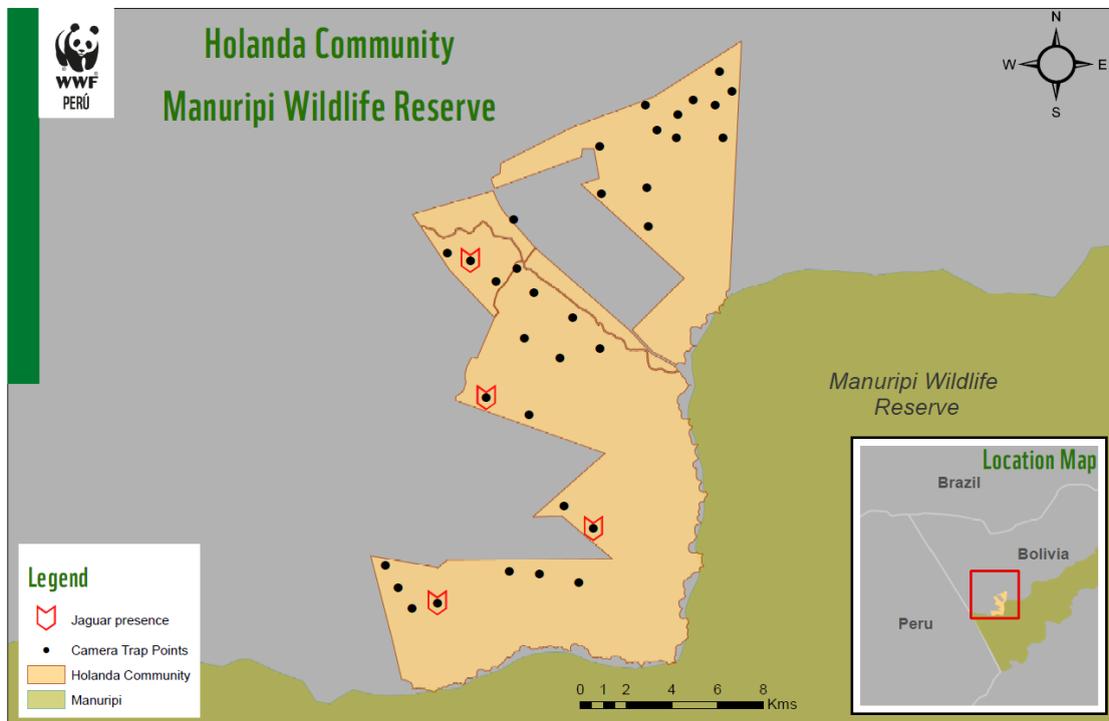
Finally, 13 jaguar observations were recorded in 4 of the total stations in the Chico Mendes Extractive Reserve (map 7).



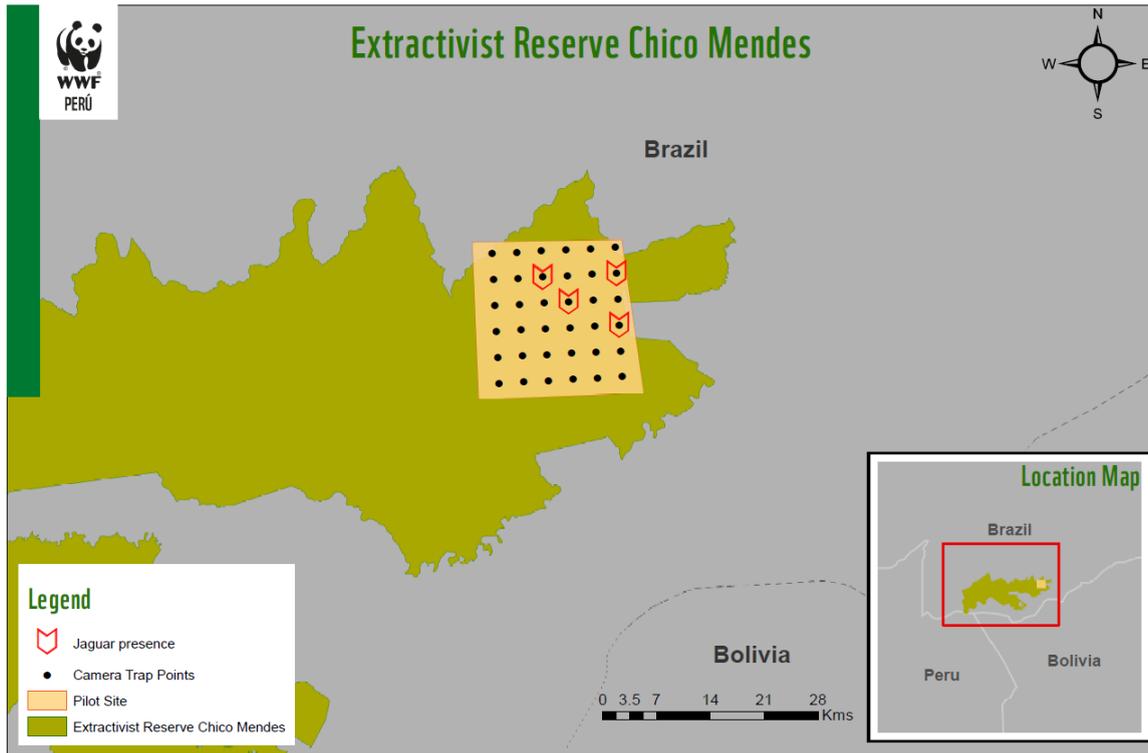
Map 4. Jaguar presence in forestry concessions and livestock areas of Madre de Dios



Map 5. Jaguar presence in Villa Florida community within Manuripi Wildlife Reserve, Bolivia.



Map 6. Jaguar presence in Holanda community of Manuripi Wildlife Reserve, Bolivia.



Map 7. Jaguar presence in Extractivist Reserve Chico Mendes

3.2. Surveys

3.2.1 Sociodemographic information

Both in Madre de Dios and in the Manuripi communities, the age of interviewed people was over 24 years old and under 83 years old, with male being the predominant gender (80% for Peru and 64% for Bolivia). The main economic activities that generate the most income varied from Brazil nut collection, agriculture, logging, transportation and cattle ranching as the most important income-generating activities in Madre de Dios, while in Manuripi reserve there's a predominance of subsistence agriculture (Brazil nut and acai collection). Likewise, in Villa Florida timber harvesting is also a relevant activity.

3.2.2 Human relationships with wildlife and domestic fauna

a. Game hunting

Between 30% and 40% of the respondents hunt bushmeat in the communities of Manuripi and Madre de Dios respectively, and almost all claim subsistence as the main driver. In Manuripi, only 31% of those who hunt have a very rare or scarce frequency (few times a month or almost never). In Madre de Dios, however, the picture is contrasting, with over 96% of those who hunt with a frequency of at least two animals per month, most of them noticing that animals are more difficult to find currently than in comparison to previous years.

b. Cattle and pets

Most people in the Madre de Dios and Manuripi communities raise animals, both for their own consumption and for companionship; most common animals are chickens, dogs, ducks, pigs and cattle. In the case of Madre de Dios, slightly more than half of the people interviewed said they raise animals for consumption and only 15% also raise animals for commercial trade.

3.2.3 Jaguar perception

a. Sightings and population change

The majority of the inhabitants of Madre de Dios stated that they have seen jaguars a few times in their life (43%) or a few times a year (31%). However, although one-fifth of those interviewed said they had never seen a jaguar in their lives, very few of them mentioned that they do see jaguar tracks occasionally and that jaguars have even eaten their livestock. Meanwhile, In Manuripi communities, jaguar encounters or sightings occur when the community members go into the forest to harvest Brazil nuts (during November to March) or when they go hunting. Throughout the last few years in the Villa Florida community, jaguar sightings and indirect signs (tracks, faeces and scratches) have been regular during acai fruits harvesting. Despite this, most people in Villa Florida (57%) don't believe that jaguars attack or kill people; nevertheless, in the Holanda community, only 20% of the respondents shared the same beliefs.

When asked about jaguar population change through time, Madre de Dios respondents declared that a little less than half (46%) thought jaguar populations had decreased over the past five years, 24% thought they had not changed, and 17% thought they had increased. Regarding current population size, Manuripi reserve respondents stated that they believe there could be more than 300 jaguars, representing 20% for Villa Florida members and 40% for Holanda members; or less than 50 jaguars in their community, representing 15% in Holanda and 30% in Villa Florida.

b. Feelings and attitudes

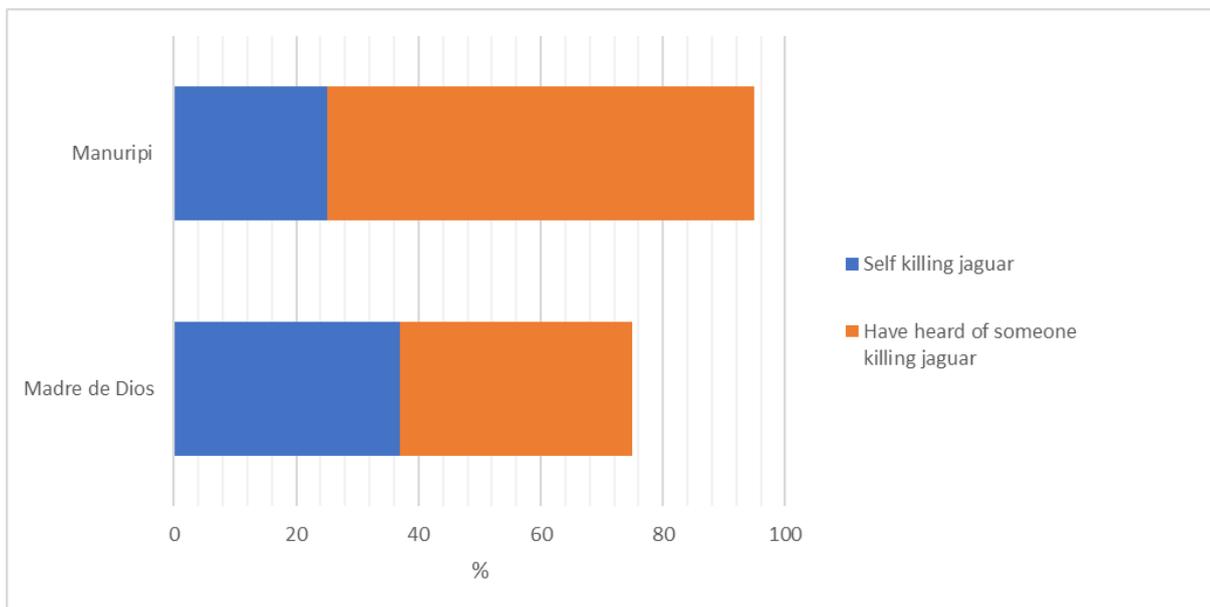
In Madre de Dios, most people (54%) either like or strongly like jaguars in comparison with 41% who dislike or strongly dislike them, showing fairly polarised attitudes. The main reasons why people said they liked jaguars correspond to beauty and attractiveness, the satisfaction of seeing them, and for their value to the ecosystem and tourism. In contrast, the main reasons for negative feelings were related to the sense of danger and fear, and, to a lesser extent, predation to domestic animals. When interviewees were asked what they would do if a casual interaction arises, many people (43%) affirmed they would do nothing hoping the animal goes away, and about a third (32%) said they would try to scare the individual away using noise.

On the other hand, in Manuripi, over 75% of people consider the jaguar as an important species both in Villa Florida and Holanda communities. Some of the key functions performed by the jaguar recognized by community members included landscape value, their predation and ecological role and their maintenance of the ecosystem's balance, security and health.

3.3.1. Human Jaguar Conflict

a. Jaguar killings

The proportion of people who had killed a jaguar themselves at some time in their lives varied slightly between the Madre de Dios and Manuripi communities. 37% of Madre de Dios respondents reported having killed a jaguar, 51% of them because they found a jaguar eating or having preyed on livestock, hens, and calves, and 10% because they are afraid there's a possibility in which they can be attacked. Meanwhile, in Manuripi reserve, this proportion was less than 25%. However, when asked if they had heard of anyone killing a jaguar in the last 5 years, 70% of respondents in Manuripi responded affirmatively, while in Madre de Dios only 38% confirmed so (see graphic 1).



Graphic 1. Jaguar killing in the study areas

While in Manuripi, of the 8% of people who had killed a jaguar in the last 5 years, half of them said that their main motivation was the fact that jaguar stalked their animals near their home (cows, pigs and sheep), while the other half killed the jaguar out of fear because they felt threatened by the idea of being able to meet them while carrying out their field activities.

4. CONCLUSIONS

- **Jaguar presence has been predominantly greater in productive systems**

~48% of presences were recorded in productive systems in Villa Florida community, within Manuripi reserve. Although this pilot site has great intervention for exploitation, sustainable resource management may allow to conserve forest functionality and might provide conditions for viability of jaguar populations and its prey.

- **People's jaguar perception is polarised between positive and negative**

Almost half interviewees claimed to like jaguars, whilst the remaining half declared the opposite. Findings in the present study suggest that the jaguar-human relationship in Manuripi reserve's communities ranges from moderate to good (Villa Florida) where economic activity is non-timber (Brazil nut/Asaí), to moderate to very bad (Holanda) where economic activity integrates timber and non-timber (Brazil nut). In the case of Madre de dios region, principal economic activities are based on brazil nut harvest, agriculture and logging.

- **Main drivers for jaguar killing are retaliation and fear**

Death of jaguars is mainly motivated by fear and the protection of smaller animals raised for subsistence. Nevertheless, it is more plausible that the inhabitants encounter indirect evidence (tracks, footprints, etc.) than a jaguar itself.