

The decline of a Jaguar (*Panthera onca*) subpopulation in Sonora Mexico.

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Abstract--During the period April 2009 - June 2015, we placed trail cameras at 61 sites in a 441 km² area in northwestern Sonora, Mexico. We used the total number of jaguars captured/100 days of camera effort as the basis for a year-to-year evaluation of the status of the area's jaguar population. A T-test comparison between the first and last 365 days of the camera trapping effort documented a significant difference between the two time periods for jaguar presence ($P=0.01$, $t=2.56$). We documented the illegal killing of six jaguars and detected a 71% decline of the population. With a lack of enforcement of law, poisons and traps are being illegally used by ranchers to kill predators. GPS collars can provide an investigative tool if needed in attempts to prosecute a person suspected of killing a jaguar or puma. We recommend that as many Sonoran jaguars as possible be collared with GPS combined with an education program that allows community school children to track and follow jaguars.

INTRODUCTION

From April 2009 to June 2015, we placed trail cameras at 61 sites across 12 cattle ranches in a 441 km² area lying north of the junction of the Aros and Bavispe Rivers in northwestern Sonora, Mexico. We selected all 61 camera survey sites based on the presence of jaguar sign including tracks, scrapes, claw marks on scent trees, and locations from female and male jaguars captured and fitted with GPS satellite collars.

We accumulated 28,068 camera-trap days and identified individual jaguars using both right and left side pictures of unique rosette patterns. The total number of jaguars captured/100 days of camera effort was used as the basis for a year-to-year evaluation of the status of the area's jaguar population. All pictures were filed and analyzed using protocols described in Harris et al. 2010. This protocol is simple, free on the Internet and is compatible with Excel and the capture/recapture program Mark (Harris et al. 2010).

A total of 68,616 pictures of 29 mammalian species, including humans were captured. Twenty-six jaguars were identified by unique rosette patterns that included 13 males, 11 females, and two kittens. Five to 10 jaguars were present at anyone time within the study area from May 2009 through March 2012. After March 2012, we documented a steady decline in the number of jaguar detections/100days (Figure 1). Data from April 2009 to March 2010 were compared to data from April 2014 to March 2015, and resulted in a significant difference ($P=0.01$, $t=2.56$). By the end of March, 2014, we had already detected an approximate 71% decline of the jaguar population. By June 2015 only one jaguar was detected within the study area.

From January 2013 to May 2015, we documented the illegal killing of six jaguars within and surrounding the study area. The deaths of four of these animals were documented through interviews. The killing of one jaguar was validated with GPS collar data, and the examination of the burned remains of the carcass. This case, although turned over to the authorities, did not result in any penalty to the person responsible for the jaguar's death due to a lack of resources and experience of the authorities (PROFEPA and PGR). Additionally, we used a photo identification of the skin of a previously detected jaguar to verify a human-caused mortality.

Area ranchers told us that more jaguars were being killed in areas outside of the study area, but we could not verify these reports. Some of the jaguars we documented alive with camera traps would periodically be absent from the study area, only to return some months later. Some of these missing individuals may have relocated their home range and may still be alive. However, both GPS collared jaguars on our study site were killed, one probably by poison, and one by gunshot. Carbofuran (see An Ever-Changing Ecological Battlefield, The Wildlife Professional, May/June 2017) is a pesticide that is currently legal to

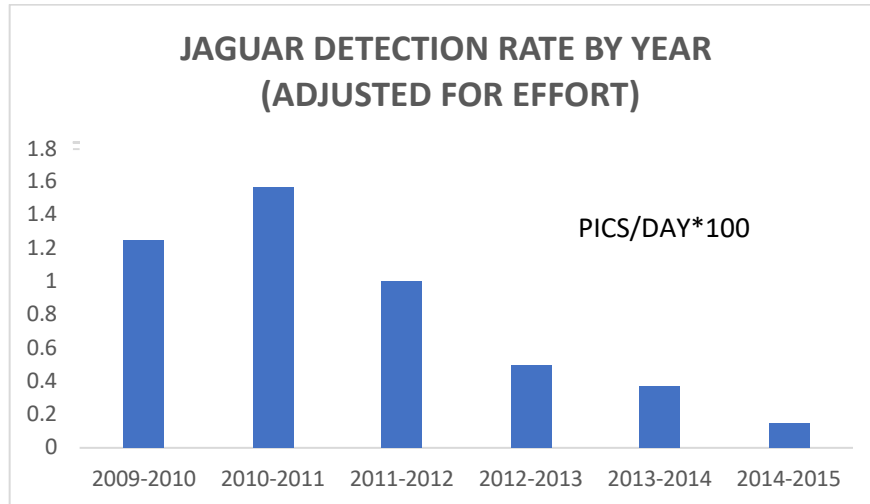


Figure 1. Declining detection rate of jaguars during the monitored periods from 2009 to 2015. These data include individuals photographed more than once, and adjusted by the number of pictures/100 days.

sell and use in Mexico. Compound 1080 is banned and illegal to use in Mexico, yet it is still manufactured for restricted use in the United States. Ranchers in Mexico are illegally using 1080 and/or Carbofuran to poison predators (Cassaigne and Galaz pers. observations). Placement of traps to kill animals is also illegal in Mexico, yet the lack of enforcement of law allows many ranchers to buy traps manufactured in the United States (and sold openly in Mexico), and place these traps on their ranches. We have captured pumas on camera with only 3 paws (Figure 2). Photographic evidence, sent to us anonymously, is proof of the current use of traps in the vicinity (Figure 3).



Figure 2. Picture of a puma from the study area missing a right front paw likely lost by steel-jawed trap). Note the atrophied right shoulder tissue (photo: Primero Conservation-Procer SEMARNAT-CONANP 2015).



Figure 3. Picture of dead jaguar sent anonymously. These highly effective trap sites are similar to those currently in use legally in Texas and New Mexico. Animals die likely from dehydration, exhaustion, and trauma due to infrequent trap site inspections (photo: anonymous).

The focus of the study has changed since the middle of 2015 and with the financial support of the not-for-profit Greater Good we are now working directly with ranchers that sign contracts not to kill jaguars or pumas in return for financial and field assistance for development of alternative water sources to keep livestock out of riparian areas favored by prey and predators during the dry seasons and to initiate a synchronized calving program, for which we also provide veterinarian assistance. Cameras are still being maintained in the core study area.

While documenting the diets of puma and jaguar during this project using GPS collars (Cassaigne et al. 2016), we were notified many times that “I would have killed a jaguar I observed, but I was afraid it may have had a GPS collar on it.” Although satellite GPS collars are considered by many as being detrimental to an animal’s daily activities, such comments from cowboys have showed us that GPS collars can and do save jaguars. When there is an informed community of area ranchers GPS collars can provide an investigative tool needed in any attempt to prosecute a person suspected of killing a jaguar or puma. It is recommended that as many Sonoran jaguars as possible be collared, and that the reasons for this be made public in the surrounding communities where jaguars are still extant.

CONCLUSIONS

This collaring effort should be combined with an educational program that allows community school children to track and follow jaguars, possibly on their own family’s ranch. This will bring more attention to a declining jaguar population and the for-all-to-view reasons of mortalities. Along with this effort, there needs to be a salaried full-time person (privately funded) that will closely monitor collared animals, both on the internet and in the field, who can then immediately notify federal officials of a rapid response team of any mortalities. This person can also help verifying reported jaguar depredation of livestock for payment by existing governmental insurance programs. Finally, Mexico’s laws need to be modified to increase the severity of punishment for crimes against wildlife and funding for wildlife law enforcement increased to facilitate proper training and resources that will result in improved investigations.

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