National Protected Area Systems Analysis
Case Study: The Jaguar

Problem statement: How well is the Jaguar (*Panthera onca*) protected within the current Protected Areas System? And what can be done to improve its situation?

Introduction:

The Jaguar is the flag ship species of Belizean conservation. Increasingly it is coming under pressure due to expansion of human activities and the number of "problem Jaguar" cases seems to be on the increase.

Increasingly it becomes obvious that the long term survival of Jaguars in close proximity to human habitation and activities is unlikely. More and more the species will be driven back to the "last wild" areas of the country.

Findings

Interesting in this aspect is a study by Victor Hugo Ramos called "The Human Footprint and Last of the Wild" (2004). This study identifies the "last" really wild areas within Meso-America (fig 1.)

For Belize, this study identifies two principal "blocks"

- The largely isolated Maya Mountains – Chiquibul - Cockscomb block extending into the Golden Stream Corridor which is approximately 1,290,000 acres (520,000 ha)

- Biosphera Maya: The Rio Bravo – Gallon Jug – Yalbac block of 470,000 acres (190,000 ha), which connects through the Northern Petén in Guatemala into Southern Mexico with a total of 7,700,000 acres (3,100,000 ha).

In total the Belizean "last wild" areas thus amount to 1,760,000 acres (710,000 ha). In the case of the Jaguar these will probably become the last strongholds of the species within Belize.
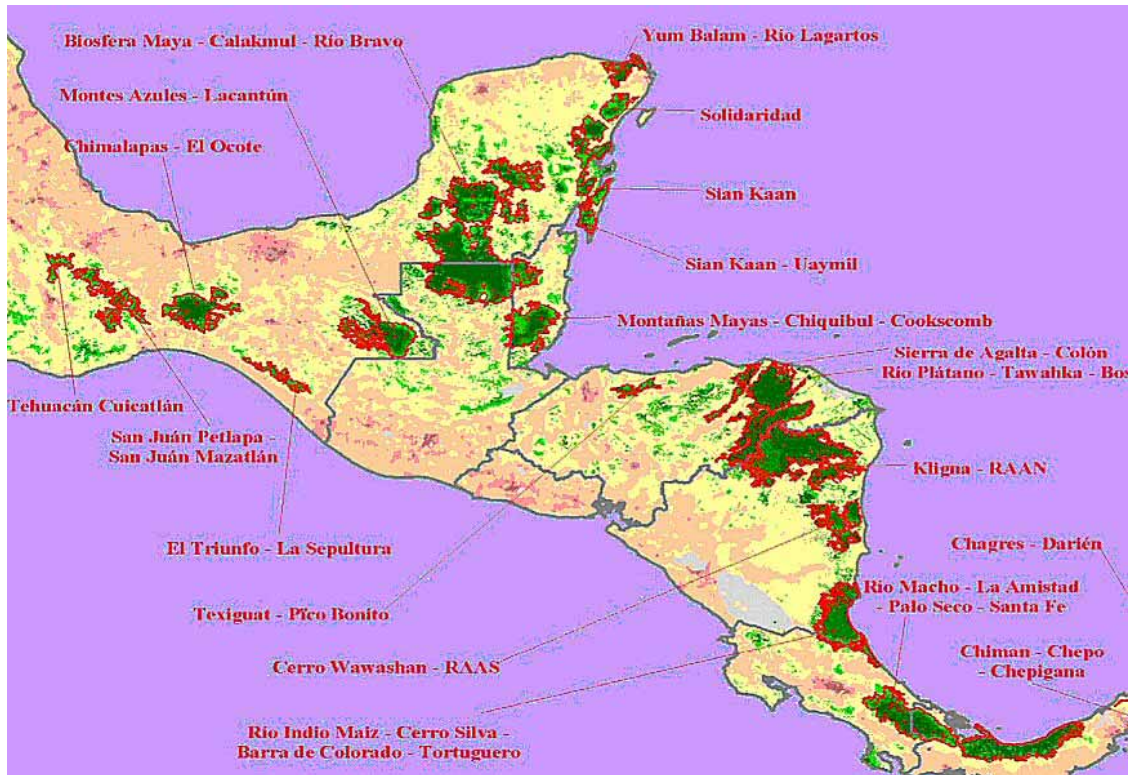
Figure 1. Meso-America and the "last of the wild" areas (Hugo Ramos, 2004)

The WCS holds Jaguar survey data[1] for three discrete areas in Belize (Gallon Jug, Chiquibul and Cockscomb Basin). There also exist data for the Mountain Pine Ridge FR, but the data were unavailable during the analysis. The jaguar densities differ quite a bit between the three sites (Figure 2):

- The CBWS study area was 159 km² and the average density was 8.8 Jaguar per 100km²
- The Chiquibul study area was 107 km² and the average density was 6.8 Jaguars per 100km²
- The Gallon Jug study area was 195 km² and the average density was 11.3 Jaguars per 100km²

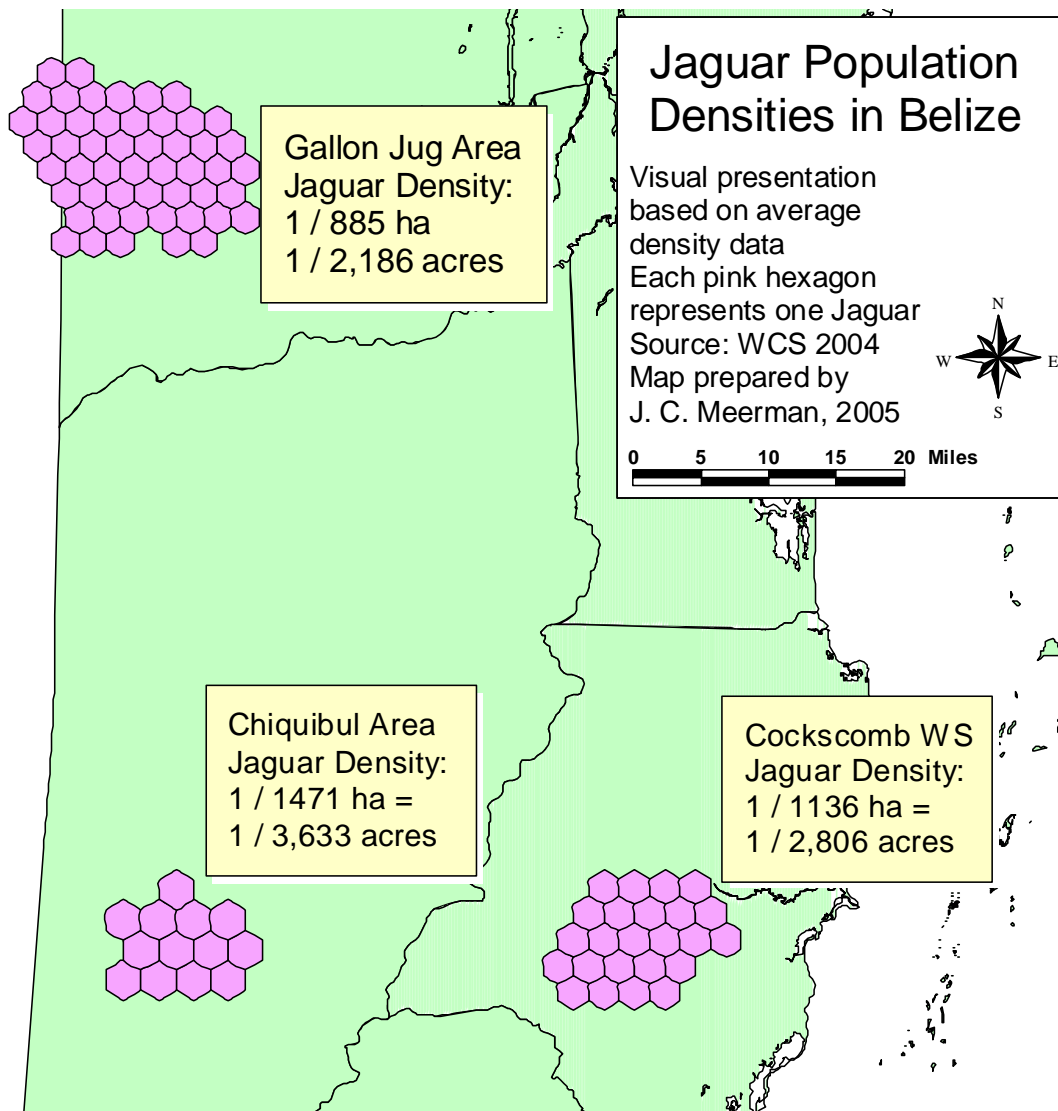[1] Carolyn Miller and Marcella Kelly pers. comm..

Figure 2. Jaguar Density Data for selected areas of Belize. Each hexagon can be seen as to represent 1 Jaguar.

The difference between these sites can have various explanations. Differences between habitat and resulting habitat suitability may be one. Level of protection may be another very likely reason. The Gallon Jug population is well protected and enjoys a healthy prey base. For the Cockscomb area habitat differences probably play a major role. The relatively low figures found in the Chiquibul area may be the result of a recent collapse of the prey-base as a result of heavy Xatero activity in the area. If this is the case, densities may also be strongly dependant on management!

Data such as these Jaguar density figures could not be incorporated in the MARXAN analysis due to a lack of consistent data for all of Belize. Nevertheless these figures should nevertheless be taken into consideration during the implementation phase of the NPAPSP.

When we consider the WCS Jaguar density data translate to the entire region, the Entire "Biosfera Maya" may provide habitat for up to 2,500 jaguars of which approximately 215 would find a home on the Belizean side. The whole "Maya Mountain Block" on the other hand might provide habitat for up to 400 adult jaguars.

A recent study by Eizirik et al[2], concludes that for the long term survival (>200 years) of Jaguar populations the minimum population size should not fall below 650 adult individuals. Base on this study, the last two potential strongholds for Jaguars in Belize are not large enough to maintain jaguar populations on the long term. Particularly the survival of the Belizean part of the "Biosfera Maya" population depends strongly on the continued connection with the rest of the "Biosfera Maya".
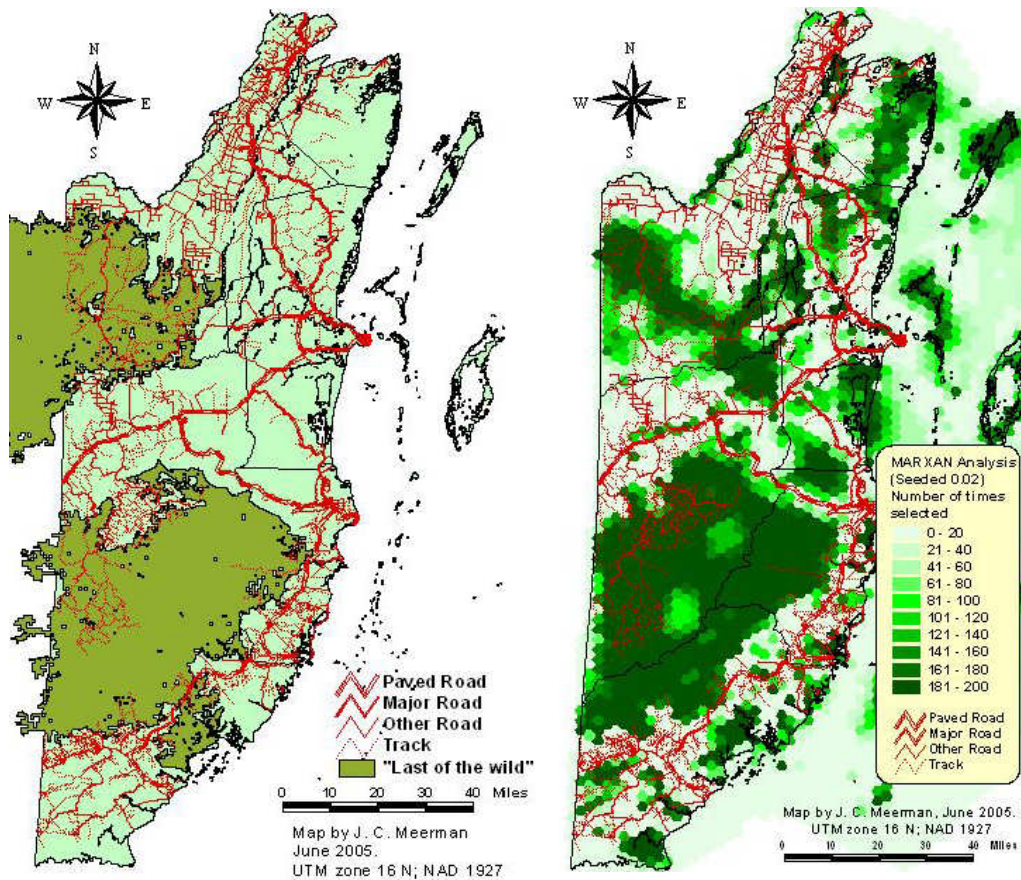
Figures 3 & 4. "Last of the wild areas" in Belize as identified by Hugo Ramos (2004) (left), compared with the MARXAN seeded_02 analysis result. Notice the difference in selected areas in the North West of Belize. To a degree this is compensated by an extention towards the Western Highway.

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[2] Eizirik, E., C. B. Indrusiak & W.E. Johnson. 2002. Analisis de Viabilidad de las Poblaciones de Jaguar: Evaluacion de Parametros y Estudios de Case en Tres Poblaciones remanentes del sur de Sudamerica. Pp 501-518 In: Medellin R. A. et. al. 2002. El Jaguar en el Nuevo Milenio. Fondo de Cultura Economica, Universidad Nacional Autonoma de Mexico, Wildlife Conservation Society. 647 pp.

Furthermore, when we compare the "last wild areas" layout with the MARXAN seeded_02 analysis, we see that the two are not identical. The MARXAN incorporates many biodiversity considerations but as noted before, Jaguar distribution was not one of those. In the MARXAN analsysis, the "Maya Mountain" block comes out very similar, but the "Biosfera Maya" block is much smaller and essentially did nut fully select the Yalbac and the Gallon Jug properties (the last one with the highest density of jaguars measured!). To some extend this exclusion is mitigated by a corridor from the Rio Bravo area towards the Western Highway and a corridor towards the Crooked Tree area and from there to the Shipstern Area. The question needs to be raised though, whether such a relative narrow "corridor" while allowing movement of jaguars will be able to prevent human-jaguar conflicts.

Conclusions:

- The two of Belize's last wild areas independently, are insufficient to maintain a Jaguar population for the long term. Continued connectivity with adjacent populations in the Petén and Southern Mexico are essential for the long term survival of this species.
- The "Maya Mountain" block is the only area that somewhat approaches the criteria for long term survival of the Jaguar but this is dependant on management (prey density).
- Maintenance of a biological corridor between the "Biosfera Maya" block and the "Maya Mountain" Block will be an important strategy to maintain 1 sufficiently large connected population of Jaguars opposed to two isolated populations that are too small.
- The MARXAN analysis probably does not do justice to the cause of long-term survival of a species in need of a large home range such as the Jaguar. Other species that fall in the same category would include Puma, Harpy Eagle and White-lipped Peccary.