

The Beni factor - Final Report - 2018

Artificial Nest boxes to improve the reproductive success of the Critically Endangered Blue-throated Macaw in the Loreto area: 2017 – 2018



Project conducted by: Asociación Armonía

With the Financial support from: Bird Endowment

Highlights

The 2017-2018 Blue-throated Macaw breeding season is highlighted with the highest number of occupied nest boxes by Blue-throated Macaws. A total of 7 nest boxes were being used. Not a single nest box was used by the Blue-and-Yellow Macaw, clearly indicating the great success of our nest box evolution, finding the right entrance size to prevent competition.

A total of 5 Blue-throated Macaws successfully fledged the nest boxes, resulting in a total of 76 successfully fledged chicks since the project started in 2005. All the occupied nests found themselves in the Esperancita Ranch.

We are very pleased to let you know that the Esperancita ranch is bought by Asociación Armonía and will be called the “Laney Rickman Blue-throated Macaw Reserve”, named after our dearest friend and conservationist Laney Rickman. The most important breeding site for the southern subpopulation is now protected forever and we can freely continue the nest box work that was started with the amazing help from Laney.

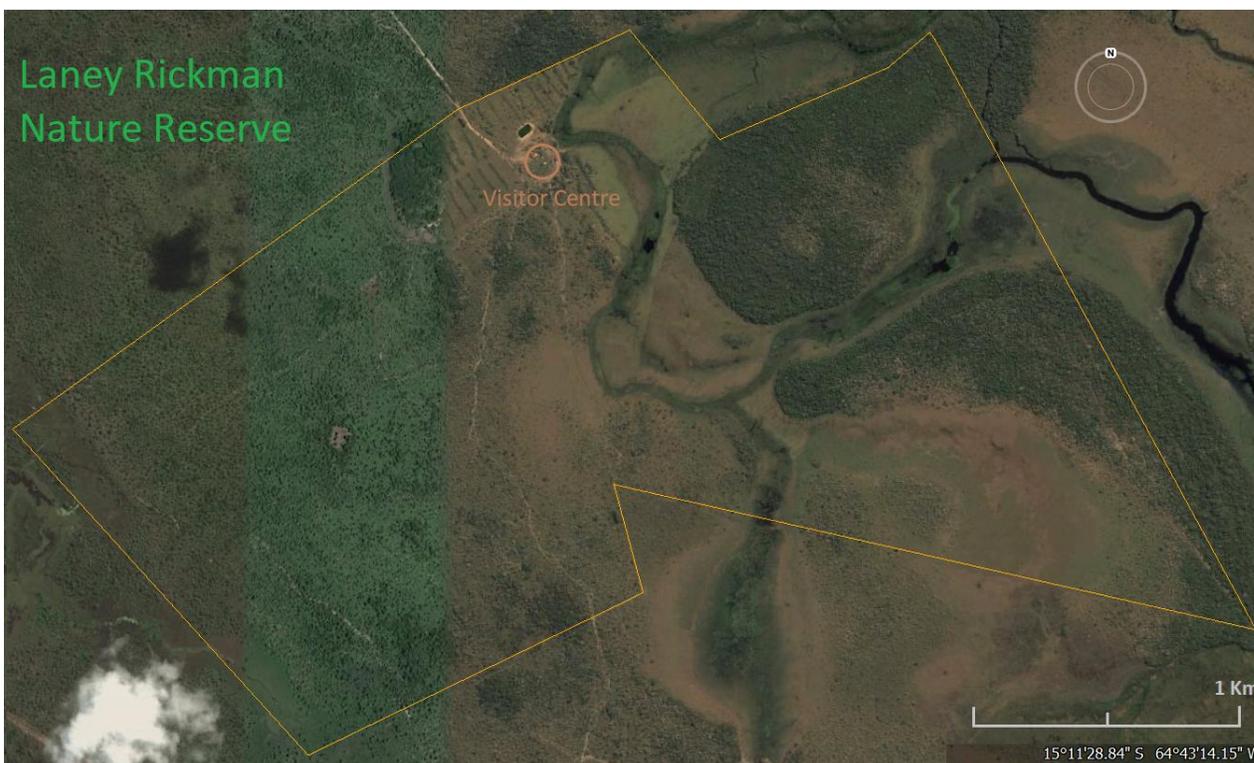
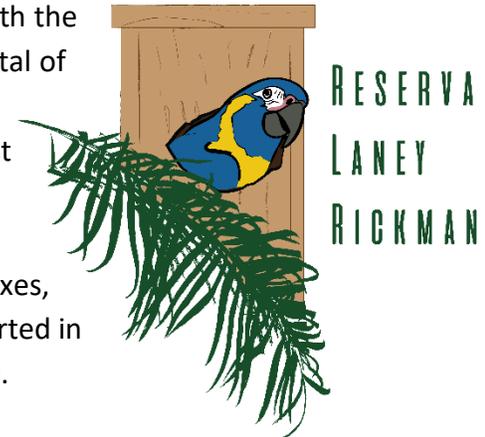


Figure 1. The Esperancita ranch is now purchased by Asociación Armonía to forever protect the most important breeding site for the southern Blue-throated Macaw subpopulation. The reserve is called “Laney Rickman Blue-throated Macaw Reserve”, after our dearest friend Laney Rickman.

Introduction

The availability of suitable reproductive sites (holes in tree trunks) for the Bolivian endemic and Critically Endangered Blue-throated Macaw (*Ara glaucogularis*) is an important limiting factor that slows down its population growth. Most natural nest sites are frequently affected by uncontrolled fires that are provoked by cattle ranchers to renew pasture. Moreover, the more abundant Blue-and-Yellow Macaw (*Ara ararauna*) (which is locally more abundant, and present throughout most of central and northern South America) frequently outcompetes the Blue-throated Macaw, further reducing available nesting sites.

Thanks to the support of the Bird Endowment and the Loro Parque Fundación, Armonía started a program with artificial nest boxes in 2005. During the first year only 20 artificial nest boxes were installed in the Loreto area. Today we have 80 nest boxes located in the Loreto area, 15 in el Ciervo area and 60 in the Barba Azul Nature Reserve. The Loreto area is where the Blue-throated Macaw southern subpopulation resides. El Ciervo area and Barba Azul Nature Reserve are located within the distribution area of the northwestern subpopulation of this species. To date, only macaws of the southern population have used our nest boxes.

Blue-throated Macaws from the northwestern subpopulation tends to breed in tall, dead Moriche palm in isolated flooded habitat (fig.2). This we would like to mimic with the placement of 12-meter-high eucalyptus posts with on top a hexagram nest box. The nest boxes have been constructed, and 10 eucalyptus posts are selected and will be bought and transported to Barba Azul Nature Reserve in August. They will be placed at strategic sites, where the macaws tend to congregate in order to explore these possible breeding locations. Macaws have traditional patterns, though we know that they can learn how to use these nest boxes as. When the macaws will breed at Barba Azul, our reserve will protect the full lifecycle of the Blue-throated Macaws.

Figure 2. Blue-throated Macaw nest discovered in January 2017 of the northwestern subpopulation, indicating a different breeding behaviour than breeding birds in the Loreto area. Armonía will mimic this type of breeding habitat in the Barba Azul Nature Reserve to increase breeding sites for the northwestern Blue-throated Macaw subpopulation. Picture taken by Tjalle Boorsma



Nest box evolution

As Blue-and-Yellow Macaws frequently outcompete the Blue-throated Macaws for nest boxes as secure reproductive sites (from 2006 to 2011), in 2012 we started to experiment with different designs of the nests. One of the most important modifications was the reduction of the diameter of the entrance hole to 10 cm. As a result of these modifications in the architecture of the nests, we recorded a reduction in the number of Blue-and-Yellow Macaws using our artificial nest boxes, thus decreasing the competition between both species.

The appearance of the nest boxes also changed to make them look more like their natural breeding trees (Fig 3). Nests are constructed with two different types of wood. The front is made from Palo María wood. Palo María is a locally abundant tree (*Calophyllum brasiliense*) and its wood is hard enough to prevent macaws from gnawing easily. The remaining sides of the nest are made of Ochoo (*Hura crepitans*) wood. Ochoo is also a locally abundant tree whose wood is softer, lighter and therefore cheaper.

Nests were cleaned and fixed between September and November 2017. A total of 10 completely damaged nest boxes have been replaced (fig.4). The nest boxes now also have the Armonía logo painted on them. From December to May, two team members monitored each nest every 15 days. During each monitoring round the nest was carefully reviewed.



Figure 3. The three types of nest we have developed and installed across the 12 years of our artificial nest box program. Left is the classic model. The hexagonal model is located in the center. To the right it is shown the octagonal model Picture taken by Asociación Armonía.



Figure 4. A total of 10 nest boxes have been replaced in the Esperancita ranch in October 2017 to ensure continuous nesting availability in the most important breeding location of the southern Blue-throated Macaw subpopulation. Picture taken by Luis Miguel Ortega.

Results 2017-2018 breeding season

In the Loreto area a total of 80 nest boxes have been surveyed and monitored, distributed over the Esperancita, La Cantina, La Tranca and Santa Rosa ranch. A total of 7 nest boxes were used by the Blue-throated Macaws, 6 in Esperancita and 1 in La Cantina (table 1). A total of 16 eggs were produced of which 6 hatched and 5 successfully fledged. Nest box #1 (PBA 12), PB (PBA 21) and PC2 (PBA 31) have been occupied by Blue-throated Macaws in the past (twice, once and once respectively). All chicks hatched and fledged came from the Esperancita ranch (fig. 6). The adult breeding in La Cantina was sadly killed by a *Boa constrictor* (annex on page 16).

The 7 used nest boxes by the Blue-throated Macaws were all square boxes of which 5 were located against Grugru Palm (*Acrocomia aculeata*) and 2 against Motacu palm (*Attalea princeps*) (table 2). From the 16 produced eggs, 6 hatched, 3 were predated by Toco Toucan (*Ramphastos toco*), 2 disappeared without evidence, 2 were infertile and 3 burst. From the 6 hatched chicks, one very small chick in a nest of three did not survive.

A total of 13 nest boxes were used by other bird species, 8 in Esperancita and 5 in Santa Rosa. Black-bellied Whistling ducks (*Dendrocygna autumnalis*) occupied a total of 11 nest boxes. One was used by the Chestnut-fronted Macaw (*Ara severus*) of which 3 chicks successfully fledged. One nest was occupied by the White-eyed Parakeet (*Psittacara leucophthalmus*) who laid a total of 8 eggs separated over three periods who were all predated.

Table 1. Summary of nest boxes used by Blue-throated Macaws during the 2017-2018 breeding season

Sponsor code	Nest code	Ranch	# eggs	# chicks	# fledglings
DR	PBA 3	Esperancita	2	0	0
MK	PBA 6	Esperancita	3	3	2
#1	PBA 12	Esperancita	2	0	0
PB	PBA 21	Esperancita	3	1	1
ME	PBA 26	Esperancita	3	0	0
PC2	PBA 31	Esperancita	3	2	2
JG	PBA 45	La Cantina	0	0	0*
Total			16	6	5

*Parent killed on nest by *Boa constrictor*



Figure 5. Difficult survey and monitoring conditions in the flooded Blue-throated Macaw breeding habitat during the heart of the rainy season. A total of 8 months out of the year this habitat is flooded and only accessible on horseback. Picture taken by Luis Miguel Ortega.

Table 2. Summary of the 20 nest boxes occupied by birds during the 2017-2018 breeding season in the Loreto area. The sponsor code column contains the acronym of the sponsor (person or institution) that sponsored the nest during the present reproductive season. The nest code column is a fixed code that identifies each nest, and remains permanent across the breeding seasons. The column “historic BTM use” indicates the number of times the nest was occupied by Blue-throated Macaws in the past. Nest type indicates the form of nest box (square, hexagonal or octagonal), and tree species indicated to which type of tree the nest box was located. A total of 7 nests were used by Blue-throated Macaws, 16 eggs and 5 chicks successfully fledged.

Sponsor code	Nest code	Historic BTM use	Species	Nest type	Tree species	Location	Description
DR	PBA3	0	Blue-throated Macaw	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	2 eggs; 22 Jan eggs disappeared
E4	PBA5	0	Chestnut-fronted Macaw	Octagonal	Sujo	Esperancita	3 eggs, 20 March 3 chicks fledged
MK	PBA6	0	Blue-throated Macaw	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	3 Eggs; 1 chick died; 3 April 2 chicks fledged
BH	PBA8	0	Black-bellied whistling Duck	Hexagonal	<i>Acrocomia aculeata (Palm)</i>	Esperancita	31 eggs
JAN	PBA10	0	White-eyed Parakeet	Square	Japunaqui	Esperancita	3 eggs predated; 2 eggs predated; 3 eggs predated
E5	PBA11	0	Black-bellied whistling Duck	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	18 eggs
#1	PBA12	2	Blue-throated Macaw	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	2 eggs; 1 infertile; 1 burst
BL	PBA15	0	Black-bellied whistling Duck	Square	<i>Attalea princeps (Palm)</i>	Esperancita	29 eggs
A2	PBA20	0	Black-bellied whistling Duck	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	41 eggs
PB	PBA21	1	Blue-throated Macaw	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	3 eggs; 2 burst; 26 March 1 chick fledged
BI	PBA23	0	Black-bellied whistling Duck	Octagonal	<i>Copernicia alba (Palm)</i>	Esperancita	35 eggs
ME	PBA26	0	Blue-throated Macaw	Square	<i>Attalea princeps (Palm)</i>	Esperancita	3 eggs; predated by Toco Toucan
PC2	PBA31	1	Blue-throated Macaw	Square	<i>Acrocomia aculeata (Palm)</i>	Esperancita	3 eggs; 1 infertile; 5 April 2 chicks fledged
DB	PBA41	0	Black-bellied whistling Duck	Square	<i>Attalea princeps (Palm)</i>	Esperancita	37 eggs

JG	PBA45	0	Blue-throated Macaw	Square	<i>Attalea princeps (Palm)</i>	La Cantina	Adult bird killed on nest by <i>Boa constrictor</i>
E2	PBA61	0	Black-bellied whistling Duck	Square	Cedrillo	Santa Rosa	23 eggs
PBA 65	PBA65	0	Black-bellied whistling Duck	Square	<i>Acrocomia aculeata (Palm)</i>	Santa Rosa	31 eggs
MC	PBA69	0	Black-bellied whistling Duck	Square	<i>Copernicia alba (Palm)</i>	Santa Rosa	X eggs
PBA 72	PBA72	0	Black-bellied whistling Duck	Square	Tabebuia aurea	Santa Rosa	3 eggs
PBA 73	PBA73	0	Black-bellied whistling Duck	Square	Japunaqui	Santa Rosa	X eggs

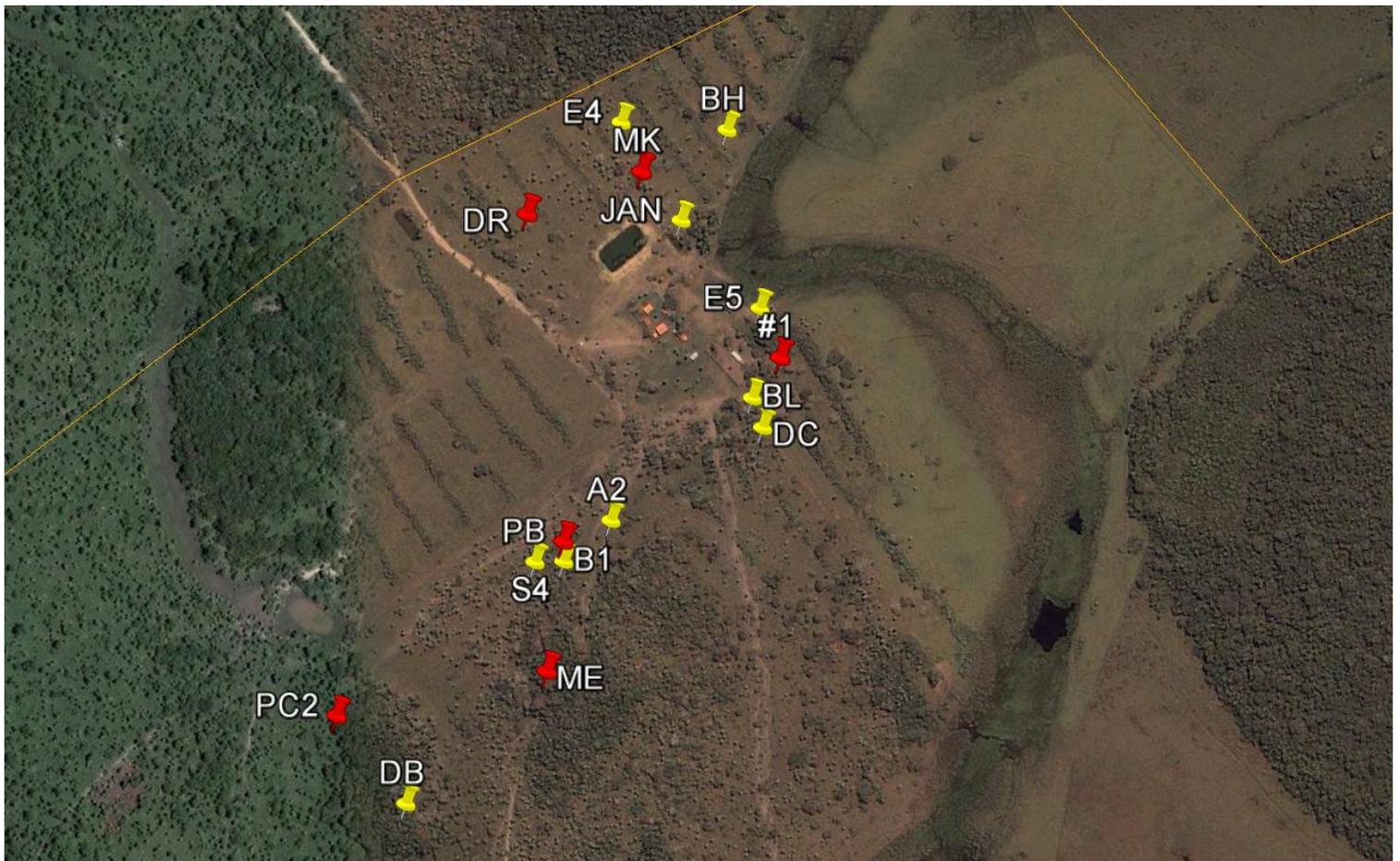


Figure 6. Location of occupied nest boxes in the Esperancita ranch. Red indicator points show occupied Blue-throated Macaw nests of which 5 chicks successfully fledged.

Since the project started in 2005, a total of 76 Blue-throated Macaws have successfully fledged the Armonía artificial nest boxes in the Loreto area (southern subpopulation). The 2017-2018 breeding season is marked by the highest number of occupied nest boxes by Blue-throated Macaws (fig. 6). Number of successfully hatched chicks fluctuate over time and is related to predation, infertility and other natural factors.

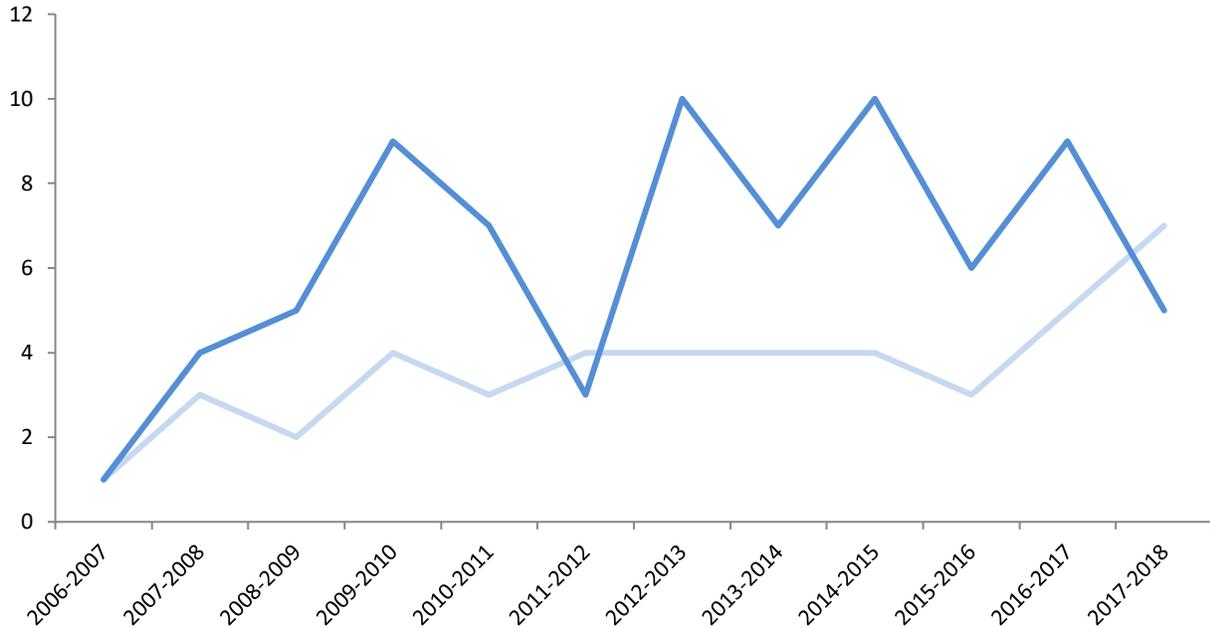


Figure 6. The light-blue line shows the number of nest boxes used by Blue-throated Macaws throughout the breeding seasons 2006-2007 to 2017-2018. The dark-blue line shows the number of chicks that successfully fledged from Armonía's nest-boxes.



Figure 7. Pair of playful Blue-throated Macaws enjoying the morning sun after a cold night. Picture taken by Bennett Hennessey.

CONCLUSION

The nest box program that was initiated in 2005 is an ongoing great success. With an additional 5 fledgling, a total of 76 successfully raised chicks from Armonía nest boxes entered the Blue-throated Macaw population, making a true difference. With an estimated global population ranging between 250 to 300 individuals, every single fledgling matter. Armonía experimented now with nest boxes for 12 breeding seasons of which the first 6 years resulted in 26 chicks (4.3 fledglings/year), followed another 6 years with 50 successfully raised chicks (8.3 fledglings/year). That clearly shows the acceptance of Blue-throated Macaws using artificial nest boxes as well as the success of Armonía presenting a favorable breeding site.

With the purchase of the Esperancita ranch, Armonía is now able to further experiment to ensure higher success rates and survival rates of hatched chicks. We will be in full control of improving breeding habitat, as well as foraging and roosting habitat. As Esperancita Ranch is the main breeding location, we will increase the number of breeding sites within the ranch, as well as studying its behavior year-round. We still know very little about the Macaws, where they move to, where they sleep and if they naturally breed in other locations near the Loreto area.

We have managed to control competition between the larger and more dominant Blue-and-Yellow Macaw, which have not been using our nest boxes in the 2017-2018 breeding season. We do still see competition with other small species like Chestnut-fronted Macaw, White-eyed Parakeet and the Black-bellied Whistling-Duck. Now that we will be owners of Esperancita, we can closely study the effect of competitions between species. Armonía has close relationships with the local University and international universities, opening up possibilities for many research studies.

Mortality rate of Blue-throated Macaw offspring raised in our artificial nest boxes throughout the program time (12 breeding seasons) varied from 0% (the first and third breeding seasons) to as high as 69% (breeding season 2011-2012) as well as this breeding season (2017-2018). As we have been taking predator prevention measures, so small mammals can't climb trees, we are aware that predators like Toco Toucan and snakes find their way in. Additional measures will be studied to improve our breeding success.

Figure 8. Predator prevention measures to protect trees with breeding Macaws. Picture taken by Luis Miguel Ortega.



Annex: Description of nest boxes used by Blue-throated Macaws

Sponsor code: DR

Nest code: PBA3

Location: Esperancita

Coordinates: 15°11'24.70" - 64°43'17.20"

Two eggs were initially laid (21 December) with adult bird being observed in the nest from 21 December until 19 January. By January 22nd both eggs were gone and parent bird were no longer around. No clear evidence on cause was found.



Sponsor code: MK
Nest code: PBA6
Location: Esperancita
Coordinates: 15°11'23.30" - 64°43'12.70"

Three eggs were initially laid (21 December) with parent bird observed in nests until 2 January. All eggs hatched by January 9. By January 13th one chick was found dead. The two remaining chicks grew healthy and fledged the nest on the 3rd of April.



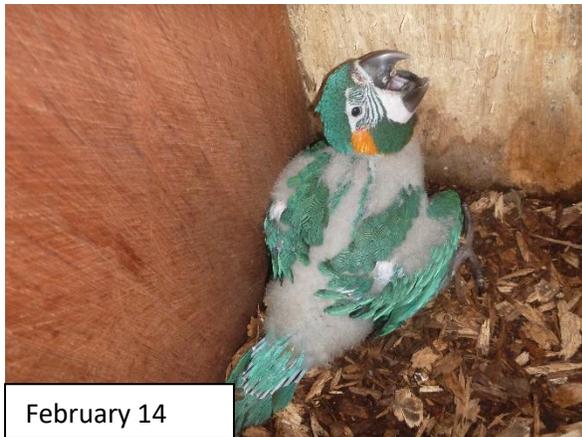
Sponsor code: #1
Nest code: PBA12
Location: Esperancita
Coordinates: 15°11'30.00" - 64°43'7.80"

Two eggs were initially laid (13th of January) with parent bird found in the nest. On the 22nd of January one of the eggs was in bad shape and already black. The second egg was found burst by the 3rd of February.



Sponsor code: PB
Nest code: PBA21
Location: Esperancita
Coordinates: 15°11'36.60" - 64°43'16.10"

Three eggs were initially laid (21 of December) with adult bird found in the nest. One egg was found burst by the 2nd of January. By the 9th of January one chick was hatched and the other egg was found burst. During monitoring the chick was found in good state. It fledged the nest on the 26th of March.



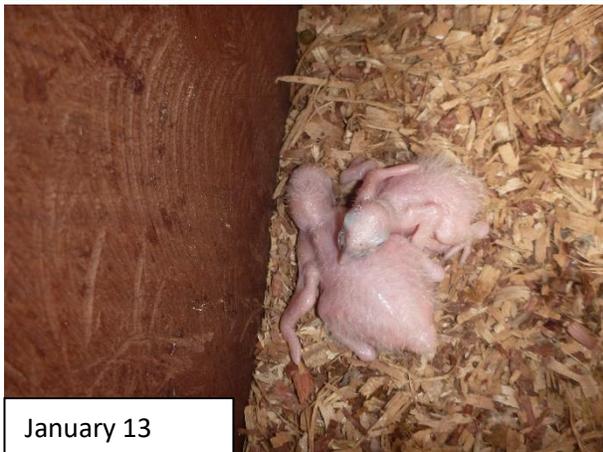
Sponsor code: ME
Nest code: PBA26
Location: Esperancita
Coordinates: 15°11'41.20" - 64°43'16.80"

Three eggs were initially laid (2nd of January) with adult bird found in the nest. By the 22nd of January all three eggs were found predated on by Toco Toucan (*Ramphastos toco*)



Sponsor code: PC2
Nest code: PBA31
Location: Esperancita
Coordinates: 15°11'42.80" - 64°43'24.50"

Three eggs were initially laid (21st December) with adult bird found in the nest. By the 9th of January 2 chicks were hatched and 1 egg turned out to be infertile. During monitoring the chicks were found in good state. Both chicks fledged the nest on the 5th of April.



Sponsor code: JG
Nest code: PBA45
Location: La Cantina
Coordinates: 15°12'48.70" - 64°40'42.60"

On the 16th of January an adult bird was found dead on the ground with a *Boa constrictor* around it. The bird was recently killed within nest box JG (PBA 45), as Cesar Floris heard the bird and snake fall on the ground while revising a nearby nest box. On arrival the bird was dead. The macaw is saved and will be donated to the Noel Kempff Mercado Natural History Museum.

