Barba Azul Nature Reserve
Annual Report 2021

A close encounter with a puma in Barba Azul Nature Reserve experienced by our Head Park Ranger Miguel Martínez during his patrolling activities.

It has been a year full of activities for our new team at Barba Azul Nature Reserve. We completed protection and development activities, including firebreak construction, perimeter fencing and Motacú Palm restoration through exclusion zone creation. Our low impact model ranch sustainability project only at the eastern area of Barba Azul increased to a total of 617 cattle, 50% of our goal. The highest count ever of over 1,500 Buff-breasted Sandpipers was recorded roosting in a single day during our monitoring program. Long-term grassland conservation has been rewarded with the arrival of the Endangered Ibera Seedeater observed now two years in a row. We are happy that despite all the challenges the past years have brought us, we are growing and moving forward with the protection of the Critically Endangered Blue-throated Macaw.

Update Video: https://youtu.be/-n0cAqgPz4k

Conservation and development of the Barba Azul Nature Reserve in 2021 is supported by:

AMERICAN BIRD CONSERVANCY
BirdLife INTERNATIONAL
WORLD LAND TRUST
Reserva Natural Barba Azul – Friends of Barba Azul Nature Reserve
future for nature
IFC where nature needs us most – International Conservation Fund of Canada
MUSEO DE HISTORIA NATURAL ALCIDE d'ORBIGNY
A grant from the Neotropical Migratory Bird Conservation Act – U.S. Fish & Wildlife Service
ARTIS
U.S. Forest Service – Department of Agriculture
Bird Bolivia – Tourism & Travel Agency

Project photos can be downloaded from:
www.flickr.com/photos/128583429@N05/albums/72157657123371838

Barba Azul Nature Reserve

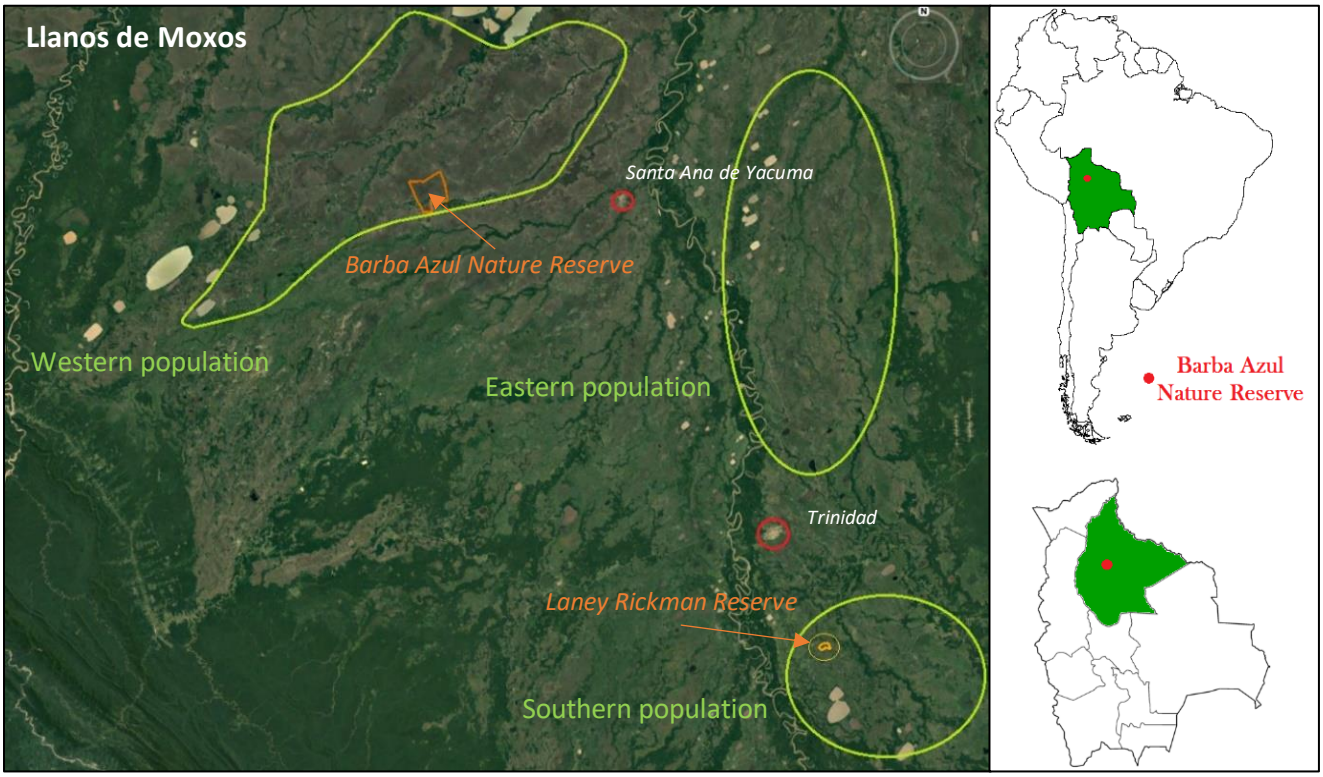


Figure 1. Light green lines indicate Blue-throated Macaw subpopulation ranges. The Barba Azul Nature Reserve is located in the western population, 75 kilometers west of Santa Ana de Yacuma and 213 kilometers northwest of the Laney Rickman Blue-throated Macaw Reserve. Armonía protects vital Blue-throated Macaw habitat in 2 isolated subpopulations.

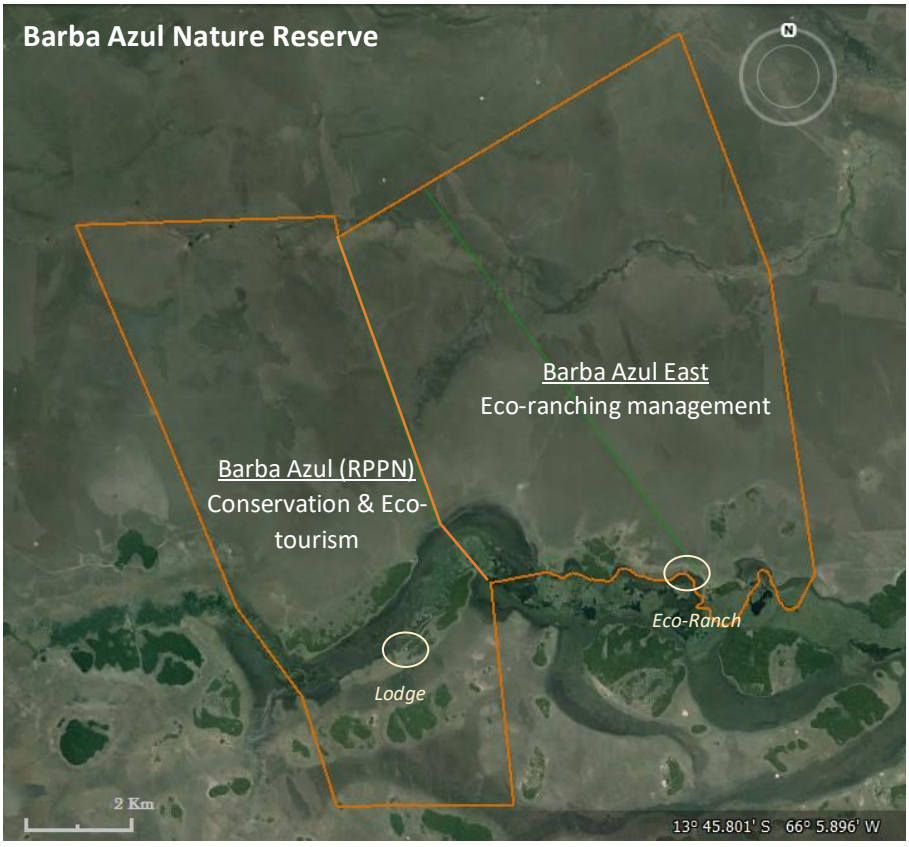


Figure 2. The Barba Azul Nature Reserve is divided into two main land-use zones: Barba Azul (5,000 ha; 12,350 ac) designated for pure conservation and declared Private Natural Heritage Reserve (RPPN); Barba Azul East (6,000 ha; 14,820 ac) where 40% is designated for sustainable cattle ranching for species and habitat conservation.

Barba Azul Nature Reserve 2021 goals

In 2021 we set the following goals to ensure we continue with protection, research, monitoring and sustainability activities at Barba Azul Nature Reserve.

1. Back burn firebreak system established in conservation priority sites
    - Improvement and maintenance of the firebreak system.
    - Creation of raised firebreaks and trails for quick fire inspection

2. Improve and create Blue-throated Macaw breeding habitat (penthouse nestboxes)

3. Savanna Management implemented
    - Patch burn management to increase grass diversity
    - Rotational grazing in sub-paddock through electric fencing

4. Complete cattle ranching infrastructure
    - Complete worker house, deposit area and roofed tractor parking
    - Complete circular corral design
    - Increase fix paddock fencing

5. Establish livestock herd of 1,000 head of cattle
    - Manage livestock according best practices techniques

6. Fine tune tourism needs
    - Trail signage
    - International and local promotion of Barba Azul
    - Finetuning service
    - Wildlife watching vehicle

7. Create easy access river crossing

8. Develop Motacu Palm regeneration methodology

9. Research and monitoring
    - Fenced exclusion zones in each habitat
    - Buff-breasted Sandpiper monitoring
    - Blue-throated Macaw DNA study between subpopulations

Blue-throated Macaws transporting Motacu seeds in Barba Azul Nature Reserve. Steffen Reichle.

Introduction

Barba Azul Nature Reserve is part of Armonía's large scale conservation program to protect the largest population of the endemic and Critically Endangered Blue-throated Macaw and its habitat, deep in the heart of the Beni Savanna ecoregion. This was an exciting year since we have a brand-new and strong team committed to this year's goals; they have shown a great capacity to overcome the challenges of conserving this 27,181-acre protected area. Our new team is composed by Miguel Martinez (Head Park Ranger), Tania Daza (Tourism Services), Jesus Arauz (Tractor operator/Assistant) and Luz Natalia Mercado (Program Coordinator).

A wide range of projects and activities took place during this year from our annual firebreak grid construction to the creation of exclusion zones and fenced forest island to promote regeneration. As well, new research and monitoring ideas are being developed by our team based on this years' experience and experience with a wider range of experts. Looking back at this year's achievements we are confident that, with the support of every donor and organization, 2022 will be a strong year for conservation, development and sustainability accomplishments for Barba Azul Nature Reserve.

Watch the Barba Azul Nature Reserve update video on our YouTube channel.
https://youtu.be/-n0cAqgPz4k

Top: Complete Barba Azul Nature Reserve team during prescribed burning activities. Bottom left: Barba Azul Conservation Team (Photo by: Susana Vargas). Bottom right: Barba Azul Sustainable cattle ranching team (Photo by: John Mittermeier)

Barba Azul 2021 Development and Conservation Plans

1. Fire management: Our goal to protect Barba Azul Nature Reserve and its most important foraging forest for the Blue-throated Macaw has been accomplished. Every year fire protection activities are one of the most important to accomplish effectively. Thanks to the support of World Land Trust this year our complete Barba Azul team was fully equipped and trained to respond to all fire threats protecting Barba Azul's forests. As we believe capacity building is important to effectively protect the reserve, two fire combat and prescribed burning workshops were held at the reserve. The experienced firefighters at FAN (Fundación Amigos de la Naturaleza) helped train Barba Azul and Laney Rickman staff and two guests if the regional government in our fire management workshop. During the second workshop the team put in practice what was learned to create a 1.8-mile long (3 km) and 65 feet wide "black line" using backburning. This prescribed burning technique helped us to improve the protection of one of the main firebreaks of the reserve.

Prescribed burning to create a "black line" that widens one of the main ploughed firebreaks, improving protection. Main Park Ranger, Miguel Martinez monitoring the line of fire. Luz Natalia Mercado.

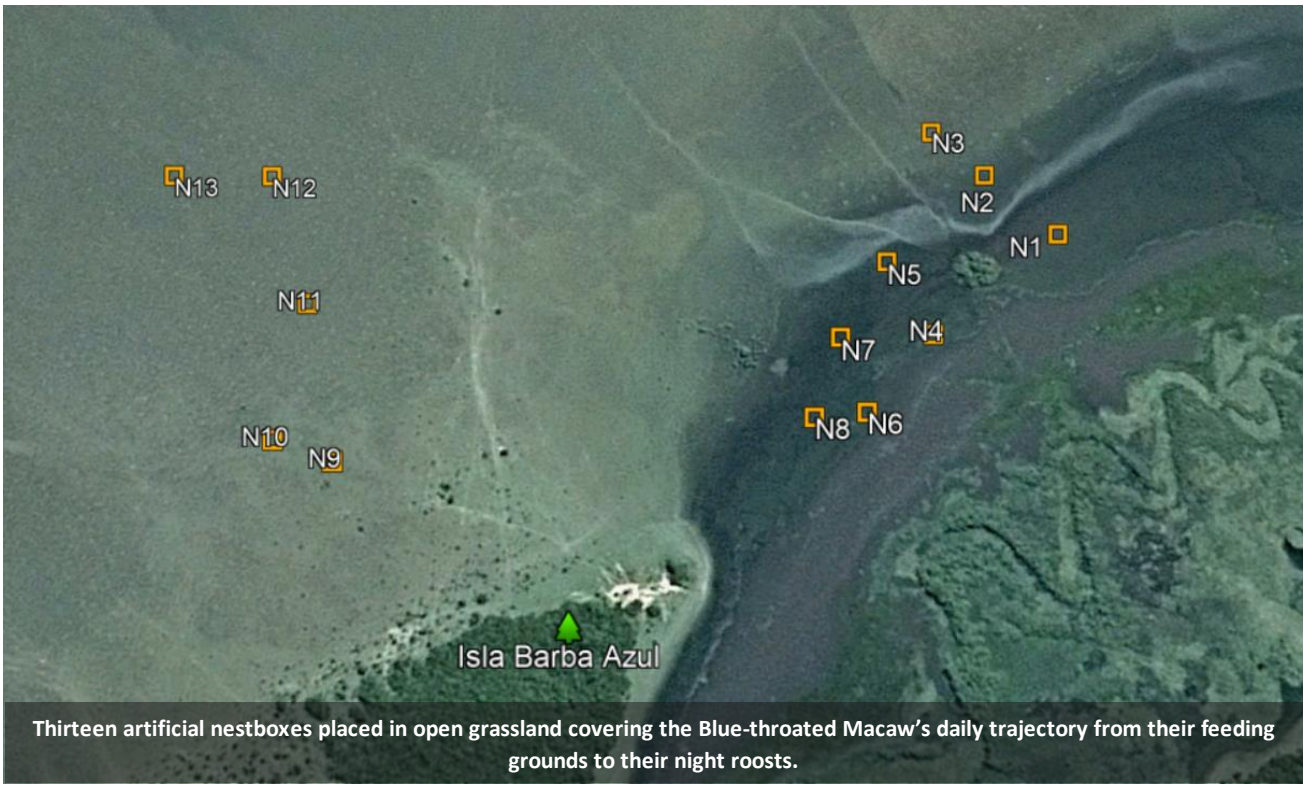
Maintaining and enhancing our firebreak system was one of our priorities. The reserve's tractor worked non-stop throughout the four-month dry season creating a grid of more than 27 miles (~35 km) of firebreaks to ensure protection as early as possible. Flood levels and drainage time can vary every year, making firebreak maintenance a gradual task since tractor work depends on soil dryness. This year's window of time to work on the far north side of the reserve was considerably short, from two to three weeks. Therefore, starting this rainy season we will monitor flood levels across the main raised firebreak to design and improve the drainage system in the lowest parts of this northern area.

After completing the 27-mile firebreak system to ensure the protection of the reserve we counted with a small window of time to raise firebreaks in areas that remained flooded most of the year. With the use of drainage pipes, we expect to improve accessibility to monitor areas where are difficult to reach even during the dry season. Miguel Martinez.

Protection from fires is a yearly machinery-intense task that comes with high monetary costs, but it is a necessary one to ensure the protection of Blue-throated Macaw habitat at Barba Azul. As we still try to raise funds for this task, our team is also developing new ideas that we will be testing to decrease costs. Next year we will experiment with a combination of tractor firebreak construction, prescribed burning and cattle firebreak grazing with electric fences.

2. Improve and create Blue-throated Macaw breeding habitat: A total of thirteen nest boxes were placed for the 2021-22 breeding season. Every year, curious macaws are spotted inspecting and perching on top of the nest boxes. Our strategy was to place five more nest boxes in open grasslands away from forested areas where macaws feed every day and their night roosts. Although most of the local population starts to leave Barba Azul at the beginning of breeding season, an unusual sixteen individuals remained at Barba Azul until November. We are optimist that interest shown by breeding pairs will eventually break their breeding local migration pattern and they will use the nest boxes. A Toco Toucan pair would appear to be using one box this year. Thanks to the support from ARTIS, we will be placing lightning rods to further protect the boxes.

Artificial nestbox placing in open grassland. Miguel Martinez



Thirteen artificial nestboxes placed in open grassland covering the Blue-throated Macaw's daily trajectory from their feeding grounds to their night roosts.

3. Savanna management and protection:

As we build on our experience, we have a clearer idea of how we need to manage the savanna ecosystem. We expect that with our fire management plan we will be able to gather data of fire ecology in grasslands, which is needed to understand this complex ecosystem and to inform local stakeholders on better and controlled fire practices.

We are observing changes in habitat occupation by grassland specialist birds. In unburnt tall grass savanna, it becomes increasingly more difficult to spot the Black-masked Finch while being more abundant in shorter grass in our ranching section of the reserve. Through patch burn management, where a small percentage of tall grass is annually burnt, we can create favorable habitat for species that require a mix of grass age. It is the second year in a row we observed the Endangered Ibera Seedeater in November. That is the start of the Bolivian breeding season for most birds. This might indicate that this species is a breeding resident and happy with Barba Azul's grassland protection.

There is 1,025 miles- 1,650 km between our breeding, recently described Ibera seedeaters in Bolivia and the breeding birds in Argentina. Clearly we need to learn more about this (these) species: John Mittermeier

Excluding cattle from Barba Azul's protected area has provided observable results in terms of habitat restoration. Thanks to the support of the U.S. Fish and Wildlife Service (NMBCA) we have been able to establish 3.3 miles (5 km) of wildlife friendly fencing in Barba Azul North. As we improve perimetral fences, neighboring cattle are no longer "visiting" Barba Azul and vegetation restoration is still following its course.

New perimetral fencing in Barba Azul North with the use of wildlife friendly smooth wire at both extremes: Miguel Martinez

4 & 5. Barba Azul model ranch:

Only 15,000 years ago the Beni savanna was teaming with large natural herbivores like we currently see in the savannas of Africa. As they became extinct after human arrival, the natural grazing component was removed from this grassland ecosystem. In present days, cows fulfill that ecological roll in the natural grasslands of Bolivia. When managing cows sustainably, this productive system can harbor over 90% of its native biodiversity. With soya and rice lurking in the distance ready to destroy 90% of its biodiversity, Armonia aims to promote ecofriendly ranching in the Beni savanna. In order to do so, we are steadily building our Barba Azul model ranch.

In 2021, we purchased 179 Brahman reproductive cows; sold 115 two-year old bulls and we produced a staggering 88 newborn calves. The profit gained in 2020 and 2021 of sold bulls was US$ 55,000, which will be reinvested in buying more livestock in order to reach our minimal herd size of 1,200 cattle. In early 2022 we will reinvest our profit in buying 190 one-year old bulls, resulting in a total herd of 617 cattle. We have reached a little over 50% of the required minimum herd size to become a financially sustainable model that support annual operational expenses to protect the habitat within the Barba Azul Nature Reserve.

Barba Azul cattle gathered in a landscape with a mixture of tallgrass savanna and river edge shortgrass: Tjalle Boorsma

Our Barba Azul East ranching team consists now of 4 staff members after hiring two more cowboys to manage our growing livestock herd. Thanks to the US Forest Service we have invested in a solar powered water pump systems that can fill daily a 2,000-litre water tank where livestock can drink clean water. This water tank was placed strategically to provide clean drinking conditions to multiple paddocks that do not have access to river water. We placed 5.5km of fixed paddock fencing and

purchased 4 km of electric fencing thanks to the Neotropical Migratory Bird Conservation Act (NMBCA) grant from the US Fish and Wildlife Service.

We have trained our livestock to be fenced within paddock with a single electric wire. Within the 200-ha fixed paddocks we have created smaller plots to control cattle stocking densities through this technique. In traditional ranching systems, 1 cow per 5 hectares is generally the standard. We duplicated stocking densities resulting in shorter period of cattle presence within a paddock while maintaining grass at an ideal palatable length. We rotate the cattle between multiple paddocks and grasses no longer have to be annually burnt. We observed many pairs of the Vulnerable Black-masked Finch in paddocks that are rotationally grazed by our cows.

Paddocks reserved for calves and cows in a *Bajío*, an area with high quality grass, important during the dry season. John Mittermeier.

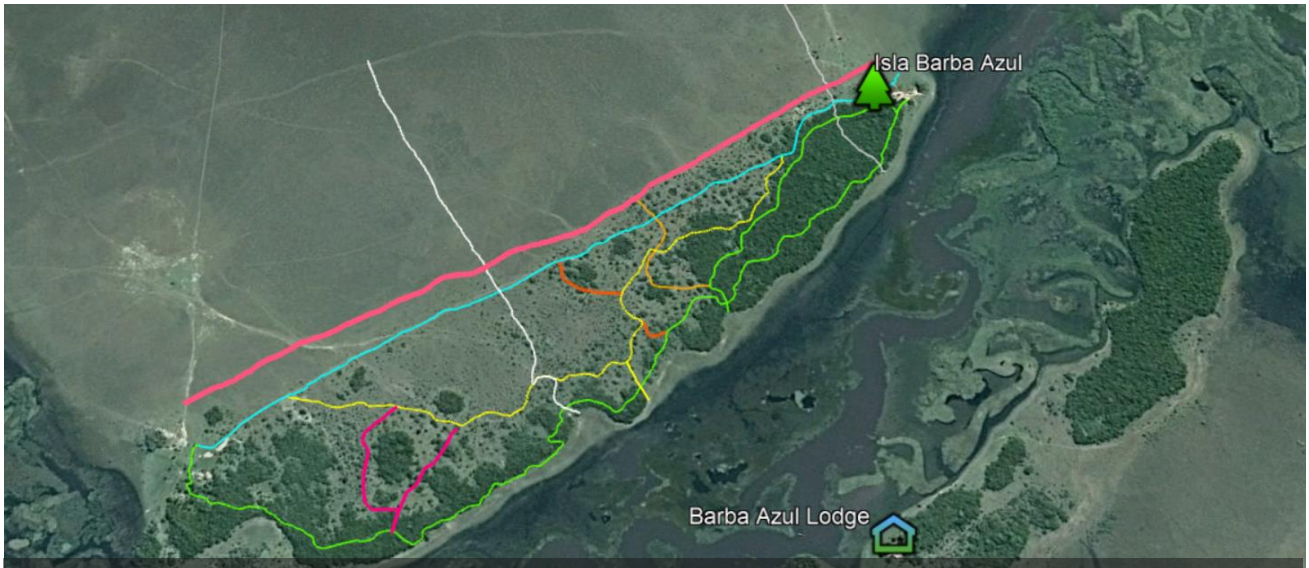
We are still seeking funding to modernize our ranch to become a representative model ranch. We will have to invest in a new staff house, deposit area, cow friendly circular corral and more paddock fencing for around US$ 200,000. Early 2022 we will start the "Savanna Cows for Conservation" fundraising campaign in order to seek support for the remaining 50% of required cattle. Please help us buy a cow for US$ 600 to support Barba Azul's long-term sustainability model (contact Bennett Hennessey: abhennessey@armonia-bo.org).

6. Tourism development and promotion: Travel restrictions due to Covid 19 drastically affected tourism in Barba Azul this year; for 7 months Bolivia required a 10-day quarantine to Bolivian visitors. But we were able to receive three groups of tourists this year. We are happy that Tania is giving her best to provide the top-notch service for our visitors who have expressed many positive comments in our surveys. While there is still much room for improvements, our team is putting all their effort to exceed our visitors' expectations.

- "We got more than we expected! We are happy we came, planning in returning next year"

Oscar and Cristina (Bolivia)

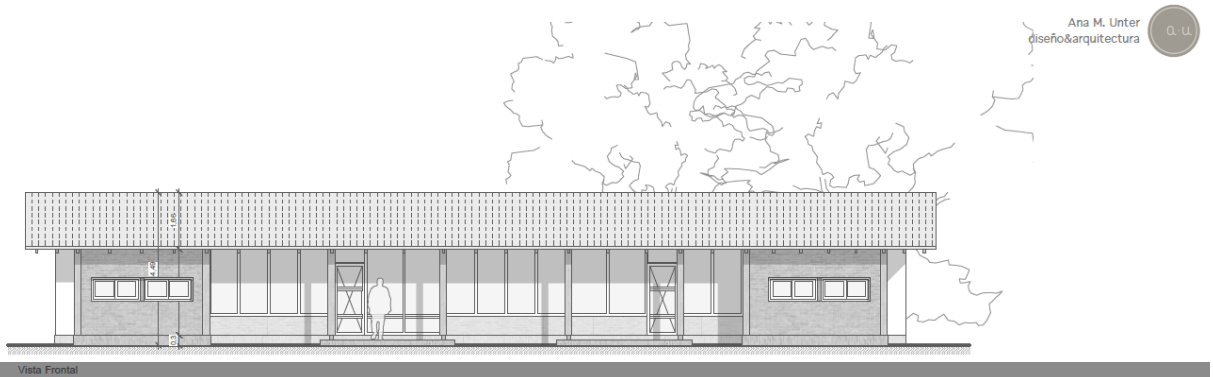
Barba Azul Nature Reserve visitors in 2021 as they observe and photograph the Beni Savanna and forest fauna. Lots of happy faces that we hope to see in their next visits: Miguel Martinez



The complete trail system at Isla Barba Azul comprehends short and medium length walks across a diversity of ecosystems of forest (green), cerrado (yellow), and savannas (white).

7a. Create easy access river crossing: Most fire threats this year happened at Barba Azul North. Our team was able to respond as quickly as they could avoiding any wildfire in the conservation section of the reserve. However, it is still a great challenge for our team to cross the Omi River quickly and reach northern areas when emergencies occur. For this reason, we are raising funds to build a boardwalk and pontoon so our staff can rapidly access all corners of the reserve to patrol, monitor and respond to any threat. This effort will need engineering technical advice since flooding levels vary and soil conditions are complicated.

7b. Construct the Barba Azul staff house: As our staff grows, we are planning to provide them with a more comfortable place to live with their families. We have contracted an architect to work on a house design. At the moment, she is working on the idea of a unit with three independent areas. We still need 50.000 USD to be able to construct our staff house in 2022.



First draft of the Barba Azul Nature Reserve staff house designed by Bolivian Architect Ana María Unterladstaetter.

8. Develop Motacú regeneration methodology: Our efforts to promote natural regeneration of vegetation in forested areas has been successful in many forested areas of the reserve, especially gallery forest where vegetation is thriving with seedlings and saplings growing fast. However, we are still looking for the best solution to recuperate Motacu palm dominated forests islands. With the support of the Davidson family, American Bird Conservancy and the Toyota Environmental Activities Grant Program, we are improving exclusion methods with the use of chain link wire fencing. Decades of cattle pressure prevented natural regeneration of Motacu trees on these islands. Regular fencing turns out to be insufficient as we observe continuous herbivory, which could mean it is not just cattle that is stopping regeneration. Within these exclusion zones we will create experimentation plots with different treatment levels that consider soil aeration, seed dispersal and reforestation. We hope to keep raising funds (27.000 USD) to create 10 more exclusion areas in forest islands to promote Motacu regeneration across the Barba Azul landscape.

Partial fencing with chain link fencing for Isla Manechi. Tjalle Boorsma.

9a. Research and Monitoring:

Exclusion zones. While thirteen years of cattle exclusion in the Cerrado habitat of the reserve is showing noticeable results in terms of vegetation and fauna recovery, we still aim to understand how grazing pressure from local wildlife effects this vegetation. In order to understand this better, we have established four 32x32 feet (10x10 m) areas in Cerrado habitat to monitor vegetation changes in a long term. As many herbaceous species are not easy to identify we are developing a research plan for local botany students from universities in Beni and Santa Cruz to help us with data gathering.

Head Park Ranger, Miguel Martinez showing one of the four exclusion zones in Cerrado habitat. Tania Daza

Camera Trap Monitoring. Being a born naturalist, our Head Park Ranger has great interest in understanding the ecology of wildlife in the reserve. He has been developing an improved camera trap system that will enable us to systematically gather data to better understand species richness in Barba Azul. This system considers three important ecosystem types; forest, Cerrado and grassland. Miguel has been systematically gathering data from patrolling and local information that will allow us to present the most comprehensive list of mammals of Barba Azul Nature Reserve. We put together a video on his Puma experience as well (https://youtu.be/DEO_qffZvLE).

9b. Buff-breasted Sandpiper monitoring:

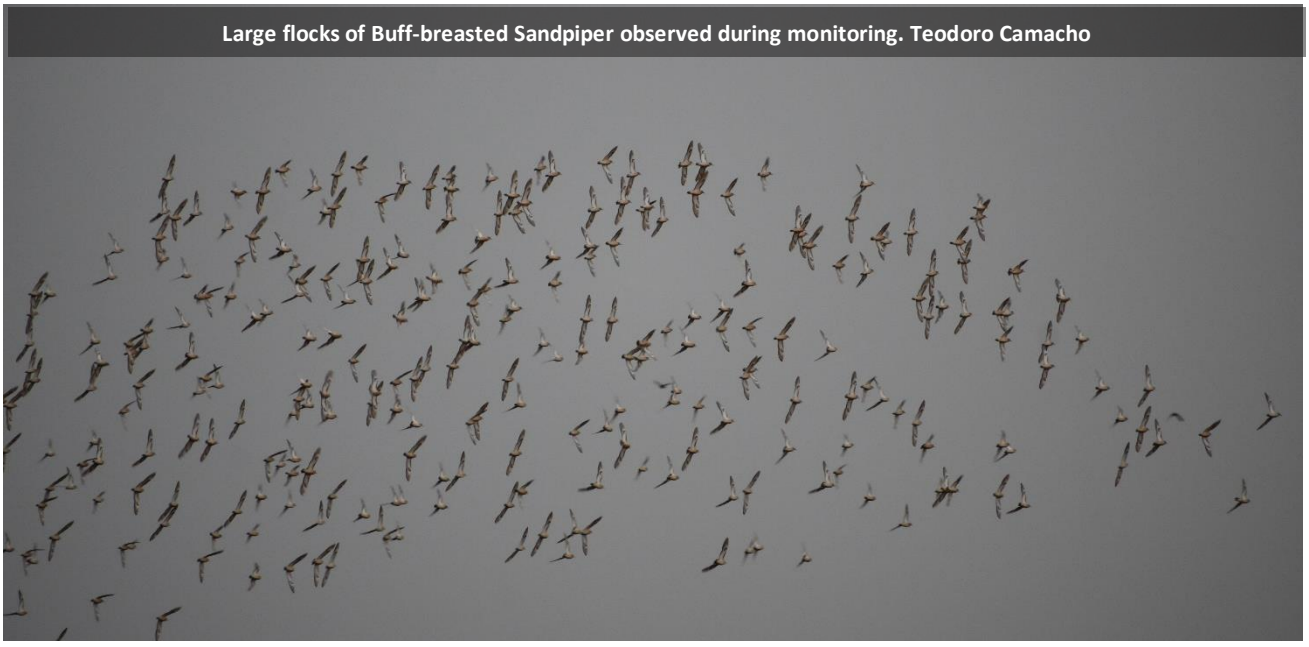
This is the eighth-year Armonia is gathering systematically long-distance shorebird migratory data within the Barba Azul Nature Reserve thanks to the long-term support from the US Fish and Wildlife Service's Neotropical Migratory Bird Conservation Act (NMBCA) program and additional support from the US Forest Service. In 2010 we discovered Buff-breasted Sandpipers using Barba Azul during their southbound migration from mid-August to Mid-October as a critical stopover site. With over 2.5% of the global population migrating through Barba Azul, it was declared a Western Hemisphere Shorebird Reserve Network (WHSRN) site for regional importance in 2015. (For more detailed information you can watch our Buff-breasted Sandpiper migration in the Barba Azul Nature Reserve video HERE)

A team of 5 researchers monitored for 30 days (all of September) all migratory and resident shorebird at 5 different river-edge shortgrass sites within the reserve. River-edge shortgrass is the favorable habitat for Buff-breasted Sandpipers. We maintain the grass at an ideal length of 2,4 inches (6cm) with use of our own cattle. This year we have been experimenting with stocking densities to evaluate the best way to manage these grasslands for Buffies. We discovered that our 24-ha plots were too small to make a significant landscape scale difference that change habitat selection behavior and we will therefore create larger plots in 2022.

Just before the start of the monitoring, Teodoro Camacho, Armonía's Shorebird Coordinator, counted over 1,500 Buff-breasted Sandpipers on the 30thy of August just before dusk, roosting at the Tiniji area. This is the highest single count ever within Barba Azul. During our daily monitoring an accumulative 3,346 buff-breasted Sandpipers were counted. This is the second highest count since 2014, confirming yet again Barba Azul to be a critical conservation site for Buff-breasted Sandpipers.

Thanks to Manomet Inc. and Environment and Climate Change Canada, Armonia conducted a Beni savanna landscape scale shorebird survey in September 2021. Six teams surveyed 1,248 km and mapped 51 river-edge shortgrass sites. Only at 13 locations a total of 673 Buff-breasted Sandpipers were counted from 3 to 12 September. At that same time period, 1,083 Buffies were counted in Barba Azul alone, demonstrating the importance of Bolivia's only WHSRN site.

Large flocks of Buff-breasted Sandpiper observed during monitoring. Teodoro Camacho



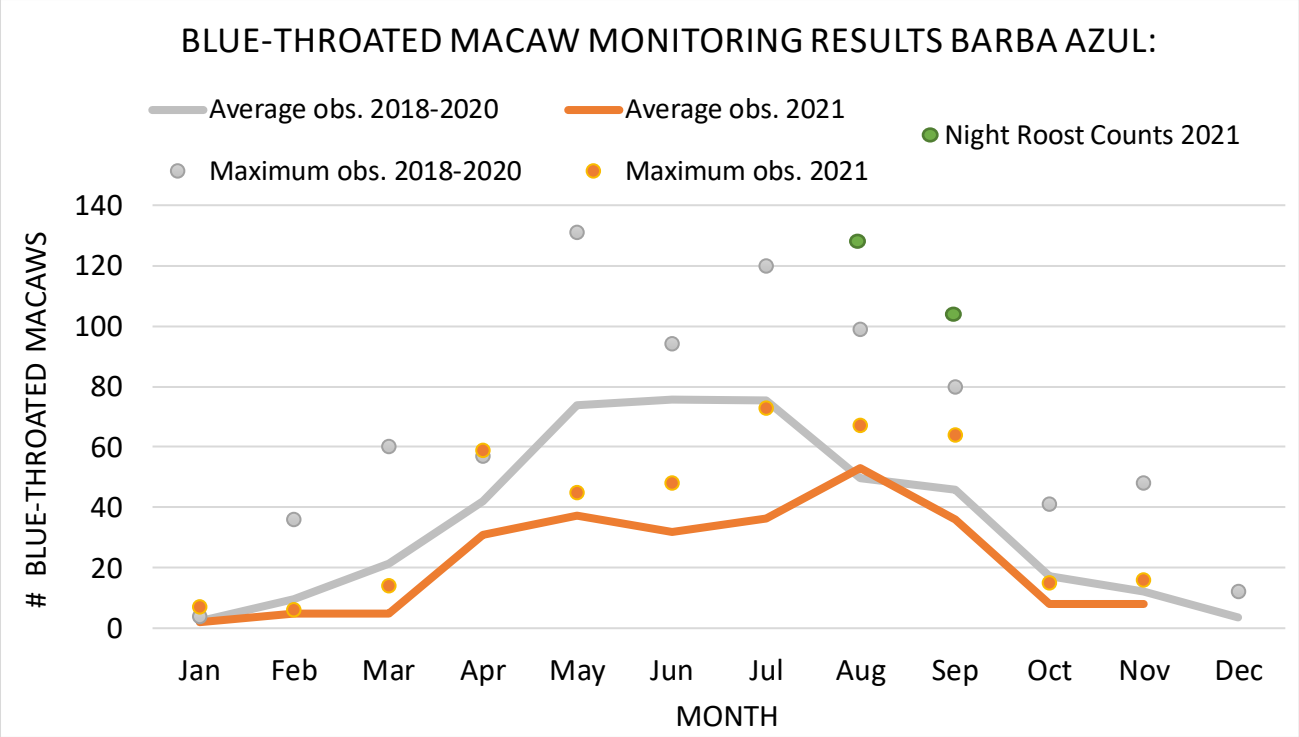
9c. Blue-throated Macaw research and monitoring:

This is the fourth consecutive year that Armonía has been gathering systematically weekly data on Blue-throated Macaw population at Barba Azul Nature Reserve. Following their behavior of gathering at one particular spot in the main foraging forest is that we set the observation point. From there, two weekly monitoring take place every month to measure population fluctuation thought the year, as we see them return from their breeding areas to the reserve in the dry season.

Tania and Miguel during weekly monitoring at Barba Azul Nature Reserve. Teodoro Camacho

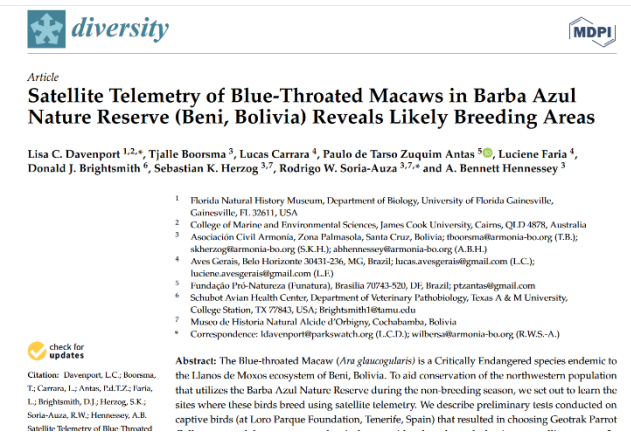
This year, Miguel Martinez and Tania Daza were trained on monitoring the Blue-throated Macaw and have been in charge of this important task every week. Being the naturalists that they are, both have developed amazing observation skills to recognize, detect and record the species and its behavior. As the year went by, they have been observing Blue-throated Macaw individuals leaving to their night roosts from different spots along the foraging forest that are not being recorded due to the difficulty counting individuals. Therefore, with the purpose of overcoming this observation difficulty, we are looking for funding opportunities to build an elevated monitoring station, that will help us avoid any sub estimation.

To have a better estimate of Blue-throated Macaw population at the reserve, Miguel has been also conducting monthly monitoring at Blue-throated Macaw night roosts when they arrive and gather from different locations. Flooding conditions at those distant night roost allowed Miguel to visit during August and September. In August Miguel counted 127 individuals and in September 102, both were the highest counts of individuals during those months, comparing with weekly monitoring observations. High counts at night roosts are showing us that macaws are coming from different locations of the reserve and neighboring forest patches and are not always foraging at our weekly observation point, Isla Barba Azul. During this year our team has also been observing individuals using islands in Barba Azul East as well tracking data has showed they forage at forest patches outside Barba Azul.



Graph 1. *Blue-throated Macaw monitoring results systematically collected at the weekly observation point near Isla Barba Azul in the Barba Azul Nature Reserve. The gray line represents average Blue-throated Macaw numbers per month based on weekly Blue-throated Macaw data gathered in 2018, 2019 and 2020. The orange line represents average Blue-throated Macaw numbers per month for 2021. Dots represent the highest single count observations per month between 2018 and 2020 (gray), 2021 (orange) and the night roosts counts in 2021 (green).*

As we continue to improve our long-term monitoring of Blue-throated Macaw by increasing our efforts to better understand population fluctuations and behavior, we are also excited to announce a new published paper about the Blue-throated Macaw and the use of Satellite Telemetry to understand more about the species' breeding sites, thanks to the support of American Bird Conservancy and the Mohammed bin Zayed Foundation and the Alcides D'Orbigny Natural History Museum. This study explain how Blue-throated Macaws of Barba Azul use breeding sites that are scattered across the Llanos de Moxos region and how the use of satellite collars is a feasible option for research with the species and could provide further conservation insights. Paper available through this **LINK.**



diversity

MDPI

Article

Satellite Telemetry of Blue-Throated Macaws in Barba Azul Nature Reserve (Beni, Bolivia) Reveals Likely Breeding Areas

Lisa C. Davenport [1,2,*], Tjalle Boorsma [3], Lucas Carrara [4], Paulo de Tarso Zuquim Antas [5], Luciene Faria [4], Donald J. Brightsmith [6], Sebastian K. Herzog [3,7], Rodrigo W. Soria-Auza [3,7,*] and A. Bennett Hennessey [3]

1 Florida Natural History Museum, Department of Biology, University of Florida Gainesville, Gainesville, FL 32611, USA
2 College of Marine and Environmental Sciences, James Cook University, Cairns, QLD 4878, Australia
3 Asociación Civil Armonía, Zona Palmasola, Santa Cruz, Bolivia; tboorsma@armonia-bo.org (T.B.); skherzog@armonia-bo.org (S.K.H.); abhennessey@armonia-bo.org (A.B.H.)
4 Aves Gerais, Belo Horizonte 30431-236, MG, Brazil; lucas.avesgerais@gmail.com (L.C.); luciene.avesgerais@gmail.com (L.F.)
5 Fundação Pró-Natureza (Funatura), Brasília 70743-520, DF, Brazil; ptzantas@gmail.com
6 Schubot Avian Health Center, Department of Veterinary Pathobiology, Texas A & M University, College Station, TX 77843, USA; Brightsmith1@tamu.edu
7 Museo de Historia Natural Alcide d'Orbigny, Cochabamba, Bolivia
* Correspondence: ldavenport@parkswatch.org (L.C.D.); wilbersa@armonia-bo.org (R.W.S.-A.)

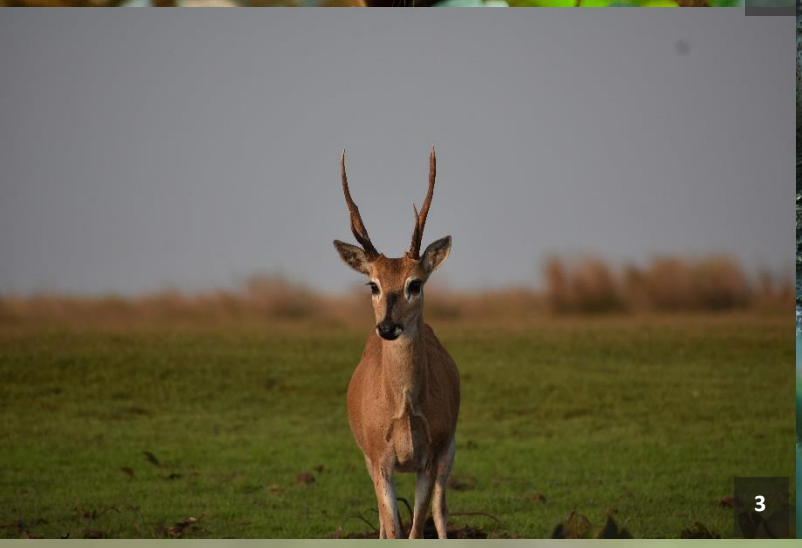
Abstract: The Blue-throated Macaw (*Ara glaucogularis*) is a Critically Endangered species endemic to the Llanos de Moxos ecosystem of Beni, Bolivia. To aid conservation of the northwestern population that utilizes the Barba Azul Nature Reserve during the non-breeding season, we set out to learn the sites where these birds breed using satellite telemetry. We describe preliminary tests conducted on captive birds (at Loro Parque Foundation, Tenerife, Spain) that resulted in choosing Geotrak Parrot

check for updates

Citation: Davenport, L.C.; Boorsma, T.; Carrara, L.; Antas, P.d.T.Z.; Faria, L.; Brightsmith, D.J.; Herzog, S.K.; Soria-Auza, R.W.; Hennessey, A.B. Satellite Telemetry of Blue-Throated

1

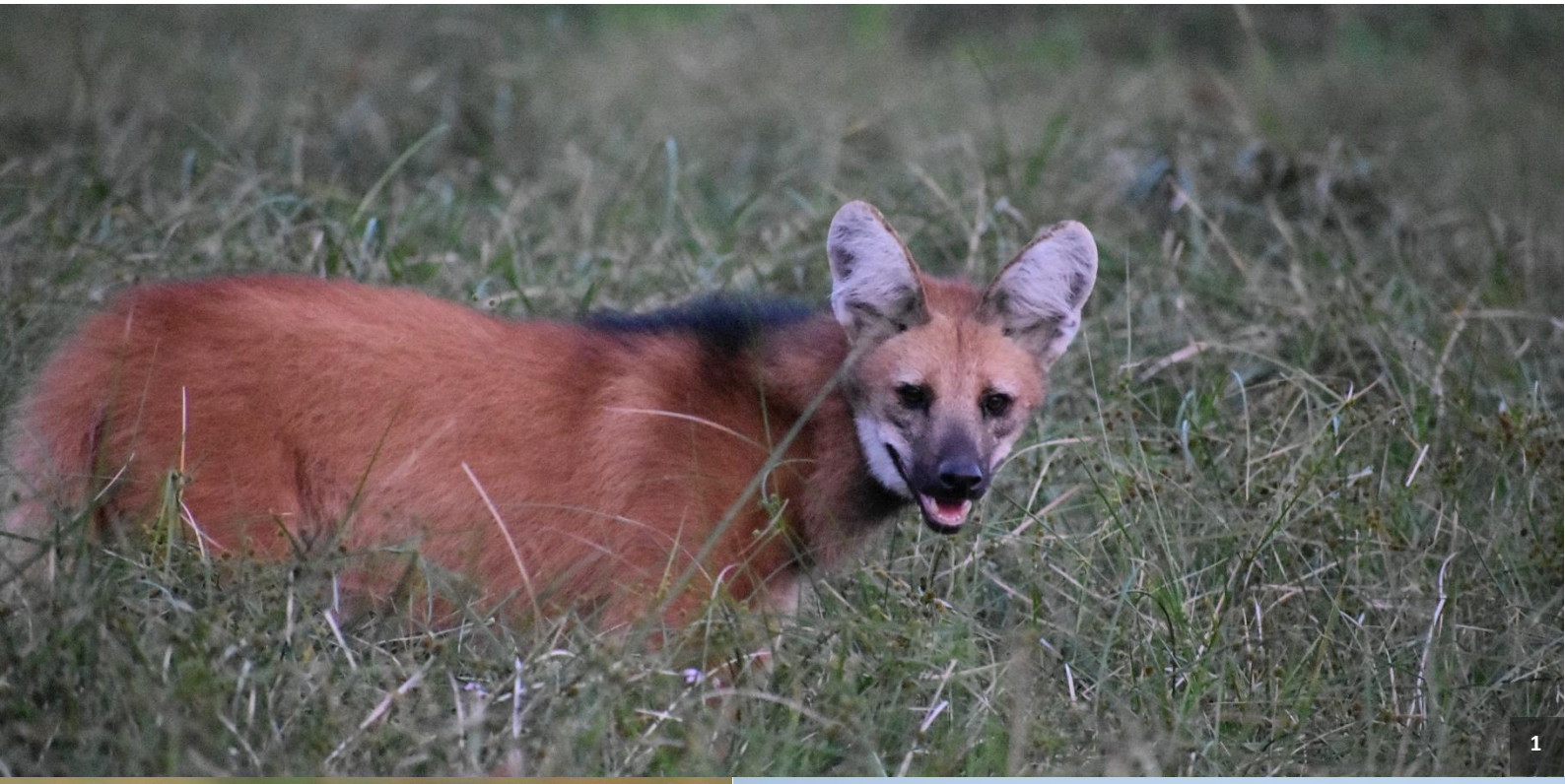
2

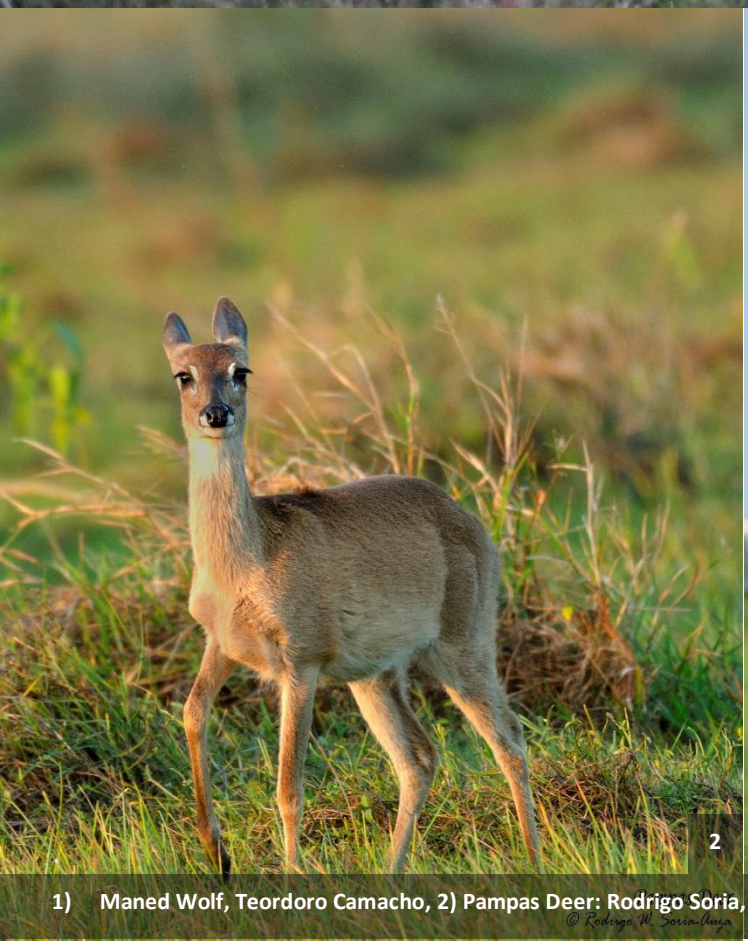


3

4

1) Yellow Armadillo 2) Blue-throated Macaws: Rodrigo Soria. 3) Marsh deer 4) Buff-breasted Sandpiper: Teodoro Camacho.





1) Maned Wolf, Teordoro Camacho, 2) Pampas Deer: Rodrigo Soria, 3) Greater Rhea: Teodoro Camacho.