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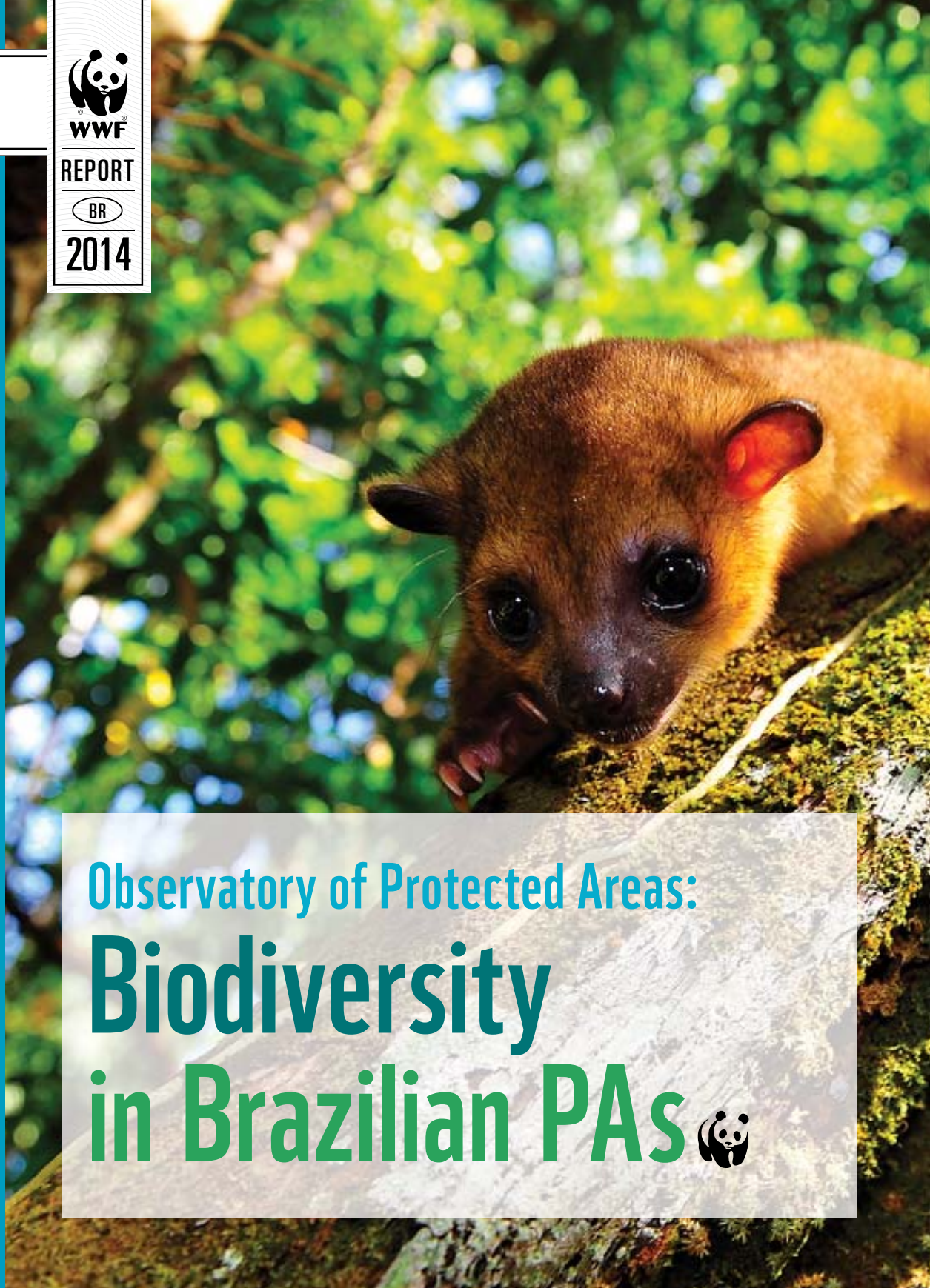

Observatory of Protected Areas:

Biodiversity in Brazilian PAs

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Biodiversity in Brazilian PAs

Brasília, Brazil. October, 2014

WWF-Brazil

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© Luciano Candisani/WWF-Brazil

Design
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Published by WWF-Brazil

O14o Observatory of protected areas : biodiversity in Brazilian PAs / Mariana Napolitano Ferreira and Paula Hanna Valdujo, coord. - Brasília : WWF-Brazil, 2014.
64 p. ; il. ; fot. - (WWF-Brazil. Report)

1. Unidade de conservação. 2. Biodiversidade.
I. Ferreira, Mariana Napolitano. II. Valdujo, Paula Hanna. III. Título: Biodiversity in Brazilian PAs.

CDU 574

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LIST OF ACRONYMS

APA – Environmental Protection Area

ARIE – Area of Relevant Ecological Interest

EE – Ecological Station

Forest – National and/or State Forest

FE – State Forest

FN – National Forest

ICMBio – Chico Mendes Institute for Biodiversity Conservation (Federal Government)

MN – Natural Monument

Park – State and/or National Park

PE – State Park

PN – National Park

Rappam – Rapid Assessment and Prioritization of Protected Area Management

RB – Biological Reserve

RDS – Sustainable Development Reserve

Resex – Extractive Reserve

PA – Protected Area

Sisbio – System for reserach authorization from the ICMBio

INTRODUCTION

Protected areas (PAs) represent a priceless national asset, with an enormous potential to promote significant benefits to human well-being as well as to the country's development in a rational and sustained manner. These PAs are areas for biodiversity conservation, the protection of endangered species and the promotion of sustainable development, besides providing means and incentives for research development, environmental education and public use. The PAs occupy around 17% of the Brazilian territory, in different categories and management spheres.

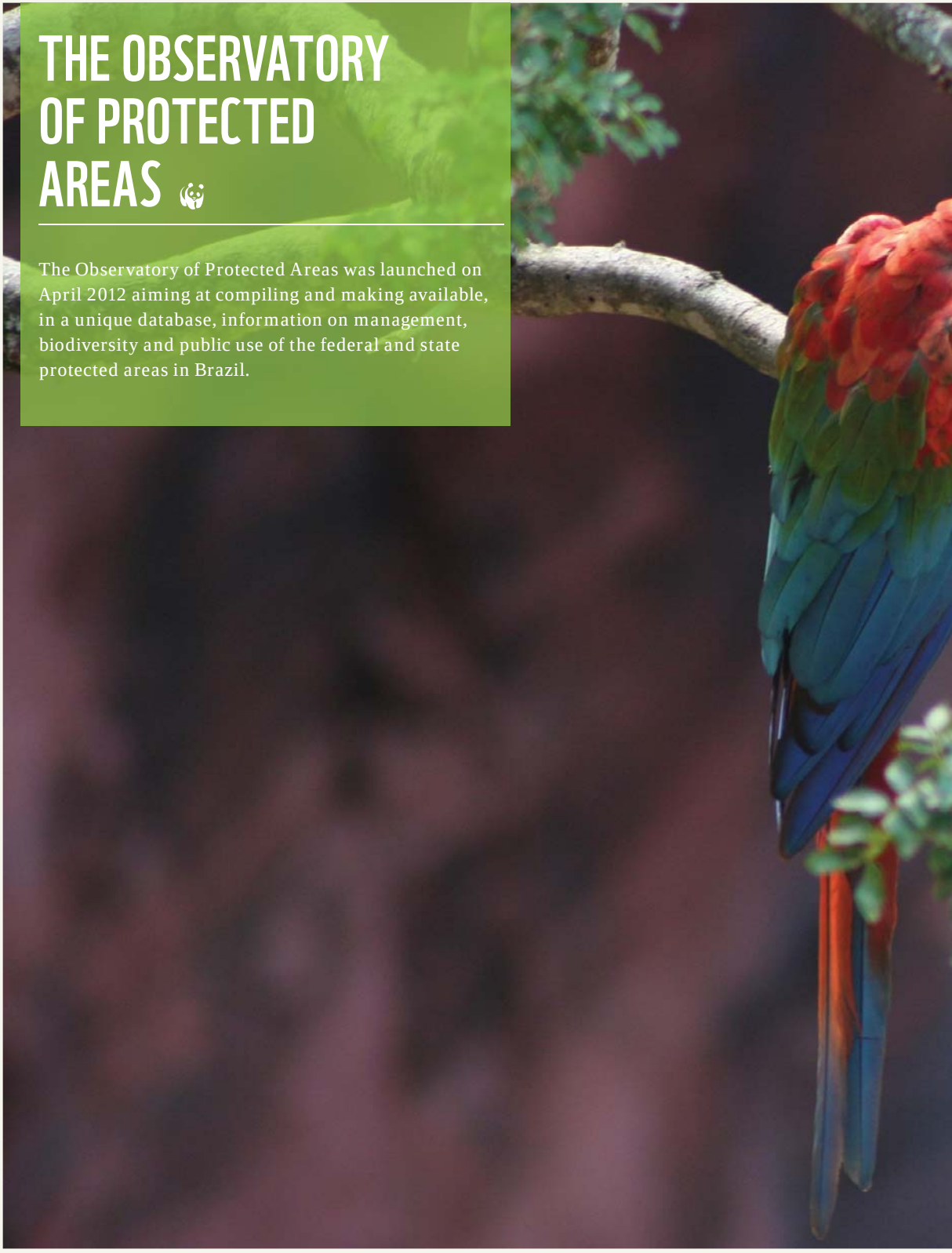
With the objective of gathering essential data for the study, monitoring and evaluation of PAs in Brazil, the Observatory of Protected Areas (obervatorio.wwf.org.br) was launched by WWF-Brazil and partner institutions in 2012. The information conveyed on the website can be used for planning strategies and actions in order to improve PA knowledge, monitoring and management.

Two years after the launching of the Observatory, a great volume of documents and information is already available for consultation and download. The data insertion process and adjustments is ongoing and looks to incorporate information as up-to-date as possible. Besides the daily work of the Observatory team, the contribution of partners, PA managers, researchers and independent users has contributed for improving the database and the online platform.

The goal of this publication is to disclosure consolidated biodiversity data from Brazilian protected areas and discuss their potentialities. From this, we hope to broaden the use of this information and identify new partners to expand the Observatory. We want to make it an even more complete system, updated and easy to use for anyone interested in having access to information about protected areas in Brazil.

THE OBSERVATORY OF PROTECTED AREAS

The Observatory of Protected Areas was launched on April 2012 aiming at compiling and making available, in a unique database, information on management, biodiversity and public use of the federal and state protected areas in Brazil.



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Information available in the website is extracted from various sources, such as the National Protected Areas Records (*Cadastro Nacional de Unidades de Conservação* – CNUC), Rapid Assessment and Prioritization of Protected Areas Management (Rappam), articles published in scientific journals, official publications, among others. Data and evaluations available can be useful for PA management, as well as for defining new research or gap analysis.

For each protected area, various types of information can be visualized or downloaded, presented according to their availability. Initially, basic data has been compiled, such as the limits for each PA, the decree establishing its creation and the official information from PA National Records. In the second phase, management plans were compiled, as well as RAPPAM (management effectiveness) assessments and lists of species, especially for vertebrates and plants.

The website provides information for each PA through thematic tabs, such as “general data”, “vulnerability”, “biological importance”, “PA documents”, among others. It is possible to download different data, such as basic information, species lists, RAPPAM assessments results, official documents and publications.

Access to species occurrence records can be obtained in two ways: in the “biological importance” tab, found on each PA page or by downloading “xls” format files through the reports page (link on the superior menu). Several filters allow selecting specific groups of PAs. After that, just select “species list by PA” in the output options.

The species records described in this publication and related analyses do not correspond to all of the knowledge regarding biodiversity in PAs, since other non-surveyed sources may contain additional information. The information presented here is a result of data compilation efforts for the Observatory between the years of 2011 and 2014.

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RESEARCH IN PROTECTED AREAS

The main information sources of biodiversity in PAs are the management plans and scientific studies made mainly by researchers linked to universities and their postgraduate programs, research institutes and independent professionals.

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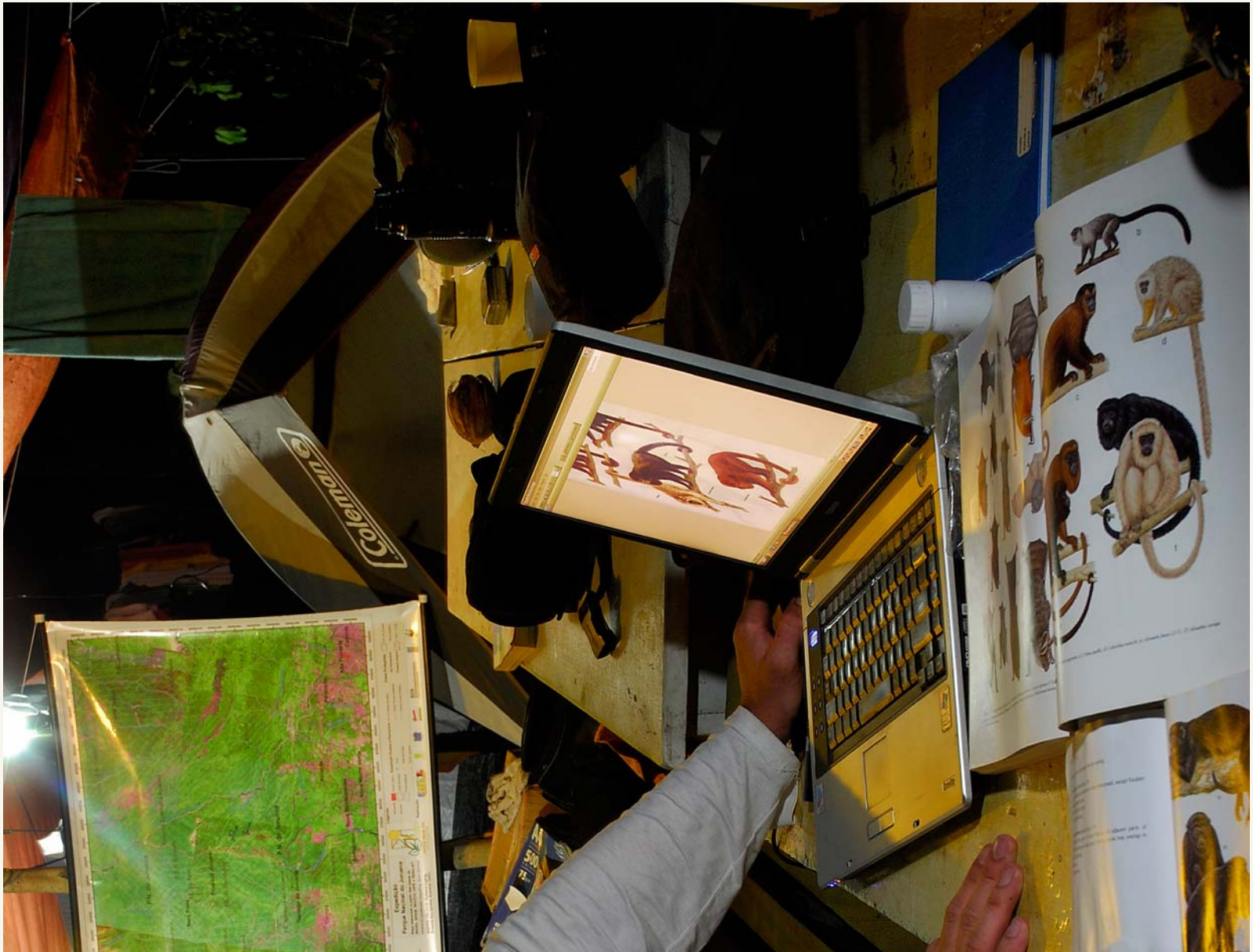


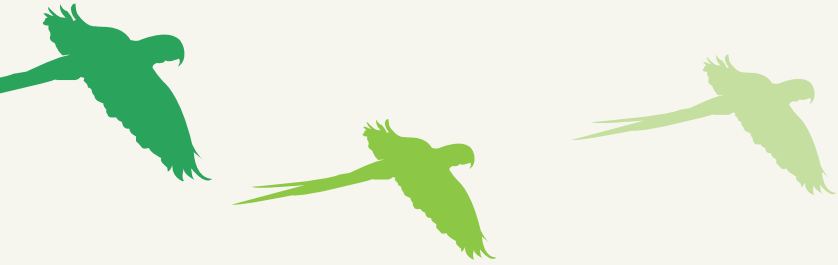
The majority of the PA's management plans, especially those strict use PAs, present diagnostics of the physical environment, flora and fauna, made by researchers and independent consultants, which can bring a great quantity of unprecedented data on the PA's biodiversity. For many areas, especially those located far from urban centers, the flora and fauna data compiled in the scope of their management plan are the only sources of information under which species are protected inside the PA.

Other areas, mainly those near large urban centers or of easier access, receive researchers interested in studying biodiversity, populations of different species, their habits and behaviors. The results of many of these researches are made available in the form of thesis and articles published in scientific journals.

Research authorizations inside federal protected areas are granted through SISBIO, a long-distance service provided by the federal agency responsible for PAs (Chico Mendes Institute for Biodiversity Conservation – ICMBio in the Portuguese acronym). According to the ICMBio management report, during 2010 and 2011, SISBIO granted 4,155 research licenses for federal PAs, the majority of them in the *Mata Atlântica* (Atlantic Forest biome), followed by the Amazon, the *Cerrado* (Brazilian tropical savannah) and Coastal and Marine Zone. In 2011, the areas with the largest number of granted licenses were the national parks of Serra do Cipó, Itatiaia, Serra dos Órgãos, Caparaó and Tijuca, as well as the Tapajós National Forest - all of these with more than 50 research authorizations.

IT IS VERY IMPORTANT THAT THE RESULTS FROM THESE RESEARCHES ARE PUBLISHED

It is very important that the results from these researches are published and made available to PA managers and other environmental agencies, as relevant reference for the elaboration and revision of management plans, listings and action plans for endangered species, environmental impact studies, among others.



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BIODIVERSITY IN PROTECTED AREAS

Protected areas have the role of conserving the rich Brazilian biodiversity.

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The conservation of natural landscapes in vast extensions of territory guarantee not only water quality and the conservation of traditional ways of living, but also the persistence of a large number of species which are vulnerable to changes in the environment. Areas with an immense richness of birds, mammals, reptiles, amphibians, fish, invertebrates and plants are protected in twelve categories of federal or state protected areas in the different Brazilian biomes, reducing the extinction risk of many of these. Even with the rise in the number of studies developed in Brazilian PAs, which evidenced by the increasing research license solicitations to ICMBio - only a few of them are satisfactorily known in relation to the species occurring there.

The information gathered in PAs by researchers from all over Brazil are dispersed in scientific journal articles in different specialized magazines, thesis, official publications, management plans, and reports, among others. Some of them are easily accessible; especially those published in free-access online magazines, while a great amount of important information require detailed searches in order to be found. The Observatory of Protected Areas aims at not only systematize the biodiversity information in a single database, but also to identify and, when possible, make the documents from which the information where extracted available.

75,540 RECORDS AVAILABLE IN THE OBSERVATORY OF MORE THAN 17,000 SPECIES OF PLANTS, INVERTEBRATES, FISH, AMPHIBIANS, REPTILES, BIRDS AND MAMMALS

Biodiversity data in the Observatory of Protected Areas

Currently, there are 75,540 records available in the Observatory of more than 17,000 species of plants, invertebrates, fish, amphibians, reptiles, birds and mammals from 417 federal and state-level PAs.

For each record, a citation of source is provided, as a way of crediting the author of the information and allowing the users of the Observatory to consult the original source, if that is the interest. To facilitate the access to the original free-access articles and documents, such publications can be downloaded from the Library of the Observatory or from the documents section on each PA page.

A constant updating effort is done by monitoring free-access scientific magazines which frequently publish species lists, such as BiotaNeotropica, CheckList, *Revista Brasileira de Ornitologia* (Brazilian Ornithology Magazine), among others. Other sources are also consulted, such as management plans, scientific articles, thesis, dissertations and official publications.

THE GROUP WITH THE LARGEST NUMBER OF INDEXED SPECIES IN THE OBSERVATORY IS **PLANTS**

Periodically, species nomenclature is revised to follow taxonomy changes, which have been occurring in the last few years. For this, sources accepted and maintained by the scientific community are consulted, such as the *Centro Nacional de Conservação da Flora* (National Center for Flora Conservation – CNCFlora), linked to Rio de Janeiro's Botanical Garden, the amphibians and reptiles lists published by the *Sociedade Brasileira de Herpetologia* (Herpetology Brazilian Society – SBH), the birds list published annually by the *Comitê Brasileiro de Registros Ornitológicos* (Brazilian Committee of Ornithological Records – CBRO), the "Fishbase" international database and Brazil's most recent mammal species compilation (Paglia 2012).

Biodiversity data profile in the Observatory

The records of species in protected areas are classified according to taxonomy groups: amphibians, birds, flora, invertebrates, mammals, fish and reptiles. The group with the largest number of indexed species in the Observatory is plants, followed by birds and fish (Table 1). Plants are also the group with the largest number of records in all of the 417 PAs, followed by birds and mammals.

TABLE 1: Number of species and records by taxonomy group

Group	Species	Records	Protected areas
Amphibians	753	3821	159
Birds	1.555	22.650	242
Flora	9.965	31.473	238
Mammals	687	6.114	159
Fish	1.535	5.245	116
Reptiles	510	3.530	154

The maximum richness by taxonomy group in a single PA is of 116 amphibians (in Serra do Mar State Park), 525 birds (in Jaru Biological Reserve), 1,578 plants (in Montanhas do Tumucumaque National Park), 159 mammals (in Igarapés do Juruena State Park), 412 fish (in Viruá National Park) and 105 reptiles (in Tapirapé Biological Reserve). It is worth noting that all these areas are strict protection PAs, one being located in the Atlantic Forest and the rest in the Amazon.

The category with the greatest number of inventoried PAs is the parks. The following is environmental protection areas, ecological stations and state/national forests. The majority of records available in the Observatory come from parks, followed by ecological stations and biological reserves (Table 2).

TABLE 2: Number of PAs inventoried and number of species registered in each PA category

Category	PAs with records	Number of records
APA	65	2.758
ARIE	14	866
EE	57	9.069
Forest	42	3.277
MN	5	495
PN/PE	169	43.572
RB	33	7.488
RDS	6	2.711
RESEX	18	5.015
RVS	8	289

The majority of species records were obtained in PAs in the Amazon, followed by the Atlantic Forest, the Cerrado, the Caatinga (dry shrubland in northeastern part of Brazil), the Pampa (lowland biome in the south of Brazil) and the Marine and Coastal Zone. The greatest volume of occurrence records is of birds in PAs in the Amazon, followed by plants in in the Atlantic Forest and in the Amazon (Table 3).

TABLE 3: Number of species records by taxonomy group and biome

Group	Amazon	Caatinga	Cerrado	Atlantic Forest	Pampa	Pantanal	Coastal and Marine Zone
Amphibians	1.262	51	508	1.877	44	36	43
Birds	12.213	1.267	4.485	4.278	55	77	273
Flora	10.162	1.382	6.096	12.201	434	754	444
Mammals	2.137	128	1.418	2.253	72	56	50
Fish	4.183	4	392	469	120	68	27
Reptiles	1.450	89	668	1.181	42	53	47
Total	31.407	2.921	13.675	22.259	749	1.044	749

CONSIDERING THE DIFFERENT TAXONOMY GROUPS, THE MAJORITY OF THE RECORDS ARE OF SPECIES OF FLORA IN PARKS

Parks are the category with the largest number of registered species. They are followed by ecological stations, biological reserves and extractive reserves (Table 4). Considering the different taxonomy groups, the majority of the records are of species of flora in parks, followed by species of birds in parks, and flora in biological reserves and ecological stations.

TABLE 4: Number of species records by PA categories and taxonomy groups.

Category(*)	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
APA (65)	221	979	806	380	122	250	2.758
ARIE (14)	19	113	594	55	24	61	866
EE (57)	415	2445	3445	735	151	460	7.651
FE (42)	149	834	1546	280	354	114	3.277
MN (5)	0	306	160	29	0	0	495
Parks (198)	2.110	12.558	19.366	3.445	2.943	1.862	42.284
RVS (8)	33	2	164	89	1	0	289
RB (33)	443	2063	3.579	561	523	319	7.488
RDS (18)	147	968	667	214	560	152	2.708
RESEX (1)	284	2.380	1.146	326	567	312	5.015

* Number of protected areas in each category

The majority of the PAs with some information about biodiversity are in the Atlantic Forest. However, a larger number of species was registered in the Amazonian PAs, mainly due to the great effort to develop management plans supported by the Amazon Region Protected Areas Program - ARPA. Of the 96 PAs that are part of the ARPA Program, at least 55 have information on biodiversity available in management plans and/or in scientific publications.

São Paulo, Minas Gerais, Paraná, Rio Grande do Sul and Bahia are the states with the largest number of PAs with some information on biodiversity (Figure 2). However, when it comes to number of species, there are more records available for the states of Amazonas, São Paulo, Mato Grosso and Paraná. Among the 10 states with the highest number of registered species, six are at least partially in the Amazon (Figure 3).

FIGURE 1: Distribution of the number of species records by PAs

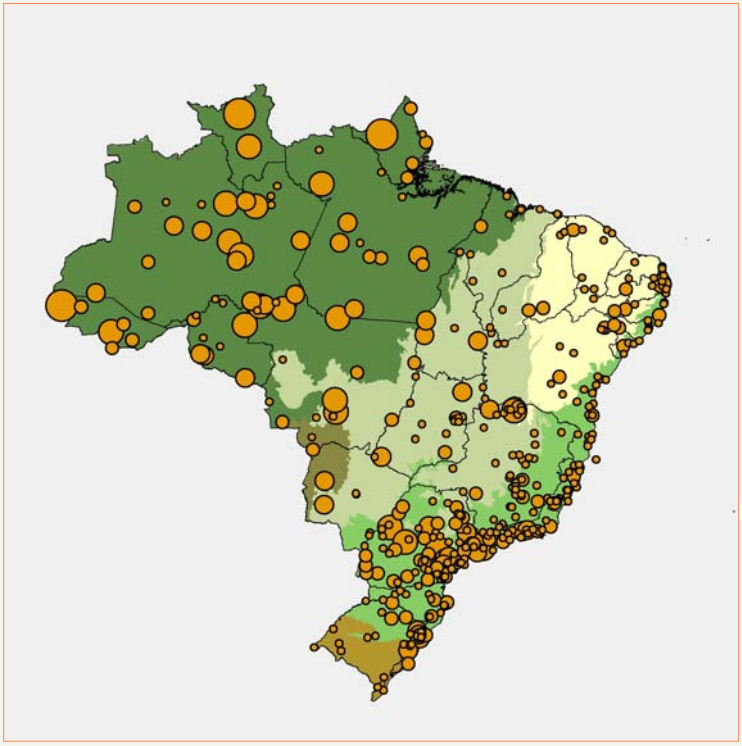


FIGURE 2: Number of PAs with records of species in the Observatory by state.

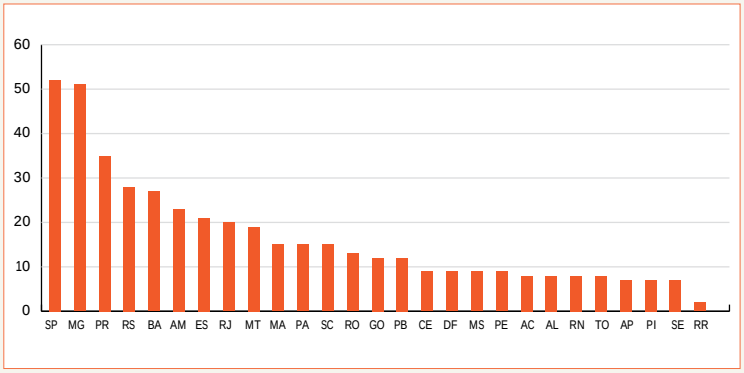
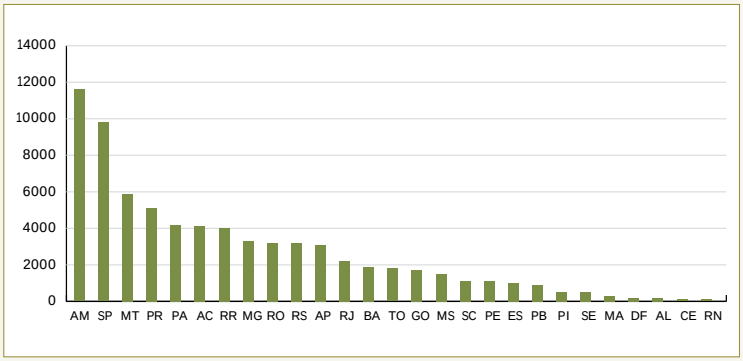


FIGURE 3: Number of species registered in the Observatory by state.



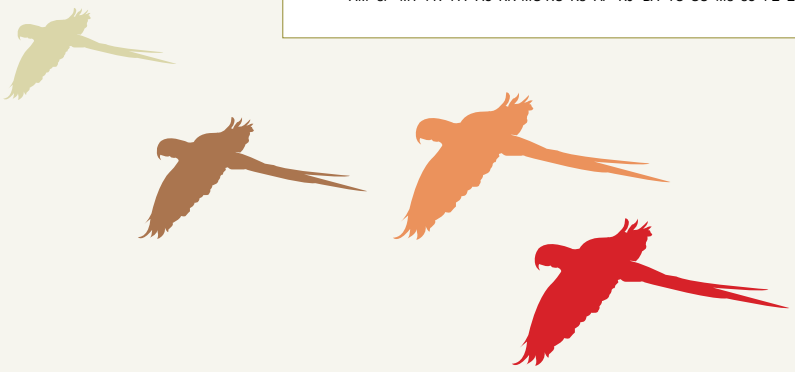
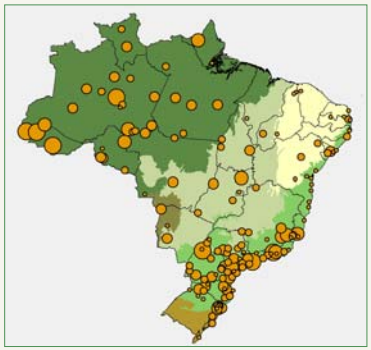


FIGURE 4: Distribution of the number of species by PA for different groups.

Biomes

- Amazon
- Caatinga
- Cerrado
- Atlantic Forest
- Pampa
- Pantanal

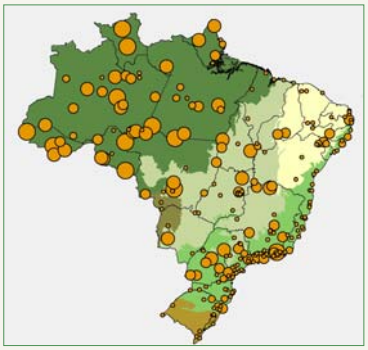
AMPHIBIANS



Number of species records

- 1 - 11
- 12 - 27
- 28 - 45
- 46 - 71
- 72 - 116

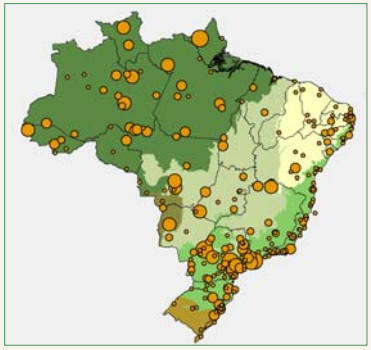
BIRDS



Number of species records

- 1 - 50
- 51 - 139
- 140 - 245
- 246 - 355
- 356 - 525

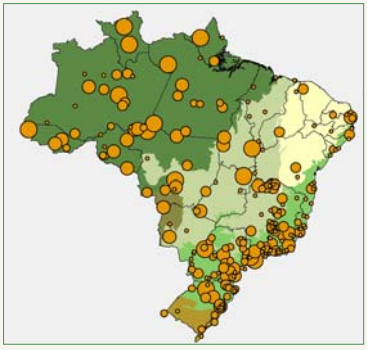
FLORA



Number of species records

- 1 - 75
- 76 - 208
- 209 - 423
- 424 - 788
- 789 - 1578

MAMMALS

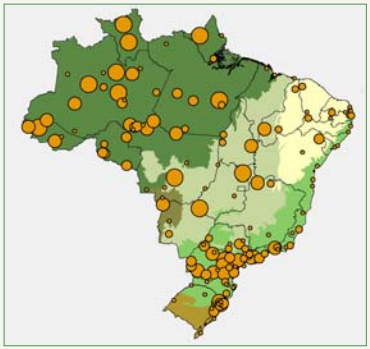


Number of species records

- 1 - 10
- 11 - 27
- 28 - 48
- 49 - 79
- 80 - 159

THE MAJORITY OF THE PAS WITH SOME INFORMATION ABOUT BIODIVERSITY ARE IN THE ATLANTIC FOREST

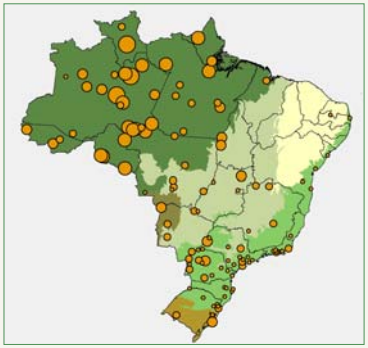
REPTILES



Number of species records

- 1 - 9
- 10 - 24
- 25 - 37
- 38 - 55
- 56 - 105

FISH



Number of species records

- 1 - 13
- 14 - 39
- 40 - 93
- 94 - 241
- 242 - 412

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AMAZON

Of the 252 protected areas of the Amazon listed in the Observatory of Protected Areas, 71 have some information about biodiversity.

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Twenty five areas have more than 500 records of fauna and/or flora species - 24 of which are supported by the ARPA Program (Figure 5). The 25 PAs with the largest volume of information on biodiversity are distributed among all Amazonian states, except for Maranhão, with most of them in the state of Amazonas, where 12 of these PAs are located.

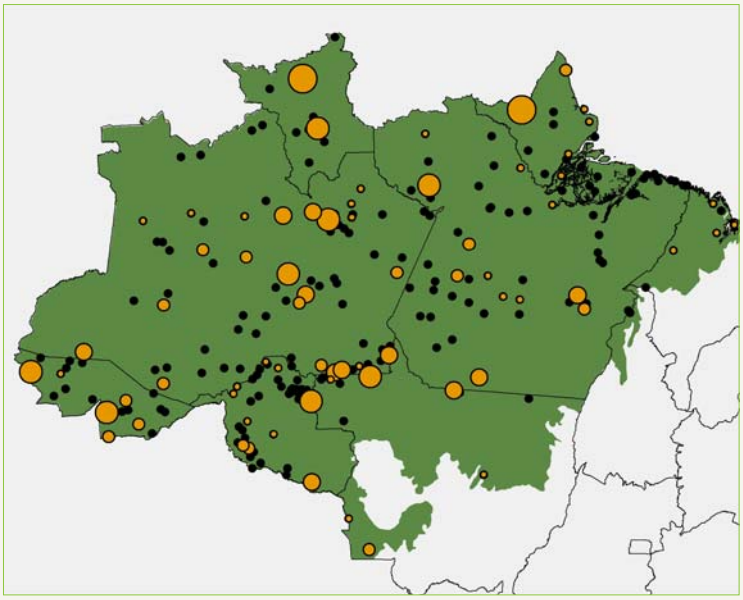
The majority of the information on biodiversity in the Amazon comes from parks, followed by extractive reserves and biological reserves. The PA with the largest number of records is the Maracá Ecological Station (2,726 species), followed by the Montanhas do Tumucumaque National Park (2,392), Serra do Divisor NP (1,784), Viruá NP (1,447) and Chandless State Park (1,373).

There are 673 records of 61 species of amphibians, birds and mammals threatened with extinction in Amazonian PAs. The majority of records are of birds (384 records, of 33 species) and mammals (288 records, of 27 species).

673

RECORDS OF 61 SPECIES OF AMPHIBIANS, BIRDS AND MAMMALS THREATENED WITH EXTINCTION IN AMAZONIAN PAS

FIGURE 5: Protected areas in the Amazon, classified by the number of species (orange circles). Black circles represent PAs without records in the Observatory.



THE PA WITH THE LARGEST NUMBER OF RECORDS IS THE MARACÁ ECOLOGICAL STATION

2,726

SPECIES

Number of species records

- 1 - 239
- 240 - 547
- 548 - 934
- 935- 1784
- 1785 - 2726

TABLE 5: Number of species records in the Amazon by PA categories and taxonomic groups.

Category	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
APA (6)	0	190	22	1	19	3	235
ARIE (1)	0	3	0	0	0	0	3
EE (12)	60	1.174	887	201	69	120	2.511
Forest (6)	58	590	648	140	307	71	1.814
Park (21)	595	5.394	5.030	1.028	2.191	639	14.877
RB (7)	147	1.515	1.766	239	471	153	4.291
RDS (6)	147	968	667	214	560	152	2.708
RESEX (12)	255	2.379	1.142	314	566	312	4.968

FIGURE 6: Number of species records in the Amazon by PA category.

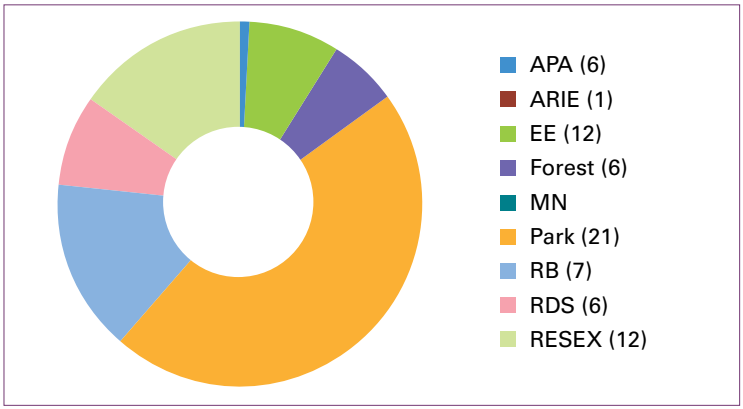
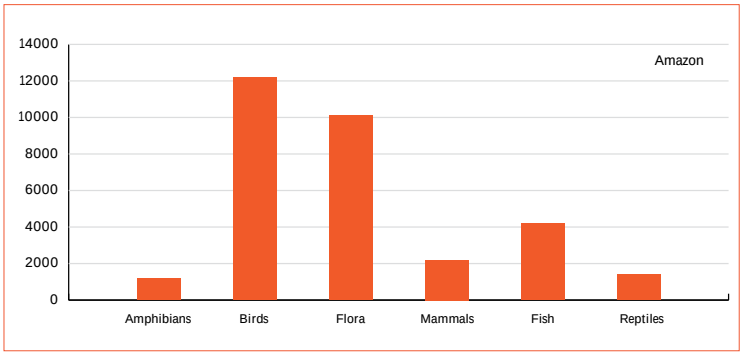


FIGURE 7: Number of species records by taxonomic group in Amazon PAs.



AS DIVERSE AS IT IS LARGE

Among all of the protected areas with species lists in the Observatory, the one standing out is the *Montanhas do Tumucumaque National* Park, with more than 2,300 species of flora and vertebrate animals. Created in 2002, with an area of 3.8 million hectares, it is the largest national park in Brazil and the largest in tropical forests in the world. Located in the northern region of the country in the Amapá and Pará states, and in the frontier of Brazil with French Guyana and Surinam, the park has an important role in the maintenance of Amazonian biodiversity, especially protecting a significant sample of the Guianas Shield flora and fauna.

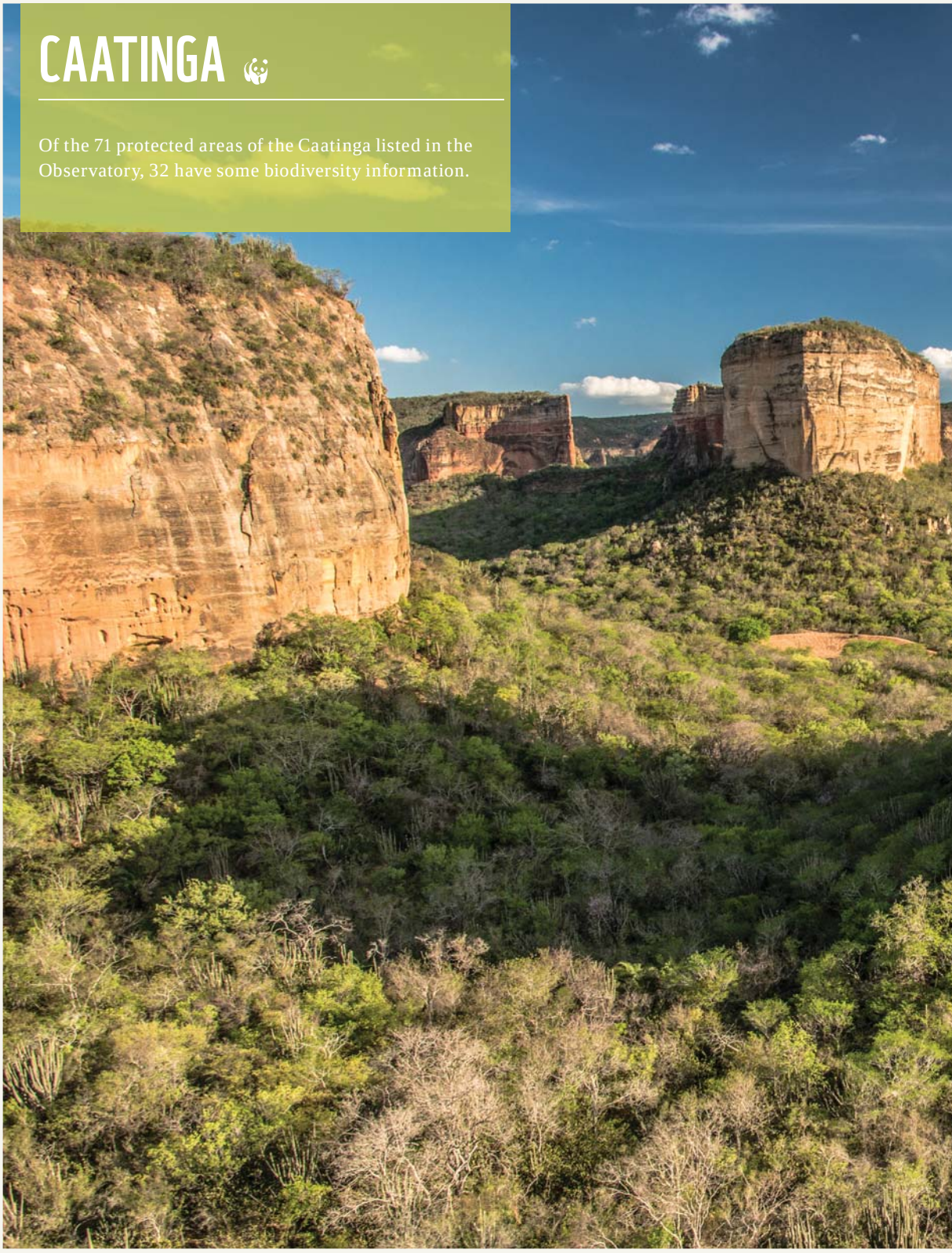
The records in the Observatory come only from Rapid Ecological Assessments performed during the development of the park's management plan. Certainly, this is only a first estimate of what must be the real diversity of the species found there.

The Park harbors forest ecosystems in an exceptional state of conservation, with rare disturbance signals caused by man. More than 1,500 plant species were registered during the assessments. When it comes to vertebrates, 366 bird species were registered. Many of these are fairly hunted species by man and that found there an important refuge. The amphibians (toads, frogs and tree frogs) are represented by 70 species, being that some are still unknown to science. Yet the reptiles summed 86 species, including three alligator, three turtle and two tortoise species, besides serpents and lizards, with at least three unknown species. New species were also found among the 207 fish species collected during the surveys.

However, the park owns its importance mainly to the mammals. Among the 57 species of non-flying mammals registered, there are endemic species (that only occur in that region), vulnerable, in danger and rare. Among the most threatened are the giant armadillo (Priodontes maximus), the bush dog (Speothos venaticus), the giant otter (Pteronura brasiliensis) and the tapir (Tapirus terrestris). Besides these, there are also 48 species of bats in the Park, but studies indicate that this number may be higher than 100. The richness of this park is not only due to its extension or conservation status, but also due to the diversity of environments found there and its location in a highly rich portion of the Amazon biome.

CAATINGA

Of the 71 protected areas of the Caatinga listed in the Observatory, 32 have some biodiversity information.



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Eleven PAs have more than 100 records of fauna and/or flora species (Figure 5). PAs with the greatest volume of information on biodiversity are distributed among all of the Caatinga's states.

The majority of the information on Caatinga's biodiversity comes from parks, followed by ecological stations. The PA with the greatest number of records is the Chapada Diamantina NP (348 species), followed by the Catimbau NP (310), Grota do Angico Natural Monument (291) and Serra da Capivara NP (239).

There are 48 records of 24 species of amphibians, birds and mammals threatened with extinction in Caatinga's PAs. The majority of the records are of birds (29 records, of 12 species) and mammals (18 records, of 11 species).

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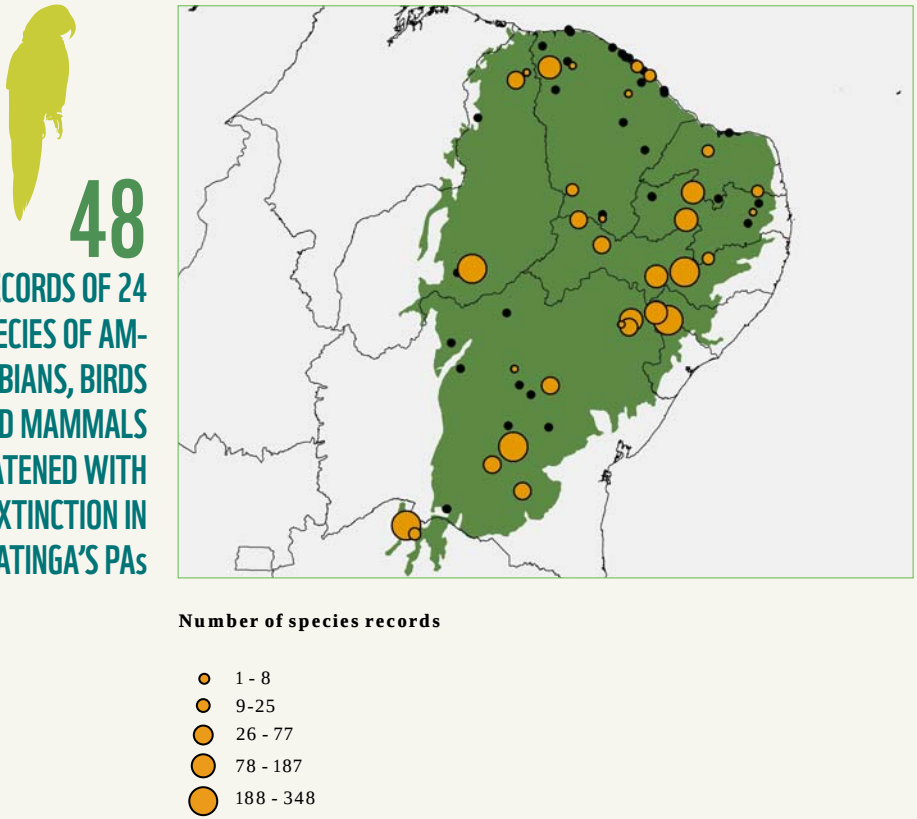
FIGURE 8: Protected areas in the Caatinga, classified by the number of species (orange circles). Black circles represent PAs without species records in the Observatory.



48

RECORDS OF 24 SPECIES OF AMPHIBIANS, BIRDS AND MAMMALS THREATENED WITH EXTINCTION IN CAATINGA'S PAs

TABLE 6: Number of species records in the Caatinga by PA category and taxonomic group.

Category	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
APA (8)	1	6	176	0	0	12	195
ARIE (2)	0	14	0	0	0	0	14
EE (3)	25	187	63	12	4	46	337
Forest (5)	2	68	44	5	0	0	119
MN (2)	0	301	160	0	0	0	461
Park (18)	10	691	752	95	0	31	1.592
RB (2)	0	0	187	16	0	0	203

FIGURE 9: Number of species records in the Caatinga by PA category.

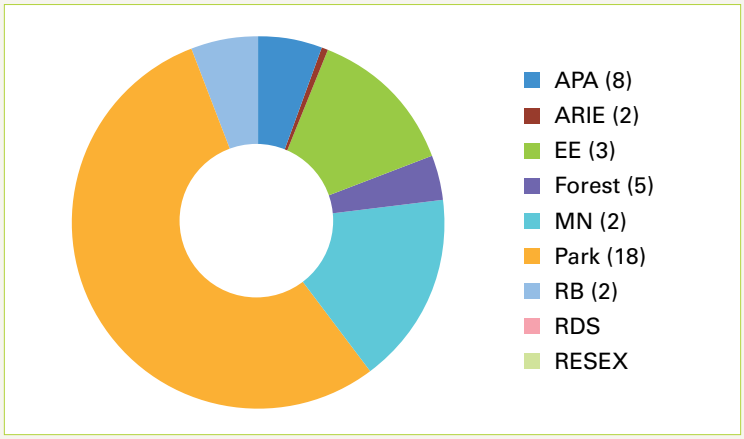
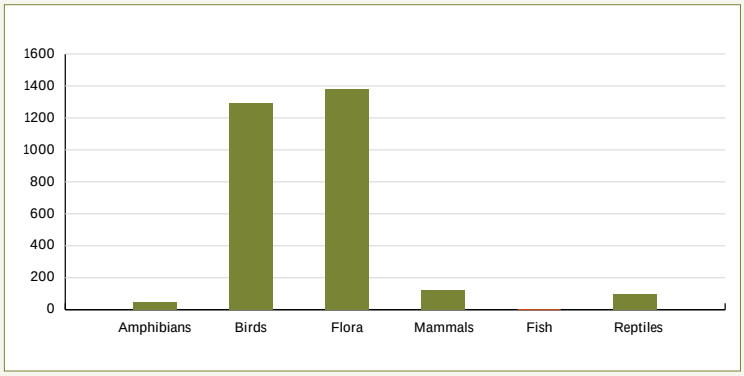


FIGURE 10: Number of species records by taxonomic group in Caatinga PAs.



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CERRADO

Of the Cerrado's 211 protected areas listed in the Observatory, 88 have some information on biodiversity.

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Twelve PAs have more than 500 fauna and/or flora species records (Figure 5). The twelve PAs with the greatest volume of information on biodiversity are distributed among all Cerrado' states, except for Maranhão and Piauí.

The majority of the information on the Cerrado's biodiversity comes from parks, followed by ecological stations. The PAs with the greatest number of records is the Cavernas do Peruaçu NP (1,151 species), followed by the Chapada dos Guimarães NP (1,090), Gruta da Lagoa Azul State Park (1,029) and Itapeva Ecological Station (962).

There are 370 records of 65 species of amphibians, birds, mammals and reptiles threatened with extinction in Cerrado PAs. The majority of the records are from mammals (218 records, from 23 species) and birds (149 records, from 29 species).

FIGURA 11: Protected areas in the Cerrado, classified by the number of species (orange circles). Black circles represent PAs without records in the Observatory.

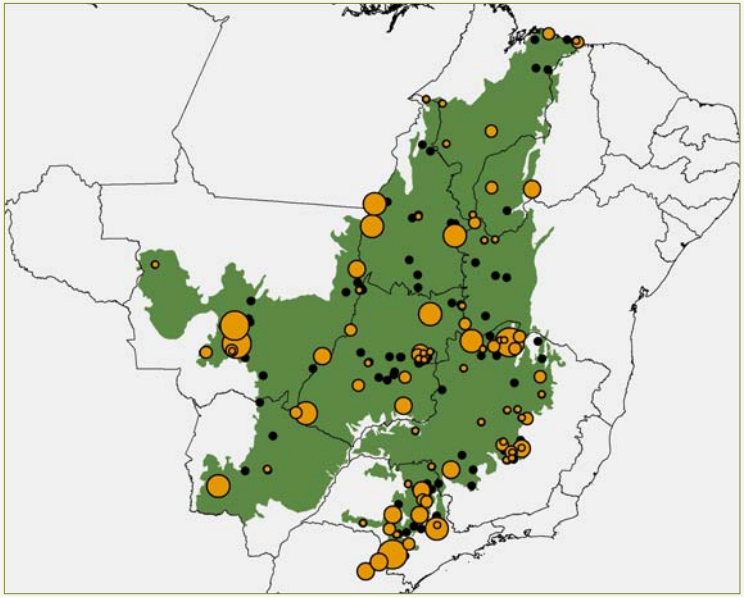
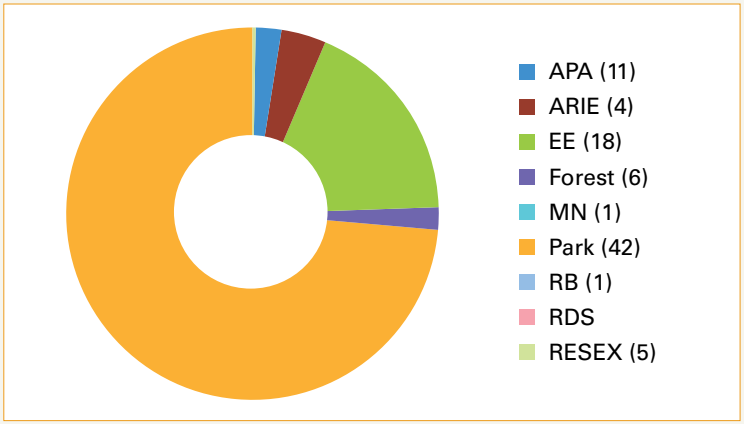


TABLE 7: Number of species records in the Cerrado by PA category and taxonomic group.

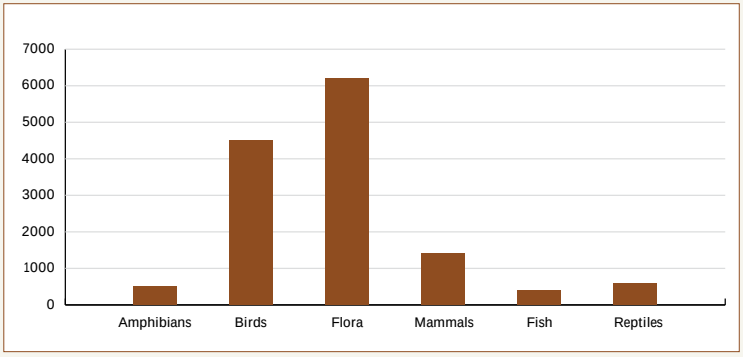
Category	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
APA (11)	0	123	10	154	0	6	293
ARIE (4)	4	92	423	18	0	24	561
EE (18)	190	590	1.237	222	7	175	2.421
Forest (6)	16	26	121	13	0	9	185
MN (1)	0	0	0	3	0	0	3
Park (42)	264	3.653	4.304	996	384	454	10.055
RB (1)	5	0	0	0	0	0	5
RESEX (5)	29	1	1	12	1	0	44

FIGURE 12: Number of species records in the Cerrado by PA category.



THERE ARE 370 RECORDS OF 65 SPECIES OF AMPHIBIANS, BIRDS, MAMMALS AND REPTILES THREATENED WITH EXTINCTION IN CERRADO PAS

FIGURE 13: Number of species records by taxonomic group in the Cerrado PAs.



PROTECTION OF RARE SPECIES IN THE CAVERNAS DO PERUAÇU NATIONAL PARK AND ITS SURROUNDINGS

The Cavernas do Peruaçu National Park, created in 1999, protects almost 57 thousand hectares of the Brazilian savannas (Cerrado) in the northern portion of Minas Gerais state.

Besides sheltering 140 caves, more than 80 archeological sites and rock paintings, there are around 1,100 species of animals and plants, among them almost 290 birds and 56 mammals, many of them threatened with extinction.

Considering this great importance for biodiversity, WWF-Brazil, in partnership with the Biotrópicos Institute, ICMBio and the PA agency from Minas Gerais state, conducts a project for systematic monitoring of medium to large-sized mammals in the PA and in two other state parks: Mata Seca and Veredas do Peruaçu.

With the use of special cameras installed in strategic points in the parks, researchers already made important discoveries. More than 30 species of mammals were registered in photos or film, among them the tapir (*Tapirus terrestris*), the giant anteater (*Myrmecophaga tridactyla*) and the little spotted cat (*Leopardus tigrinus*), all of them facing some risk of extinction.

Jaguars and ocelots, deer and capybaras were also observed. Nevertheless, two recent records surprised researchers: a black-maned wolf (*Chrysocyon brachyurus*) and a bush dog (*Speothos venaticus*).

Although some accounts existed, it is the first record of a black-skinned maned wolf in the world. From now on, the canid is in the experts' radar and the goal is to learn more on the animal: his habits, behavior and, mainly, the reason for his coloration.

The bush dog is a species practically unknown to science. Described in 1842 by a Danish citizen, it remained forgotten for a long time, with only track records. Some recent records are available elsewhere, but it took seven years of attempts to register the bush dog in the Peruaçu region.

Its name comes from the strong scent of its urine. With a dark-brown fur, a body of up to 70 cm and around five kilos, it is one of the smallest and more social canids in South America, since it forms permanent packs of up to ten animals. Despite being found in the Cerrado, Atlantic Forest and the Amazon, the species is in a vulnerable situation in the country and critically endangered in Minas Gerais.

This record makes it even more evident the importance of PAs for biodiversity conservation, especially in the Cerrado and other highly fragmented areas. Currently, the Cerrado has less than 3% of its area in strict use PAs.

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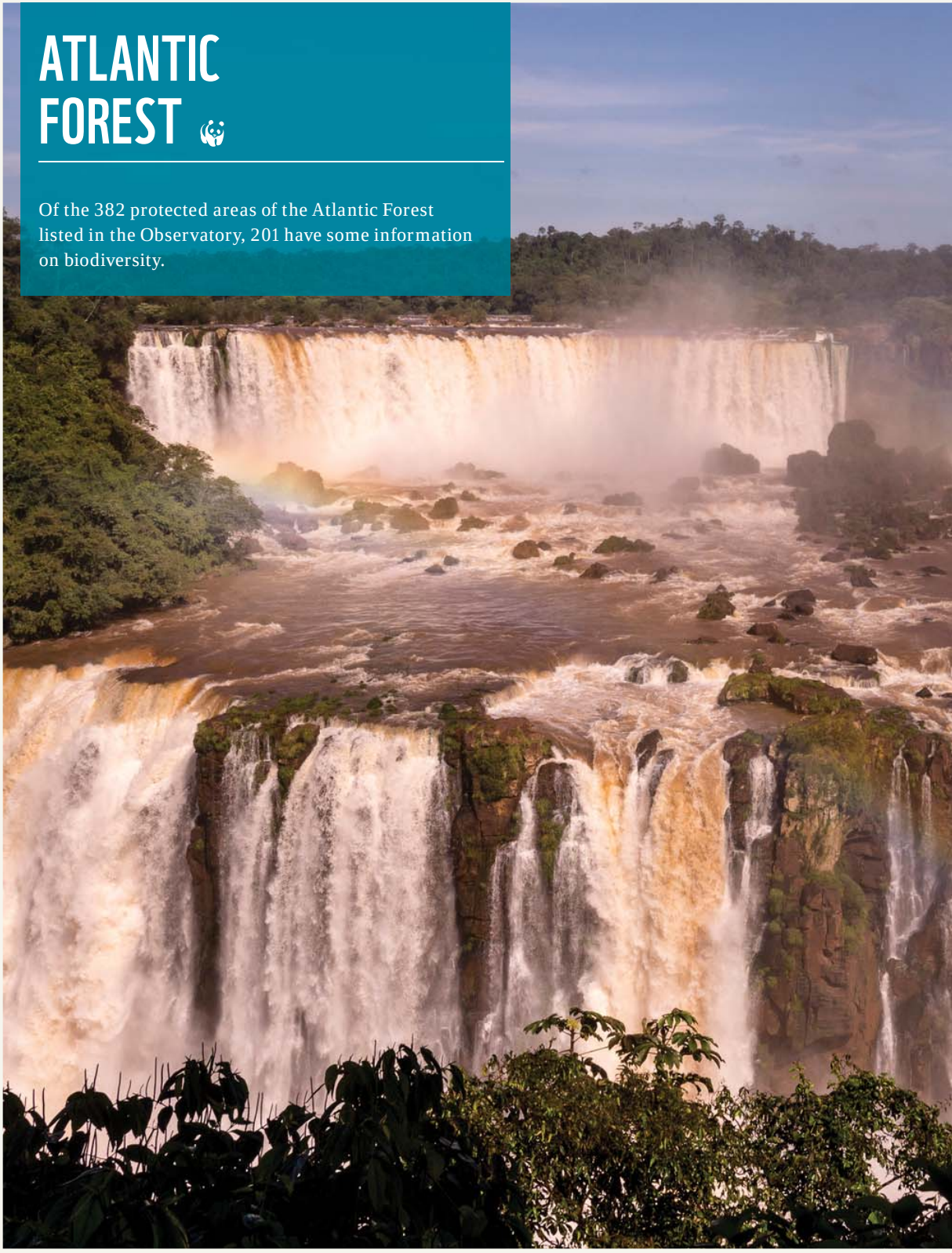
ATLANTIC FOREST

Of the 382 protected areas of the Atlantic Forest listed in the Observatory, 201 have some information on biodiversity.



© Richard Stonehouse

Of the 382 protected areas of the Atlantic Forest listed in the Observatory, 201 have some information on biodiversity. Nine PAs have more than 500 records on fauna and/or flora species (Figure 5). The nine PAs with the largest volume of information on biodiversity are concentrated in the states of São Paulo, Paraná and Paraíba.

The majority of information on biodiversity of the Atlantic Forest comes from parks, followed by biological reserves and ecological stations. The PA with the greatest number of records is the Serra do Mar State Park (1,236 species), followed by the Morro do Diabo SP (1.123), Mata dos Godoy SP (849) and Cantareira SP (730).

There are 615 records, of 110 species of amphibians, birds, mammals and reptiles threatened with extinction, in the Atlantic Forest's PAs. The majority of the records are of mammals (360 records, of 37 species) and birds (237 records, of 62 species).

FIGURE 14: Protected areas in the Atlantic Forest, classified by the number of species (orange circles). Black circles represent PAs without records in the Observatory.

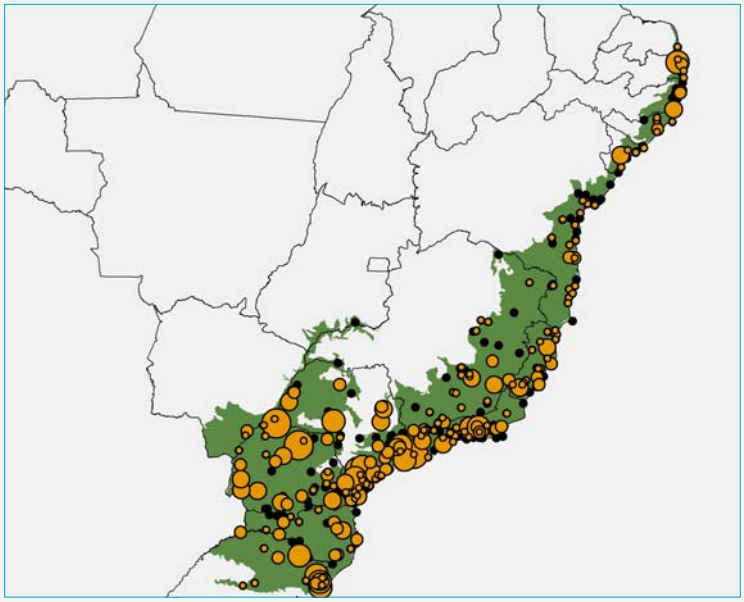


TABLE 8: Number of species records in the Atlantic Forest by PA category and taxonomic group

Category	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
APA (36)	218	650	575	214	77	228	1.962
ARIE (6)	15	2	171	37	24	37	286
EE (21)	132	482	1.197	292	71	113	2.287
Forest (25)	73	150	733	122	47	34	1.159
MN (2)	0	5	0	26	0	0	31
Park (84)	1.118	2.463	7.918	1.193	205	609	13.506
RVS (7)	33	0	164	89	1	0	287
RB (19)	288	526	1.440	280	44	160	2.738
RESEX (1)	0	0	3	0	0	0	3

FIGURE 15: Number of species records in the Atlantic Forest by PA categories.

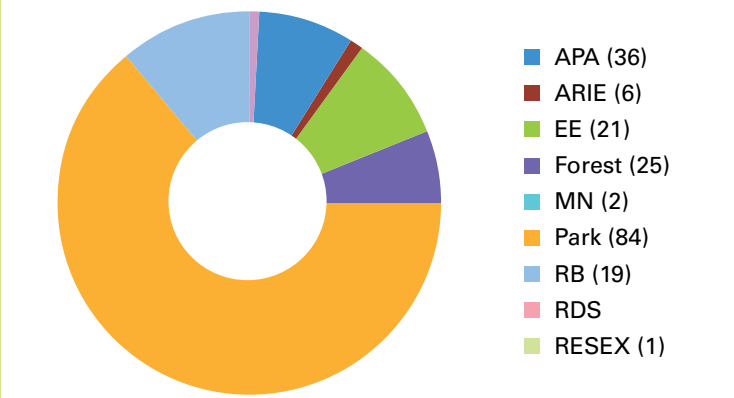
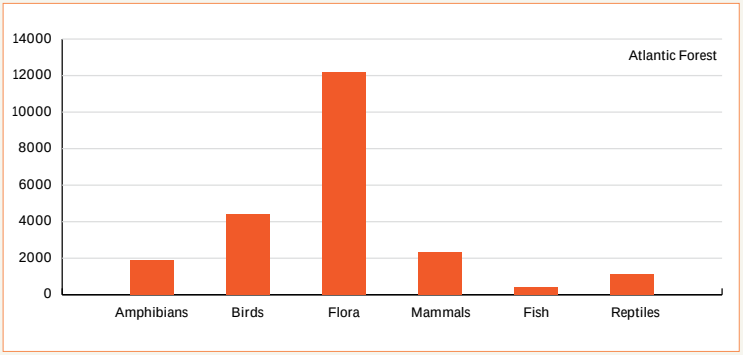


FIGURE 16: Number of species records by taxonomic group in the Atlantic Forest's PAs.



CANTAREIRA STATE PARK
WATER SPRINGS AND RARE SPECIES IN THE MIDDLE OF SÃO PAULO

Who would imagine that, inside the city of São Paulo, with all its chaos, there is a protected area housing a great variety of animals, including some species threatened with extinction? Well, this PA exists and, besides protecting a rich biodiversity, it is also essential for the capital's water supply. We are talking about the Cantareira State Park.

The park protects almost eight thousand hectares of Atlantic Forest and it is one of the largest native tropical forest remnants located inside a metropolitan area in the world. The park also shelters springs and waterways supplying São Paulo, which makes this PA essential to the quality of life of the city inhabitants.

Another enormous contribution from the Cantareira Park, created in 1963, is the protection of the rich biodiversity of the Atlantic Forest. Studies indicate that there are at least 730 species of animals and plants living in this PA, including 89 mammals, 17 birds, 35 amphibians and 17 reptiles. Some of these species are the grey brocket deer (*Mazama guazoubira*), the coati (*Nasua nasua*) and the suçuarana (*Puma concolor*).

Many different species threatened with extinction are also on this list, such as the little spotted cat (*Leopardus tigrinus*), the tinamou (*Tinamus solitarius*) and the white-necked hawk (*Amadonastur lacernulatus*). It is also worth mentioning the 569 species of important and vulnerable plants such as the imbuya (*Ocotea porosa*) and the blackleg (*Ocotea catharinensis*).

And the most impressive, is that all of this is located in the northern region of the city of São Paulo, only 10 km in a straight line from the city center. The park has four visiting sites: Pedra Grande, Águas Claras, Engordador and Cabuçu. All of them offer visitants many trails for walks and mountain biking, with short, long, steep and flat courses for all tastes.

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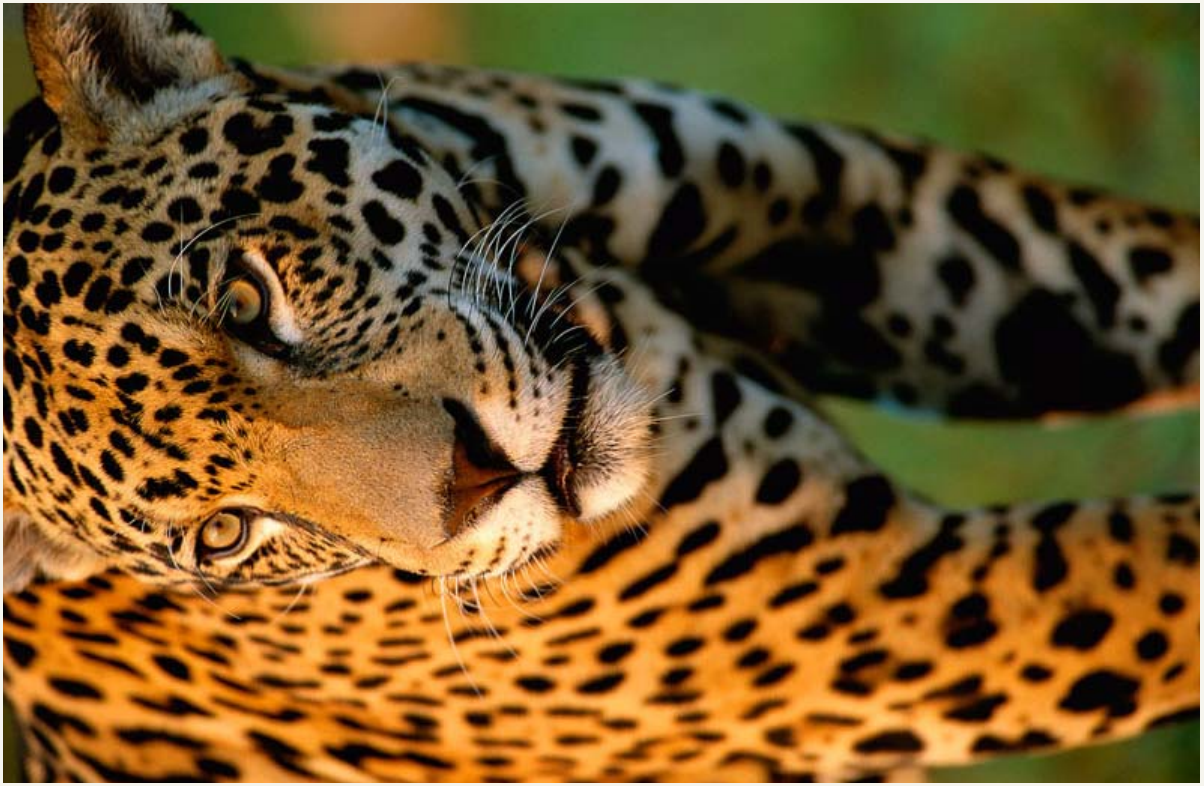


PAMPA

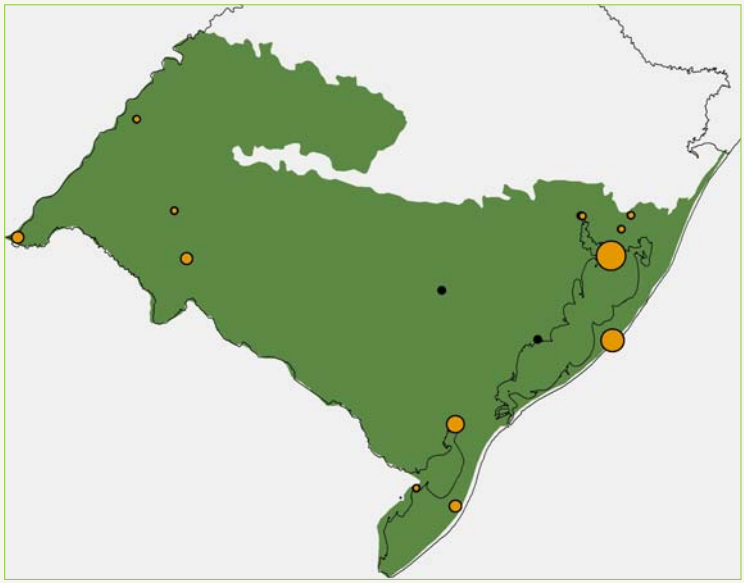
Of the 15 protected areas in the Pampa listed in the Observatory, 12 have some information on biodiversity.

© Daniel Loebmann

Two PAs have more than 100 records on fauna and/or flora species. The majority of information on biodiversity in the Pampa comes from parks. The PAs with the greatest number of records are Itapuã State PArk (411 species) and the Lagoa do Peixe National Park (186 species).

There are seven records of six species of birds, mammals and reptiles threatened with extinction in the Pampa's PAs. The majority of the records are of birds (four records, of four species) and mammals (five records, of one species).

FIGURE 17: Protected areas in the Pampas, classified by the number of species (orange circles). Black circles represent PAs without species records in the Observatory.



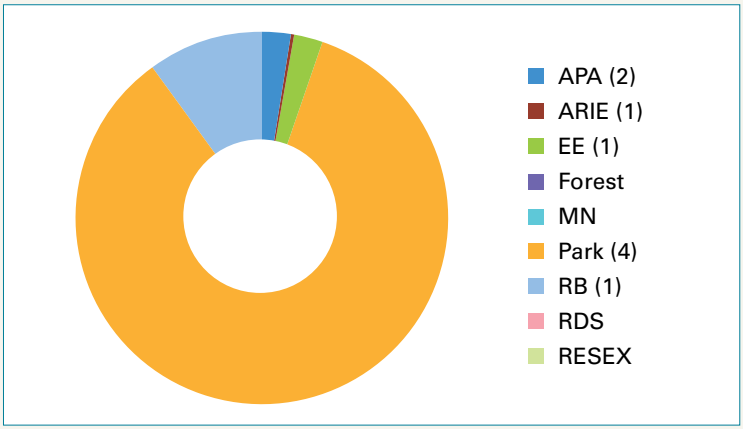
Number of species records

- 1 - 3
- 4 - 26
- 27 - 73
- 74 - 186
- 187 - 411

TABLE 9: Number of species records in the Pampas by PA category and taxonomic groups.

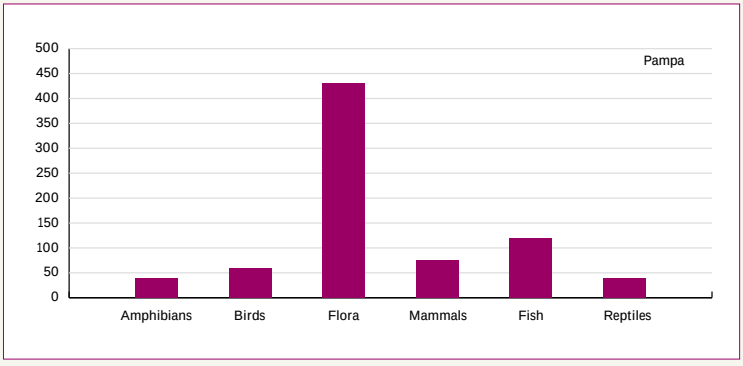
Category	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
APA (2)	0	0	1	0	26	0	27
ARIE (1)	0	2	0	0	0	0	2
EE (1)	8	7	3	1	0	4	23
Park (4)	36	41	369	58	76	37	617
RVS (1)	0	2	0	0	0	0	2
RB (1)	0	3	61	13	0	1	78

FIGURE 18: Number of species records in the Pampas by PA category.



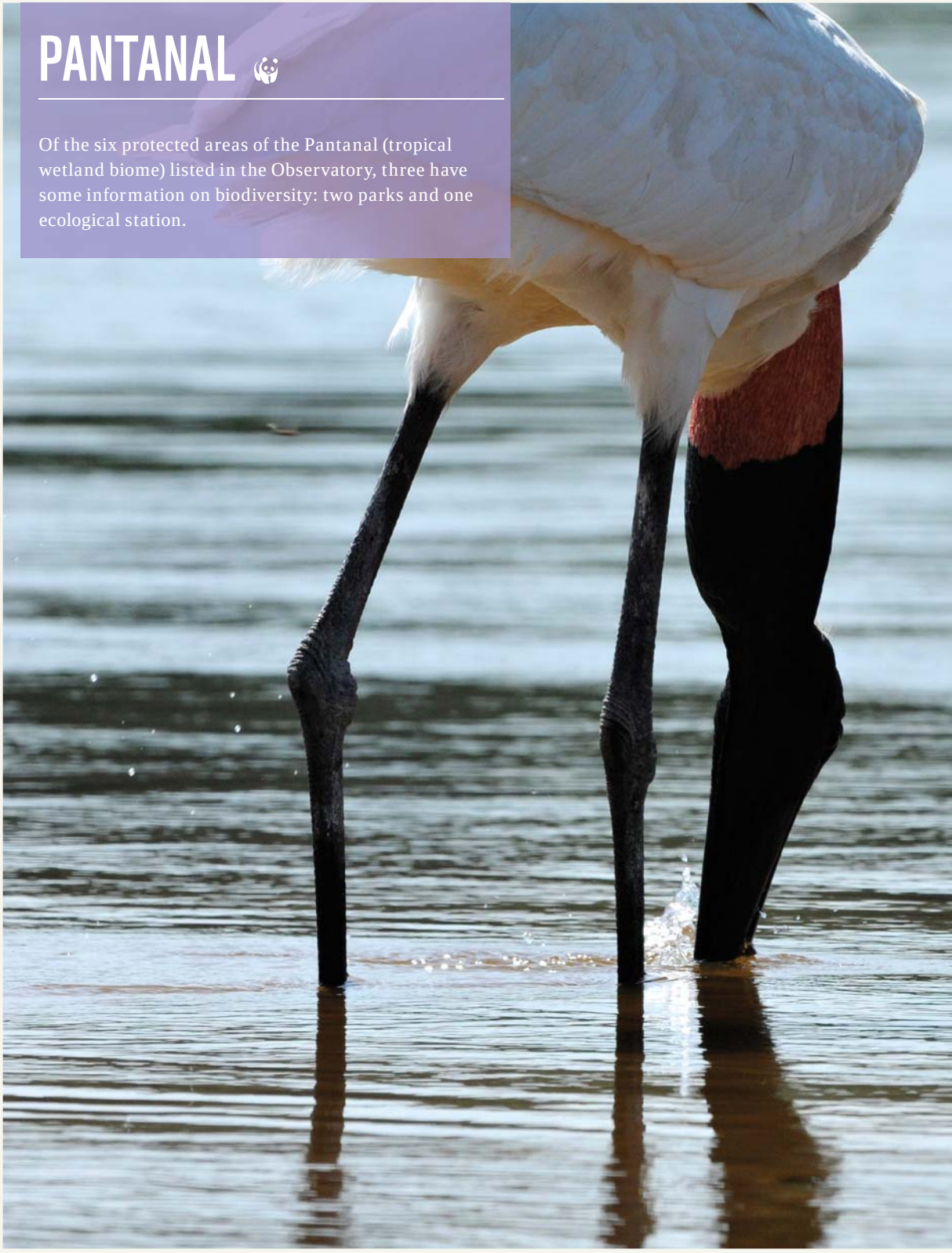
7 RECORDS OF SIX SPECIES OF BIRDS, MAMMALS AND REPTILES THREATENED WITH EXTINCTION IN THE PAMPA'S PAS.

FIGURE 19: Number of species records by taxonomic group in the Pampa's PAs.



PANTANAL

Of the six protected areas of the Pantanal (tropical wetland biome) listed in the Observatory, three have some information on biodiversity: two parks and one ecological station.

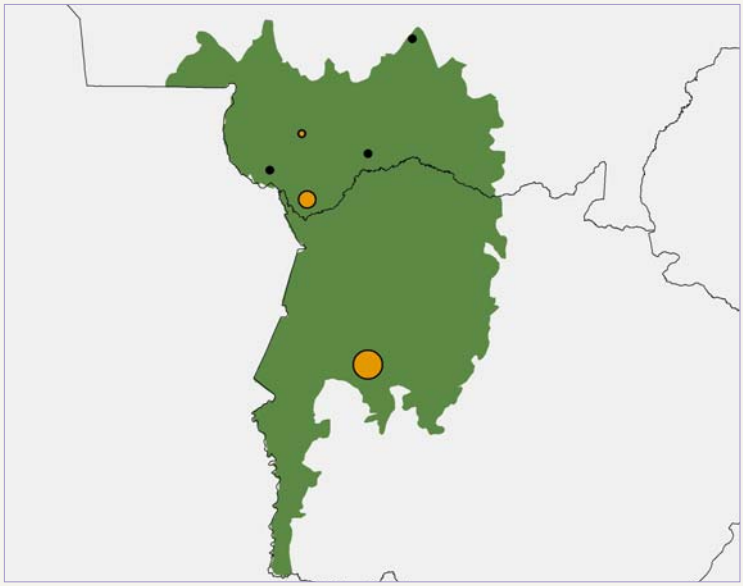


© Adriano Gambarini / WWF-Brasil

Two PAs have more than 100 records on fauna and/or flora species: the Pantanal of Rio Negro State Park (663 records) and the Pantanal Matogrossense National Park (371 records).

There are nine records of eight species of birds and mammals threatened with extinction in the Pantanal's PAs. The majority of the records are of mammals (five records, of five species) and birds (four records, of three species).

FIGURE 20: Protected areas in the Pantanal, classified by the number of species (orange circles). Black circles represent PAs without species records in the Observatory.



Number of species records

- 10
- 11 - 371
- 372 - 663

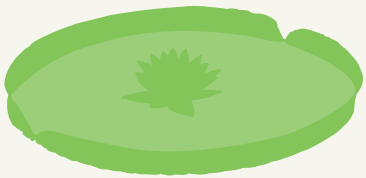


TABLE 10: Number of species records in the Pantanal by PA category and taxonomic groups.

Category	Amphibians	Birds	Flora	Mammals	Fish	Reptiles	Total
EE (1)	0	1	8	0	0	1	10
Park (2)	36	76	646	56	68	52	1.007

FIGURE 21: Number of species records in the Pantanal by PA category.

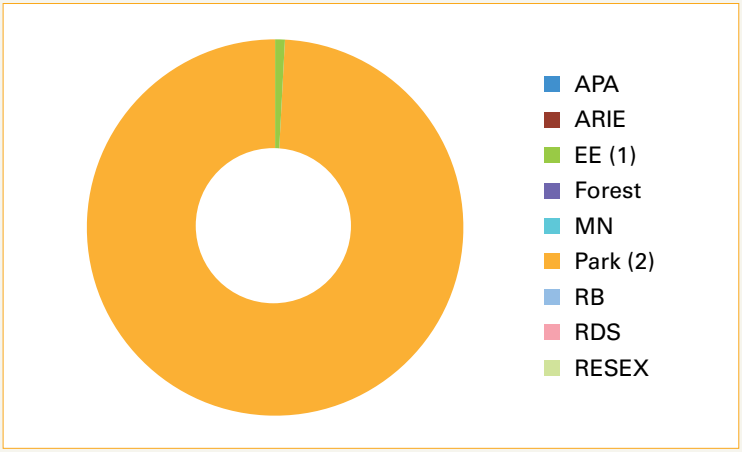
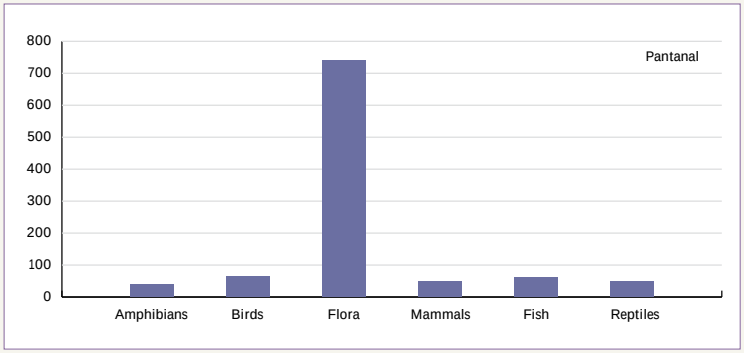


FIGURE 22: Number of species records by taxonomic group in Pantanal's PAs.



NEW SPECIES DISCOVERED FROM PROTECTED AREAS

Besides protecting our rich biodiversity and providing important environmental services, like climate regulation and sediment and nutrients retention, PAs have a fundamental role in the generation of knowledge about species of the Brazilian fauna and flora. Since the year 2000, 15 new bird species were described in Brazil, of which six had, as basis, individuals collected inside PAs. The caburé-de-Pernambuco (*Glaucidium mooreorum*) was discovered in Saltinho Biological Reserve, the papa-formiga-do-sincorá (*Formicivora grantsaui*) and the tapaculo-da-chapada-diamantina (*Scytalopus diamantinensis*) came from Chapada Diamantina National Park, the suiriri-da-chapada (*Suiriri islerorum*), from the Chapada dos Guimarães Environment Protection Area, the tapaculo-serrano (*Scytalopus petrophilus*), from the Caraça Natural Park, and the choca-do-acre (*Thamnophilus divisorius*), from the Serra do Divisor National Park.

Among amphibians and reptiles, the numbers are even more impressive: of the 211 amphibian species and of the 106 reptile species described between 2000 and 2012, 67 (or 32%) and 31 (or 29%) species, respectively, were discovered based on individuals collected in PAs. Among PA categories, parks had the highest levels of new amphibian species.

In 2008, a scientific expedition was undertaken at the Serra Geral of Tocantins Ecological Station, in the Jalapão. The group was formed by specialists from all the vertebrate groups, coming from various Brazilian institutions. During almost 40 days of studies in the region, the group of scientists registered more than 450 species, including 35 fish, 36 amphibians, 45 reptiles, 254 birds, 39 bats and 41 terrestrial mammals. Of the 450 species registered, 17 are threatened with extinction, 50 are endemic of the Cerrado and 12 were never described.

In June 2009, WWF-Brazil promoted a scientific expedition to Altamira National Forest, a protected area of 689,012 hectares in

the heart of the state of Pará, in Brazil. This part of the Amazon still guards unknown secrets, even to the most experienced researchers. The expedition discovered 11 species inside the national forest devoid of any scientific description: eight fish species, a possibly new genre of crab and two bird species. Among the new fish species, there is a catfish of the Trichomycteridae family, two fish species with striped fins of the Anostomidae family, two characids (*Characidae*) and one armored catfish (*Loricariidae*). Besides that, two unknown bird species were discovered in the area, including a type of wood creeper (*Campylorhamphus sp.*), which should be confirmed as new species still this year.

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HOW CAN THIS DATA BE USED?

The biodiversity data gathered in the Observatory of Protected Areas can be used in many ways by partners or independent users.

Gap analysis: from the species list, it is possible to undertake conservation gap analysis, and based on this, plan other new PAs and priority areas for conservation.

Management plans: data can be used in the review of management plans, can guide actions of species management, support the definition of more suitable research sites, among other actions.

Endangered species lists: the assessment of the conservation status of fauna and flora species for the elaboration of endangered species lists takes into account, among other factors, the occurrence of species inside PAs, so that less protected species tend to present a threat level higher than species with several occurrences in PAs.

Environmental licensing: this is a legal requirement that precedes the construction, installation, expansion and functioning of any large scale enterprise or activity deemed to be effectively or potentially polluting, or which may cause environmental degradation. The information available in the Observatory can help to evaluate direct and indirect impacts of ventures located close to PAs.

Research: this data can also be used to guide the development of new scientific research, assisting students and researchers in the planning and execution of studies in biodiversity, natural history, taxonomy, landscape ecology and other areas of knowledge, which will reflect in better strategies for biodiversity protection.

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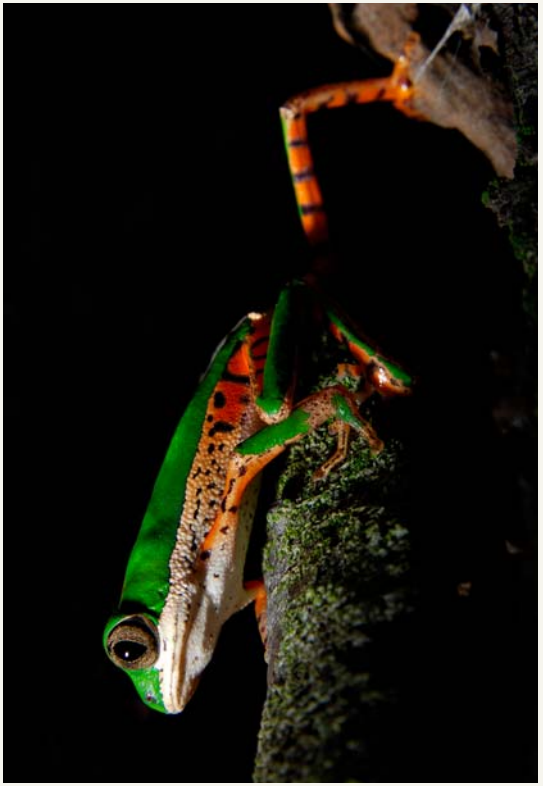

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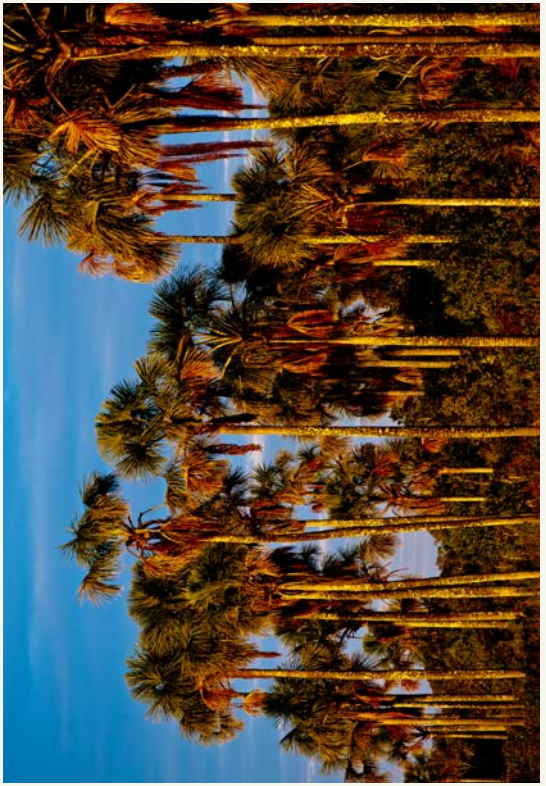

OBSERVATORY OF PROTECTED AREAS: BIODIVERISITY IN BRAZILIAN PAs

GORDON AND BETTY MOORE FOUNDATION HAVE GENEROUSLY SUPPORTED THE PREPARATION OF THIS REPORT.

GORDON AND BETTY MOORE FOUNDATION

100% RECYCLED

990

protected areas are listed in the Observatory

75,540

records of more than 17,000 species are listed in the Observatory

2,726

species were recorded in Maracá Ecological Station

417

protected areas have at least one species record in the Observatory

Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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