Distribution, diversity and conservation status of Bolivian Reptiles

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2008
Dedication

This work is dedicated to my grandparents Franz and Irene Roeder. Their support and love they shared with me throughout all my life will always be in my heart.

Widmung

Diese Arbeit widme ich meinen Großeltern Franz und Irene Roeder. Ihre Unterstuetzung und Liebe die sie mir gegeben haben werden immer einen Platz in meinem Herzen haben.
Abstract

The study area was defined as being the whole country of Bolivia. The Conservation Status of Bolivian Reptiles has been poorly investigated. Very few species had been assessed by the IUCN and very few were listed in CITES. As Bolivia still is within the countries with best conserved habitat, now is the moment to plan the conservation of its Biodiversity. This makes the present study urgent and necessary.

To be able to identify the conservation status of the reptiles of Bolivia first the species had to be identified correctly, a complete list of reptiles in Bolivia, and a most complete possible database had to be elaborated including geo-referenced data. On base of the obtained information distribution of the species had been extrapolated with the Distribution Model BIOM (Sommer et. al 2002). Later on the maps were overlaid to get different maps as species richness and endemism richness.

A new methodology for the evaluation of the Conservation status of Bolivian Reptiles was elaborated for this work. The reason for this is that there has been information which was considered by the author as essential but which are not included in the IUCN methodology and some other information required by the IUCN methodology was difficult to obtain.

A total of 269 reptile species were been evaluated for its conservation status. 211 of them are identified for the category “lower risk” (or Least Concern). This is 79% of the total species number evaluated. The results vary strongly within the different families. Boidae for example just showed one species worse than the category “Least Concern”. From the 14 Liolaemidae evaluated, just four resulted as “Least Concern”; all others from this family showed higher categories. 34 species were evaluated as “Nearly Threatened” (13 %), 9 species as “Vulnerable” (3 %), 6 as “Endangered” (2 %) and 9 species as “Critically Endangered” (3 %).

6379 datasets (264 caimans, 401 turtles, 2539 ophidians, 3175 lizards) were used to generate 268 (7 Boidae, 10 Elapidae, 4 Caïmans, 14 turtles, 13 Vipers, 114 Colubrids, 5 Leptotyphlopids, 2 Typhlopids, 99 lizards) extrapolated distribution maps, this is a medium of 24 datasets per map. Additionally 266 fragmentation maps were generated and maps of species richness, endemism and others.

For all species included in this work in addition the IUCN methodology (3.1 (2001)) was applied (see also discussion). In several cases the results varied from the results obtained by the methodology used and elaborated for this work. 255 species of the total 269 species have been evaluated as “Least Concern”, one as “Near Threatened”, three as “Vulnerable”, eight as “Endangered” and 4 as “Critically Endangered”.

Also the official IUCN Conservation status has been listed for all species. 258 species has been found as “Not Evaluated”, seven as in “Lower risk” and four as “Vulnerable”. 23 species have been found to be listed in CITES II, one species in CITES I and one species in CITES III.

Finally the obtained results were compared with two other similar studies and species richness and endemism patterns were identified. An outlook for the Conservation of Reptiles in Bolivia is given
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1. Introduction

1.1 General Introduction

The Conservation Status of Bolivian Reptiles has been poorly investigated. Very few species were assessed by the IUCN and very few were listed in CITES. The red book for the Bolivian fauna existed based partially only on basic information (Ergueta & Morales 1995). In 2004, the new red book (Flores, E. B. & Miranda, C. L. (eds.), 2003), now a yellow design, was published and showed some advances in knowledge of the Bolivian fauna.

The scarce knowledge has its origin in the basic knowledge as the list of species known for Bolivia. The most complete species list for snakes (Fugler et al. 1995) lists several species that have been misidentified. For lizards the situation is similar. None of published lists (as for example Fugler (1989) or Dirksen & De la Riva (1999)) examined in detail the specimens in the Bolivian Museums.

A new species list published by Langstroth (2006) “cleaned” the existing lizard species list for Bolivia and mentioned probable additions to the list that included species, which had not been recorded until that point for Bolivia.

Many new species of reptiles, which have been described in the recent years (e.g. Reichle & Embert (2006), Harvey (2001)), are described or already known and will be described. Also, many initial records for Bolivia let the total number of reptile species of Bolivia grow almost constantly (e.g. Embert (2005), Aparicio (2006)). The total number of reptile species listed for Bolivia in the present work is at this time slightly over 300.

The main purpose of this work is to identify the conservation status of the reptile species known for Bolivia. This required basic work as examining museum specimens, fieldwork in areas with low or even without collection data, and a great time effort for the entire work. In order to identify the conservation status of the reptiles of Bolivia, first the species had to be identified correctly, a complete list of reptiles in Bolivia had to be developed, and a database had to be elaborated, including geo-reference data, to be as complete as possible. Based on the obtained information, a distribution of all species was extrapolated with the Distribution Model BIOM (Sommer et. al 2002). Later on the maps were superimposed to get a variety of maps detailing richness of species and endemism.

1.2 Study area (modified after Reichle 2007)

The study area was defined as the whole country of Bolivia. Biodiversity does not know political frontiers. Implementation efforts for its conservation are mostly bound to political geography. This is mainly due to the different legislations in various countries, as well as different political entities dealing with the issue, and last but not least different social structures in each of them. Another reason speaking for Bolivia as study area is, that very little is known about its fauna and at the same time Bolivia’s habitat is still quite healthy. As such, early and scientific based conservation can have a very strong and positive impact.
1.3 Bolivia - General data (modified after Reichle 2007)

With a surface of 1,098,581 km² Bolivia is the fifth largest country in South America and besides Paraguay the only one landlocked. Historically, Bolivia was almost twice the size but it lost territory to all the neighboring countries (Argentina, Brazil, Chile, Paraguay and Peru). Probably the worst losses were after the war with Chile in the late 19th century and when in 1904 the Bolivian Parliament signed a peace treaty, which defined the borders of the country anew, prohibit access to the Pacific Ocean. Since then, and especially in the last years, the lost sea access has been a controversial issue between the two countries and a mayor problem for the Bolivian economy. Only recently Bolivia is reopening official political relations with Chile.

Bolivia does count on enormous not renewable natural resources such as petroleum and gas, as well as gold, silver and other minerals. In addition it harbors enormous renewable natural resources, being one the 13 megadiverse countries in the world and having the world’s largest certified managed natural forests with just over 2 million hectares (BOLFOR 2004).

Currently Bolivia is composed of nine divisions (= departamentos), the Santa Cruz division being the largest (table 2.1.a) and La Paz division the most populated. The population is mostly concentrated in big cities. Santa Cruz de la Sierra with 1,166,000 is the largest one, followed by La Paz with 781,000 inhabitants (INE 2003).

<table>
<thead>
<tr>
<th>Division</th>
<th>Surface (km²)</th>
<th>Population</th>
<th>Mayor Cities</th>
<th>Provinces / Dep.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuquisaca</td>
<td>51.524</td>
<td>531.522</td>
<td>Sucre</td>
<td>10</td>
</tr>
<tr>
<td>La Paz</td>
<td>133.985</td>
<td>2,350,466</td>
<td>La Paz, El Alto</td>
<td>20</td>
</tr>
<tr>
<td>Cochabamba</td>
<td>55.631</td>
<td>1,455,711</td>
<td>Cochabamba</td>
<td>16</td>
</tr>
<tr>
<td>Oruro</td>
<td>53.588</td>
<td>391,870</td>
<td>Oruro</td>
<td>16</td>
</tr>
<tr>
<td>Potosi</td>
<td>118.218</td>
<td>709,013</td>
<td>Potosi</td>
<td>16</td>
</tr>
<tr>
<td>Tarija</td>
<td>37.623</td>
<td>391.226</td>
<td>Tarija</td>
<td>6</td>
</tr>
<tr>
<td>Santa Cruz</td>
<td>370.621</td>
<td>2,029,471</td>
<td>Santa Cruz de la Sierra</td>
<td>15</td>
</tr>
<tr>
<td>Beni</td>
<td>213.564</td>
<td>362.521</td>
<td>Trinidad</td>
<td>8</td>
</tr>
<tr>
<td>Pando</td>
<td>63.827</td>
<td>52.525</td>
<td>Cobija</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1: Bolivian departments, surfaces, population and mayor cities (based on INE (2003))

After the decentralization law in 1995, more political power has been given to the current 315 municipal governments. Since then some important decisions for conservation are taking place there. In addition, the Divisional Prefectures have recently strengthened Conservation work and efforts, especially in the lowlands.

1.4 Ecoregiones (modified after Reichle 2007)

Following Ibisch et al. (2003) Bolivia consists of 12 eco-regions, some of which are divided into sub ecoregions (see table 2).
<table>
<thead>
<tr>
<th>Eco-region</th>
<th>Sub-eco-region(s)</th>
<th>Surface (km²)</th>
<th>Current conservation status</th>
</tr>
</thead>
<tbody>
<tr>
<td>South West Amazon forests</td>
<td>Flooded Amazon Forests</td>
<td>63,588</td>
<td>This is one of the best-conserved eco-regions. Especially in the Pando Division the human impact is still very low. The more south you go the higher is the impact, especially in the Beni and Santa Cruz Amazon Forest sub ecoregions.</td>
</tr>
<tr>
<td></td>
<td>Sub-Andean Amazon Forests</td>
<td>23,529</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-Andean Amazon Forests</td>
<td>58,308</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pando Amazon Forests</td>
<td>71,217</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Beni and Santa Cruz Amazon Forests</td>
<td>59,905</td>
<td></td>
</tr>
<tr>
<td>Cerrado</td>
<td>Cerrado of La Paz</td>
<td>9,837</td>
<td>Cerrado eco-regions in general are used for cattle ranching. The most extensive use does not have too strong of an impact on the conservation status of this ecoregion. Frequent Fires caused by human influence have much higher impact.</td>
</tr>
<tr>
<td></td>
<td>Cerrado of Beni</td>
<td>27,171</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cerrado of the Chiquitano Region</td>
<td>23,491</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cerrado of the Chaco Region</td>
<td>24,468</td>
<td></td>
</tr>
<tr>
<td>Flooded savannas</td>
<td>Moxos Plains Flooded Savannas</td>
<td>94,660</td>
<td>The flooded savannas are also used for cattle ranching, but mostly in a dispersed way. There is no strong impact on this eco-region.</td>
</tr>
<tr>
<td></td>
<td>Pantanal Flooded Savannas</td>
<td>33,328</td>
<td></td>
</tr>
<tr>
<td>Chiquitano Dry Forest</td>
<td>-</td>
<td>101,769</td>
<td>This eco-region in general is used for cattle ranching. The mostly sporadic use does not have to strong of an impact on the conservation status of this ecoregion. Frequent Fires caused by human influence have much higher impact.</td>
</tr>
<tr>
<td>Gran Chaco</td>
<td>-</td>
<td>105,006</td>
<td>This eco-region in general is used for cattle ranching. The mostly sporadic use does not have to strong of an impact on the conservation status of this ecoregion. Frequent Fires caused by human influence have much higher impact.</td>
</tr>
<tr>
<td>Yungas</td>
<td>-</td>
<td>55,556</td>
<td>This important eco-region</td>
</tr>
</tbody>
</table>
suffers partially strong human influence, mostly deforestation for different kinds of plantation, for example bananas or the coca plant. The precipice deforestation has strong impact on soil as it causes very fast erosion and loss of soil quality.

<table>
<thead>
<tr>
<th>Ecoregion</th>
<th>Surface</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tucuman Bolivian Forest</td>
<td>29,386</td>
<td>Until now the Tucuman forest has not been impacted in the same manner as the Yungas.</td>
</tr>
<tr>
<td>Montane Chaco</td>
<td>23,176</td>
<td></td>
</tr>
<tr>
<td>Interandean Dry Forest</td>
<td>44,805</td>
<td>The Interandean dry forest is the eco-region with the strongest human impact. Excellent soil quality was the cause for high population densities and strong deforestation. Little of this very valuable habitat is left.</td>
</tr>
<tr>
<td>Prepuna</td>
<td>8,516</td>
<td>A historically strongly impacted habitat is mostly altered. Its original Polylepis forests have been reduced to very few relicts and reforestation efforts use alien species including Pines or Eucalyptus.</td>
</tr>
<tr>
<td>Northern Puna</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humid Puna</td>
<td>8,869</td>
<td>A historically strong impacted habitat, mostly altered and very densely populated.</td>
</tr>
<tr>
<td>Semi-humid Puna</td>
<td>67,600</td>
<td></td>
</tr>
<tr>
<td>High-Andean Vegetation of the</td>
<td>8,137</td>
<td></td>
</tr>
<tr>
<td>Cordillera Oriental above and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>below the snowline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Puna</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Puna</td>
<td>35,973</td>
<td>A historically strong impacted habitat, mostly altered.</td>
</tr>
<tr>
<td>Desert Puna</td>
<td>100,204</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2:** Bolivian Ecoregions

The Ecoregion and sub-Ecoregion definitions and surfaces follow Ibisch et al. (2003). The values for the current conservation status are estimates by the present author and partially taken from Reichle (2007).
Figure 1 Ecoregions of Bolivia
1.5 Political and legal framework of Biodiversity Conservation in Bolivia (modified after Reichle 2007)

Throughout the years Bolivia has been developing its legislation toward the environment, renewable, and non-renewable natural resources. Efforts have been systematic since 1992, when the environmental law was passed. So far no law directly protects biodiversity, but there are sector laws, which include regulations on the matter.

The executive power on conservation and biodiversity issues are united under the Vice Ministry of sustainable development and environment, which is part of the Ministry of sustainable development and strategy. Two entities, the “Direccion General de Biodiversidad”- General Biodiversity Direction, DGB and the “Servicio Nacional de Areas Protegidas” – National Service of Protected Areas, SERNAP are in charge of the implementation of existing legal regulations and administration of biodiversity inside (SERNAP) and outside (DGB) protected areas.

1.6 Protected Areas (modified after Reichle 2007)

At present the SERNAP includes 21 protected areas in different categories (see table 2.3.1a and Fig. 2.2.a). Additionally several protected areas with Departmental or Municipal character (see Vides & Reichle 2003). Some of them are contemplating remarkable extensions and functioning implementations (for example the Municipal Reserve of Roboré “Valle de Tucavaca” with more than 240.000 hectares). However, in most of the Departmental and Municipal areas no real implementation does exist so far.

The following table shows the protected Bolivian areas included in the SERNAP (for areas created before 2001, categories and surfaces follow SERNAP 2001, areas created later are based on the official creation documents (“decretos supremos”). Eco-regions are based on figure 1 and therefore Ibisch et al. 2003, functionality based on estimations, experience and interviews with key persons by Reichle (2007), such as investigators, protected area personal, administrators etc.)

<table>
<thead>
<tr>
<th>Protected Area</th>
<th>Category</th>
<th>Surface (in hectares)</th>
<th>Ecoregions or sub ecoregions included</th>
<th>Grade of functionality and protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parque Nacional Sajama</td>
<td>National Park</td>
<td>100.230</td>
<td>- Desert Puna</td>
<td>Generally good</td>
</tr>
<tr>
<td>Parque Nacional Tunari</td>
<td>National Park</td>
<td>300.000</td>
<td>- Semihumid Puna - Yungas</td>
<td>Not well protected, the protection body only covers a sector of the southern part of the Park.</td>
</tr>
<tr>
<td>Parque Nacional y Territorio Indigena ISIBORO-SECURE</td>
<td>National Park + Indigenous Territory</td>
<td>1.236.296</td>
<td>- Moxos Plains flooded savannas - Pre Andean Forests - Sub Andean Forests - Yungas</td>
<td>Several areas with protection problems, i.e. currently a road is projected to cross the area</td>
</tr>
<tr>
<td>National Park Name</td>
<td>Type of Protection</td>
<td>Area (ha)</td>
<td>Vegetation Types</td>
<td>Conservation Status</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>-----------</td>
<td>------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| Parque Nacional NOEL KEMPFF MERCADO | National Park | 1,523,446 | - Beni y Santa Cruz Amazon Forests  
- Cerrado of the Chiquitano region  
- Moxos Plains flooded savannas  
- Some small portions of the Chiquitano Dry Forest in the southern part. | Well protected and functional. Some minor problems with fishing and turtle hunting at the river borders |
| Parque Nacional TOROTORO | National Park | 16,570 | - Interandean Dry Forests | Not very well protected |
| Parque Nacional CARRASCO | National Park | 622,600 | - Pre Andean Forests  
- Sub Andean Forests  
- Yungas | Some areas suffer from illegal invasions and coca growing, increased pressure by locals to reduce the area |
| Parque Nacional y Área Natural de Manejo Integrado AMBORO | National Park and ANMI | 637,600 | - Pre Andean Forests  
- Sub Andean Forests  
- Yungas | Especially some of the higher parts suffer from illegal settlements. The ANMIA part is not well protected. Most of the Amazonian forests of the Andean foothills (pre Andean + Sub Andean forests) within the ANMIA are deforested or at least largely fragmented. |
| Parque Nacional y Área Natural de Manejo Integrado COTAPATA | National Park and ANMI | 40,000 | - Yungas  
- High-Andean Vegetation of the Cordillera Oriental | Protection does exist but is not very functional in some areas |
| Parque Nacional y Área Natural de Manejo Integrado MADIDI | National Park and ANMI | 1,895,750 | - Yungas  
- Interandean Dry Valleys  
- Sub-Andean Amazon forests  
- Cerrado of La Paz | Protection in the National Park seems functional, protection in the ANMIA in some areas is insufficient |
<p>| Parque Nacional y Área Natural de Manejo Integrado KAA-IYA DEL | National Park and ANMI | 3,441,115 | - Gran Chaco | Overall very well protected. |</p>
<table>
<thead>
<tr>
<th><strong>GRAN CHACO</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| Parque Nacional y Área Natural de Manejo Integrado OTUQUIS | National Park and ANMI | 1.005.950 | - Pantanal flooded savannas  
- Chiquitano Dry Forest  
- Cerrado of the Chaco region  
Recently the management plan of the area has been completed and several park rangers were hired. Nevertheless hunting and illegal logging are still a mayor problem within the area. In the northern part due to pressure from the Puerto Suarez area, in the southern part due to incursions from Paraguay. |
| Parque Nacional y Area Natural de Manejo Integrado SERRANIA DE AGUARAGÜE | National Park and ANMI | 108.307 | - Tucumane Bolivian Forests  
- Montane Chaco  
Recently declared area. Currently co-administrated by the Municipalities of Villamontes and Yacuiba. Real protection is not in place. |
| Reserva Nacional de Fauna Andina EDUARDO AVAROA | | 714.745 | - Desert Puna  
Relatively well protected, but problems with tourism and illegal extraction of fire material. |
| Reserva Nacional Vida Silvestre Amazónica MANURIPÍ-HEATH | | 747.000 | - Pando Amazon Forests  
Huge problems with hunting especially during the Brazil Nut season. |
| Reserva Nacional de Flora y Fauna TARIQUÍA | | 246.870 | - Tucumane Bolivian Forests  
- Montane Chaco  
Problems with illegal timber extraction and over fishing in some places. Also cattle overgrazing in some parts. |
| Reserva Biológica de la Cordillera de SAMA | | 108.500 | - Semihumid Puna  
- Tucuman Bolivian Forests  
A lot of people living in the area, natural original forests are rather badly conserved. |
<p>| Área Natural de Manejo | | 483.743 | - High-Andean Vegetation of the Many people living in some parts of the area, |</p>
<table>
<thead>
<tr>
<th>Integrado Nacional APOLOBAMBA</th>
<th>Cordillera Oriental - Yungas</th>
<th>problems with habitat loss and natural resource use. Generally though big parts of the area in good conservation conditions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserva de la Biosfera Estación Biológica del Beni</td>
<td>135.000</td>
<td>- Pre Andean Amazon Forests Due to the presence of several native communities strong hunting pressures within almost the whole area.</td>
</tr>
<tr>
<td>Reserva de la Biosfera y Territorio Indígena Pilón Lajas</td>
<td>400.000</td>
<td>- Sub-Andean Amazon Forests - Yungas Relatively well managed. Formerly huge problems with timber extractions but currently rather well protected. Hunting is allowed for native communities within the area.</td>
</tr>
<tr>
<td>Area Natural de Manejo Integrado El Palmar</td>
<td>59.484</td>
<td>- Interandean Dry Forests -Tucuman Bolivian Forests</td>
</tr>
<tr>
<td>Area Natural de Manejo Integrado San Matías</td>
<td>2.918.500</td>
<td>- Pantanal flooded savannas - Cerrado of the Chiquitano region - Chiquitano Dry Forest The area does not count on a management plan, protection is rather low and hunting, illegal timber extraction and deforestation are common. There are also several legally established timber concessions in the southern area of San Matías.</td>
</tr>
<tr>
<td>TOTAL SURFACE</td>
<td>16.741.707</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 Bolivian Protected Areas (Reichle 2007)
1.7 Identification of the conservation status

Fine and coarse scale filters:
Approaches to identify the Conservation status of reptiles are made on a fine scale and a coarse scale. The fine scale approach is on species level. This is where basic work like taxonomic work, describing new species, new records for the country, complete species lists, good information about distribution, and others become extremely important. The fine filter is at the same time the basis for the coarse filter.

Coarse scale approaches for conservation of reptiles are several quantitative methods as identification of hotspots of biodiversity (Myers 1988, 1990; Dobson et al. 1997), identification of indicator and surrogate species (Curnutt et al. 1994), development of rarity and complementary sets (Williams et al. 1996), gap analysis (Scott & Csuti 1996), identification of key Ecoregions (Olson & Dinerstein 1998), and cost-minimizing or land-value analysis (Ando et al. 1998).

Once a complete list of reptiles in Bolivia has been developed, distribution maps have been calculated, and the conservation status for all species has been identified, the coarse filter can identify hot spots of diversity, endemism, and vulnerability. Based on that further evaluation priority areas for conservation work can be proposed.

Gap Analysis:
Gap analysis is an integrative method that links distributional information with information on land use and protection to identify priorities for conservation action (Scoot et al. 1996). Normally a GAP analysis includes more than one group of animals or plants. Here a very basic pure “reptile GAP” analysis is presented, which will be compared with recently published works, as the one on the conservation status of Bolivian amphibians (Reichle 2007) or the GAP analysis for several groups of animals and plants in Bolivia by Naraujo et al. (2007). Krohn (1996) states that the success of such programs and approaches depend critically on the quality of distributional data. This is why extrapolated distributions are used in the present approach.

This work does not include complementarity studies or policy-based algorithms as proposed by Faith et al. (2003). Proposed areas are areas with a high value for conservation work, because of high species richness, endemism, presence of endangered species or other factors. The applicability, viability, and policy to conserve these areas will be a task for decision makers.
2. Methodology

2.1 Abbreviations

ANMI: Area Natural con Manejo Integrado
ANSP: Academy of Natural Sciences - Natural History Museum in Philadelphia
AOO: Area of Occurrence

BIOM: BIOclimatic Model for the extrapolation of species ranges and diversity patterns
B.M.N.H.: British Museum of Natural History
BOLFOR: Bolivia Forestal

CBF: Colección Bolivian de Fauna – Bolivian Collection of Fauna
CITES: Convención sobre el comercio internacional de especies amenazadas de fauna y flora silvestres – Convention on international Trade in Endangered Species of Wild Fauna and Flora
C-Value: endemism richness

DGB: Dirección General de Biodiversidad- General Biodiversity Direction

EBB: Estación Biológica del Beni
EDC: Estado de Conservación (Conservation Status)
EOO: Extend of Occurrence

FAN: Fundación Amigos de la Naturaleza
FMNH: Field Museum of Natural History

GIS: Geographical Information System

INE: Instituto Nacional de Estadística - National Statistics Institute
IUCN: International Union for the Conservation of Nature

LACM: Natural History Museum of Los Angeles County

MACN: Museo Argentino de Ciencias Naturales
MBUCV: Museo de Biología de la Universidad Central de Venezuela
MCP: Minimum convex polygon
MCSNG: Museo Civico di Storia Naturale, Genova
MNHN: Muzeum national d'Histoire naturelle France
MNKR: Museo Noel Kempff Mercado, Bolivia, Reptiles
MPEG: Museo Paraense Emilio Goeldi
MSNM: Museo Civico di Storia Naturale, Milan, Italy

NE: Not Evaluated
NGO: Non Governmental Organization
NKM: Parque Nacional Noel Kempff Mercado
NKR: Museo de Historia Natural Noel Kempff Mercado-Reptiles
2.2 Museum and taxonomic work

Reptile specimens in the collections of Santa Cruz, Cochabamba, Cobija and parts of the La Paz collection (all Bolivia) were examined and identified. Most of the Bolivian specimens in the collections of Bonn, Munich, and Berlin (Germany) were examined and identified.

Ventral count methodology in colubrid snakes follows Dowling (1951) and for further comparisons the sequence of standard characters for Xendodontine snakes used by Zaher (1996) was adopted. For Elapid and Viperid snakes I followed the very recent revision of these genera by Harvey et al. (2004 and 2006).

For lizard species, except Amphisbaenids, characters given in Avila-Pires (1995) were used and for Amphisbaenids different descriptions by Gans (1962, 1964a, 1971, 1972). Abbreviations used are TTL (total length); TL (tail length); HL (head length, measured from tip of the snout to furthest edge of posterior-most supralabial); HW (head width, measured at angle of jaw); and ED (eye diameter, measured horizontally at is midpoint). All measurements except for TTL, TL, HL and HW were made to the nearest 0.1 mm using a caliper held under a dissecting microscope. Sex was determined by observation of anatomical structure at the base of the tail through a small ventral incision. Furthermore, the stomach and oviduct was examined by opening it with a scalpel.
A complete database was elaborated including the following information: Identification Number, Coordinates in Degrees (e.g. 19°13′22″S 64°18′12″W), Genus, Species, Subspecies, Department, Province, Locality, Museum-Field Number, Museum, Source (e.g. citation, pers. com. etc). Additionally for the extrapolation of the distribution of the species the following data was given codified: global distribution, frost tolerance, distribution in water or not, forest or not.

The database contains data from examined specimens (Museums, own collections), reliable Literature Data, data from personal communications and own data obtained in several field trips.

### 2.3 Fieldwork

Important sites for fieldwork were identified by the elaboration of a map of collection points (see Figure 2). As a first step, on this map gaps of collection points were identified as a higher priority for fieldwork. These sites were examined for their uniqueness, status of knowledge of the general habitat, accessibility, and probable diversity and endemism. Based on this data, sites for fieldwork were chosen.

Normally the collection activity included manual search during night and day. No unified transects were used. The average search time for each field day was about 8 to 10 man-hours. Additionally to manual search, pitfall traps were used. The standard was a number between 4 and 8 traps placed in different areas and habitats. Each trap consisted of three 20L buckets, connected by a 1m high transparent plastic fence. The total length of a trap was 30m, 10m between each bucket.

### 2.4 Preparation of voucher specimens

Once collected, amphibian specimens were photographed and notes on their life-coloration were taken. The specimens were then killed with a super-dose of an analgesic. After death the specimens were prepared using 10% formaldehyde solutions in a plastic tray and positioned. Additionally a 10% formaldehyde solution was injected into their body cavity. Normally specimens were fixed in the tray for at least 12 hours. After fixation took place a tag with a field number (DE- number-year) was attached to every specimen. For each number collection data such as date, climate, exact location, and life-coloration were noted in a field book. Then the specimens were put into plastic jars with 75% ethanol solutions.
Map of collection localities of Bolivian Reptiles

Figure 2 Map of collection localities of Reptiles in Bolivia
2.5 Extrapolation of ranges (after Nowicki et al. 2004 & Nowicki 2004)

Based on abiotic parameters and localities were recorded, a computer-based model (BIOM = BIOclimatic Model for the extrapolation of species ranges and diversity patterns (Nowicki et al. 2004, Sommer et al. 2003)) was used to calculate the optimal conditions for each species. Using a 2 arc min. grid as the minimum resolution for analysis (approximately 3.6 x 3.6 kilometers), BIOM then compares the values obtained from the optimal habitats with the parameters present in the remaining cells and calculates the aptitude as a habitat, assigning values of similarity to each cell. The abiotic parameters used are temperature, precipitation (on a log rhythmic scale), and aridity (comp. Rafiqpoor et al. 2003). Following Liebig’s law of the minimum – which can be interpreted as that the lack of a single essential factor determines the presence or absence of a species even if all remaining essential elements are favorable – a simple but efficient algorithm calculates the minimum parameter that expresses similarity to the optimum habitat and the aptitude of the cells as a possible habitat (see Hill & Binford 2002). A Gaussian algorithm is applied to evaluate the similarities of the ecological characteristics of the cells. The result of this calculation is the potential range of the species, which can be illustrated by using a Geographical Information System (GIS).

In addition, the distribution of species also depends on historical-evolutionary factors. This means that a species that is young in terms of evolution probably has not had the same opportunity to disperse as extensively as a species that has existed for centuries. As an indicator of the evolutionary history of a species, the distance between its farthest recorded points is used to restrict the space of the potential range, assuming that the probability of the presence of a species diminishes with the increase in the distance between its recorded points (see Müller et al. 2003).

As abiotic and historical data are not the only ones to determine distribution ranges, structural parameters are also taken into account. The selected parameters, forest, water cover (including seasonal flooding) and frost were assigned for each taxon or automatically be evaluated by the program itself. Thus, due to the specific habitat requirements, the range of the taxon is being diminished by the species’ ecogram and leads to a more realistic extrapolation of the taxons’ range.

In order to establish distribution maps for each species, a critical limit of habitat similarity needed to be defined to be able to use the maps further for diversity analysis. This limit, due to the personal knowledge of the species, was seen to be most reliable at 33% habitat similarity. Therefore, every distribution map shown in the result chapter is based on a habitat similarity of 33%.

As a second step, the program calculates the diversity patterns (number of species/taxa) and the endemism richness (= C-Value; Kier & Barthlott 2001), by overlapping the distributional ranges of the species to be analyzed (see Fig. 3). Endemism richness is a value that combines diversity with the degree of endemism, and illustrates the contribution of a specific location to the general diversity of the area studied. For technical reasons the usually very small C-Value is raised artificially by BIOM multiplied by 1,000.
2.6 Elaboration of maps

Distribution
The distribution maps were elaborated on base of the database and were extrapolated with the distribution model “BIOM”. To express the results of the extrapolation, different versions of ArcView were used (Arc View 3.2 and ArcGis 9.x).

Fragmentation
Using values between 1 (best) and 5 (worst) the extrapolated distribution maps were intersected by using the Program ArcGis with a map of the conservation status of the habitat (EDC). Pending on the defined sensibility of a species (values between 1 [very sensible] and 5 [advantage]) all habitats worse than the defined sensibility were cut out.

National park occurrence
To check the occurrence of the species in National parks, the extrapolated distribution was intersected with a layer of the national park limits.

Diversity
For the elaboration of species-richness maps, the extrapolated distributions of all species (or a group of species) were overlaid and species-richness was expressed in different colors.

Endemism-richness or C-Value
Endemism richness is a value that combines diversity with the degree of endemism, and illustrates the contribution of a specific location to the general diversity of the area studied. For
technical reasons, the usually very small C-Value is raised artificially by BIOM, multiplying it by 1,000.

2.7 Identification of conservation status of species (Fine filter)

**Sensibility**

Based on field experience, literature data, and distribution patterns the sensibility of each species has been identified. The sensibility of a species is here defined as its tolerance for habitat change. Here counts, in general: the more specialized (habitat, food, radiation etc.) the more sensible, and species specialized in forest habitats are more sensible than species specialized in savanna habitats.

Sensibility is given as
- Very sensible EDC 1
- Sensible EDC 1+2
- Tolerant EDC 1+2+3+4
- Advantage EDC 1+2+3+4+5

This means, that for a species identified as very sensible only the habitat in the best condition (conservation status), EDC1, was regarded as a suitable habitat. This normally resulted in a reduction of the extrapolated habitat because much of the habitat was in a worse condition. For a sensible species EDC 1 and 2 was used and so on. After overlaying the distribution map over the EDC map a filter was used to sort out all grid cells worse than the given sensibility. This resulted in the “real “ distribution and showed possible fragmentations of habitats.

**Distribution value**

This value can somewhat be compared with the “extent of occurrence” used by the IUCN (see also discussion). Maps produced, consisted of grid cells with 3,6 km length or 12,96 km². The first value are the grid cells occupied by the species in the fragmentation map (grid cell value), the second value, the one in parenthesis, is the grid cell value expressed in square kilometers (km²), and the third value is the value given for the calculation of the conservation status.

\[
\begin{align*}
<7 (<100\text{km}^2) &= 13 \\
<38 (<500\text{km}^2) &= 10 \\
<385 (<5000\text{km}^2) &= 5 \\
<1543 (<20,000\text{km}^2) &= 2 \\
>1543 (>20,000\text{km}^2) &= 0
\end{align*}
\]

Example: A species which occupies less than 38 grid cells on the fragmentation map, occupies less than 500km² and will receive a distribution value of 10.

**Fragmentation**

Fragmentation is mostly directly connected with habitat loss, except that this loss separates only partial or complete populations or habitats used by the species. A gap of at least 3,6 km (1 grid cell) was considered as only “some fragmentation”, bigger gaps were considered as strong or very strong fragmentation. This is depending on how big the gap, how many fragments are left or produced by the gaps, and how big these are.
NONE: 0

No Fragmentation of habitat. All suitable habitats are connected. Simple reduction of habitat size is not considered as fragmentation, as this value is regarded in the distribution value.

Example:

![Example Map of NO FRAGMENTATION](image)

**Figure 4** Example Map of NO FRAGMENTATION
SOME: 1
Some fragmentation is considered as habitats separated by small gaps, mainly caused by highways and their side effects. A gap of at least 7.2 km (2 grid cell) was considered as some fragmentation.
Example:

Figure 5 Example Map of SOME FRAGMENTATION

STRONG: 5
Wider gaps (at least 10.8 km [3 grid cells] separating habitat in two or more fragments was considered as strong fragmentation. Also fragmentation habitat in several small fragments only seperated by a narrow gap was considered as strong fragmentation.
Example:

Figure 6 Example Map of STRONG FRAGMENTATION
VERY STRONG: 12
A habitat was considered as very strong fragmented when gaps were very wide (at least 36km [5 grid cells] and if the habitat was seriously fragmented in several gaps, including narrower gaps. Example:

![Figure 7 Example Map of VERY STRONG FRAGMENTATION](image)

**Distribution in good National parks**
Sufficient distribution in protected areas (sufficient was defined as the minimum habitat size defined by the IUCN) should have a positive effect on the conservation status for the species. At least the population/s distributed within the limits are supposed to be protected from most threats.

NONE: not within National Park borders or just within borders of parks (<8 grid cells) = 3
LOW: with a maximum of 39 grid cells (= 500km²) within park borders = 2
STRONG: with more than 39 grid cells = 1
VERY STRONG: with at least 387 grid cells or at least 50% of distribution = 0

**Use**
The use of species as pets, for alimentation or other purposes is one of the best-known threats, also used by the IUCN. Additionally, the use of a species’ notoriety was considered. If a species is killed occasionally because it is considered as venomous (false and real coral snakes and vipers) it is considered to underlie “some” use. Finally, simple killing off the individual has the same effect as the use of it.

Most populations of species overused = 15
Just few populations overused or most populations strongly used but not overused = 10
Species little used and never overused, killed occasionally for meat or because of notoriety (e.g. venomous or believed to be) = 2
No use or sustainable use = 0
Status of conservation of the Reptiles of Bolivia

Rarity
very common: commonly found, at least 10 specimens known in Bolivia = 0
normal: normal findings, less than 10 specimens = 1
rare: 5 or less specimens or just known from one locality = 3
very rare: just known from types (and having been described at least 5 years ago) or not being found for at least 10 years = 8

Conservation category
To evaluate the conservation category the sum from the above-mentioned values was calculated. Pending on the resulting sum the conservation status was given.

>21 Critically endangered
17-21 Endangered
11-16 Vulnerable
6-10 Near threatened
0-5 Least concern

2.8 Data Sheets

Map Quality: High confidence
Map Quality gives the subjective opinion of the author about the quality of the extrapolation. It is given as High confidence, Medium confidence or Low confidence. Bad results of the extrapolation are mostly a problem of scarce input data.

Global distribution: Endemic for Bolivia (Beni, Cochabamba, La Paz, Santa Cruz)
Gives the global distribution of the species. If it is endemic for Bolivia it is said so. In parenthesis are given the Departments in Bolivia the species appear. It is important to say that many Departments are included in the Distribution because of the extrapolation of the distribution, yet they may still lack an assortment of species.

Taxonomic status: OK
Gives short information about the taxonomic situation of the species. If the species status is confident it is given as OK. If the species status is uncertain or if it is believed to be a species complex it is given as UNCERTAIN. This leads automatically to a Conservation Category, which is at least: NEAR THREATENED (see also discussion).

Sensibility for habitat alteration: SENSIBLE
This gives the sensibility of a species towards habitat alteration. This is very important to calculate the distribution Value and Fragmentation. Values given are: VERY SENSIBLE, SENSIBLE, TOLERANT, ADVANTAGE.

Distribution Value: 6726
Distr. Total = 8836; EDC 1 = 4421; EDC 2 = 1634; EDC 3 = 1301; EDC 4 = 1087; EDC 5 = 393
This gives several values of the extrapolated distribution in numbers of grid cells. Given is the Distribution Total including all grid cells in all 5 categories of Status of Conservation of the
Habitat (EDC). EDC 1 to 5 gives the grid cells in the different conservation categories of the habitat. One represents the best-conserved habitat, 5 the worst. The underlined number in bold is the calculated “real” distribution (see chapter 2.6).

**Fragmentation: SOME**

Some Fragmentation by strong habitat alteration near Santa Cruz, in the Chapare region, and by highways.

For the calculation of the Fragmentation of a habitat, an intersection between the extrapolated distribution of every species and the EDC map was realized. All habitats worse than the defined sensibility were removed.

**Distribution in good National parks: VERY STRONG**

1843 grid cells in Parks: Amboró, Carrasco, Cavernas del Repechón, EBB, Isiboro Sécure, Pilón Lajas

For the calculation of the Distribution in National parks, an intersection between the extrapolated distribution of every species and the map showing the limits of the 22 protected areas in Bolivia was realized. All grid cells, occupied by the species and lying within protected area limits were calculated for that value.

**Use: NONE**

No use known

The use of a species includes the use as a pet, as food, use of different parts of the body for various purposes, collecting the species for selling on local, national, and international markets, superstition, and notoriety of a species, which may influence reactions when encountered.

**Conservation status IUCN: LC**

The results of using the given data on the IUCN methodology are shown here. It has to be clear that the results may be subjective and are not the official results given by the IUCN.

**Official IUCN Conservation Status: NE**

This is the official Conservation status given by the IUCN. For most species it is NE (not evaluated).

### 2.9 Coarse scale filters

#### 2.9.1 Species richness maps

This simply marks the species-richest areas overlaying the extrapolated distribution of all species or groups of species (e.g. turtles). The base for this is the most complete database of species occurring in the country and very good information about their distribution. As the second detail normally is difficult in countries with scarce collection data, a distribution extrapolation model, BIOM, was used to predict the possible distribution of a species. With this method very good results for the distribution of species within Bolivia were reached as long as there were at least 3 collection points.
2.9.2 Endemism richness maps

The program BIOM calculated the endemism-richness (= C-Value; Kier & Barthlott 2001) by overlapping the distributional ranges of the “to be analyzed species”. Endemism-richness is a value that combines diversity with the degree of endemism and illustrates the contribution of a specific location to the general diversity of the area studied. For technical reasons, the usually very small C-Value is raised artificially by BIOM, multiplying it by 1,000.

2.9.3 Hot spots of Vulnerability

Shows the concentration of all species, which were identified at least as vulnerable. This means that a hot spot of vulnerability hosts several threatened species and gives a high conservation value to the area.

2.9.4 Reptile specific GAP-Analysis

A basic GAP Analysis was applied for the reptiles. Maps of Species-richness, Endemism, and hot spots of vulnerability were compared with the Map of protected areas of Bolivia. This way, areas were identified that were species and endemism-rich, that were having conservation problems, and that were without any protected area coverage.
3. Results

3.1 Species List of Bolivian Reptiles (303 species included)

Clase REPTILIA
Subclase ANAPSIDA

Orden TESTUDINES

Suborden PLEURODIRA

Familia CHELIDAE

Acanthochelys macrocephala
Acanthochelys pallidipectoris
Chelus fimbriatus
Phrynops geoffroanus
Phrynops gibbus
Phrynops nasutus
Phrynops raniceps
Phrynops vanderhaegei
Platemys platycephala

Familia KINOSTERNIDAE

Kinosternon scorpioides

Familia PODOCNEMIDIDAE

Podocnemis expansa
Podocnemis unifilis

Familia TESTUDINIDAE

Geochelone carbonaria
Geochelone chilensis
Geochelone denticulata
Subclase ARCHOSAURIA

Orden CROCODYLIA

Familia ALLIGATORIDAE

*Caiman latirostris*
*Caiman yacare*
*Melanosuchus niger*
*Paleosuchus palpebrosus*
*Paleosuchus trigonatus*

Subclase LEPIDOSAURIA

Orden SQUAMATA

Suborden IGUANIA

Infraorden PLEURODONTES

Familia HOPLOCERCIDAE

*Enyalioides palpebralis*
*Hoplocercus spinosus*

Familia IGUANIDAE

*Iguana iguana*

Familia POLYCHRIDAE

*Dactyloa punctata*
*Dactyloa transversalis*
*Norops fuscoauratus*
*Norops meridionalis*
*Norops nitens*
*Norops ortonii*
*Norops scapularis*
*Polychrus acutirostris*
*Polychrus liogaster*
*Urostrophus gallardoi*

Familia TROPIDURIDAE

*Stenocercus aculeatus*
*Stenocercus aff. crassicaudatus*
Stenocercus caducus
Stenocercus marmoratus
Stenocercus prionotus
Stenocercus roseiventris
Tropidurus callathelys
Tropidurus chromatops
Tropidurus etheridgei
Tropidurus melanopleurus
Tropidurus oreadicus
Tropidurus plica
Tropidurus spinulosus
Tropidurus torquatus
Tropidurus umbra
Tropidurus xanthochilus
Uranoscodon superciliosus

Familia LIOLAEMIDAE

Liolaemus alticolor
Liolaemus chacoensis
Liolaemus chaltin
Liolaemus cranwelli
Liolaemus dorbignyi
Liolaemus erguetae
Liolaemus fittkaui
Liolaemus forsteri
Liolaemus islugensis
Liolaemus jamesi
Liolaemus orientalis
Liolaemus ornatus
Liolaemus pantherinus
Liolaemus puna
Liolaemus schmidtii
Liolaemus signifer
Liolaemus stolzmanni
Liolaemus variegatus
Liolaemus sp. nov. boulengeri group

Suborden SCLEROGLOSSA

Infraorden GEKKOTA

Familia GEKKONIDAE

Coleodactylus amazonicus
Gonatodes hasemani
Gonatodes humeralis
Hemidactylus mabouia
Homonota dorbignyi
Homonota fasciata
Lygodactylus wetzeli
Phyllopezus pollicaris
Thecadactylus rapicauda

Infraorden AUTARCHOGLOSSA

Familia GYMNOPTALMIDAE

Alopoglossus angulatus
Ptychoglossus brevifrontalis
Arthrosaura kockii
Arthrosaura reticulata
Bachia dorbignyi
Bachia trisanale
Cercosaura argula
Cercosaura eigenmanni
Cercosaura manicata
Cercosaura ocellata
Cercosaura parkeri
Cercosaura schreibersi
Iphisa elegans
Micrablepharus maximiliani
Opipeuter xestus
Potamites ecpleopus
Potamites ocellatus
Proctopus bolivianus
Proctopus guentheri
Vanzosaura rubricauda

Familia TEIIDAE

Ameiva ameiva
Ameiva vittata
Cnemidophorus sp. ex gr. lacertoides
Cnemidophorus sp. ex gr. ocellifer
Dracaena paraguayensis
Kentropyx altamazonica
Kentropyx calcarata
Kentropyx paulensis
Kentropyx pelviceps
Kentropyx sp nov
Kentropyx vanzoi
Kentropyx viridistriga
Teius cyanogaster
Teius teyou
Tupinambis merianae
Tupinambis rufescens
Tupinambis teguixin

Familia SCINCIDAE

Mabuya cochabambae
Mabuya dorsivittata
Mabuya frenata
Mabuya guaporicola
Mabuya nigropalmata
Mabuya nigropunctata

Familia ANGUIDAE

Diploglossus fasciatus
Ophiodes intermedius
Ophiodes sp. nov.

Infraorden AMPHISBAENIA

Familia AMPHISBAENIDAE

Amphisbaena alba
Amphisbaena angustifrons
Amphisbaena bolivica
Amphisbaena camura
Amphisbaena cegei
Amphisbaena darwini
Amphisbaena fuliginosa
Amphisbaena silvestrii
Amphisbaena slateri
Amphisbaena vermicularis
Anops kingi
Cercolophia borelli
Cercolophia steindachneri
Leposternon microcephalum

Infraorden SERPENTES

Familia LEPTOTYPHLOPIDAE

Leptotyphlops albifrons
Leptotyphlops albipuncta
Leptotyphlops melanotermus
Leptotyphlops septemstriatus
Leptotyphlops striatula
Leptotyphlops undecimstriatus
Leptotyphlops unguirostris

**Familia TYPHLOPIDAE**

*Typhlops brongersmianus*
*Typhlops reticulatus*

**Familia ANILIIDAE**

*Anilius scytale*

**Familia BOIDAE**

*Boa constrictor*
*Corallus caninus*
*Corallus hortulanus*
*Epicrates cenchria*
*Eunectes beniensis*
*Eunectes murinus*
*Eunectes notaeus*

**Familia ELAPIDAE**

*Micrurus annellatus*
*Micrurus diana*
*Micrurus hemprichii*
*Micrurus lemniscatus*
*Micrurus narducci*
*Micrurus obscurus*
*Micrurus pyrrhocryptus*
*Micrurus serranus*
*Micrurus spixii*
*Micrurus surinamensis*

**Familia COLUBRIDAE**

*Apostolepis ambinigra*
*Apostolepis breviceps*
*Apostolepis dorbignyi*
*Apostolepis multicincta*
*Apostolepis nigroterminata*
*Apostolepis phillipsi*
*Apostolepis quinquelineata (complex)*
*Apostolepis tenuis*
*Apostolepis vittata*
*Atractus balzani*
*Atractus bocki*
Atractus boettgeri
Atractus latifrons
Atractus major
Atractus snethlageae
Atractus taeniatus
Boiruna maculata
Chironius exoletus
Chironius flavolineatus
Chironius fuscus
Chironius laurenti
Chironius monticola
Chironius multiventer
Chironius quadricarinatus
Chironius scurrulus
Clelia bicolor
Clelia clelia
Clelia langeri
Dendrophidion dendrophis
Dipsas catesbyi
Dipsas chaparensis
Dipsas indica
Dipsas pavonina
Dipsas variegata
Drepanoides anomalus
Drymarchon corais
Drymobius rhombifer
Drymoluber dichrous
Echinanthera brevirostris
Echinanthera occipitalis
Echinanthera sp. nov.
Erythrolamprus aesculapii
Erythrolamprus sp.
Helicops angulatus
Helicops leopardinus
Helicops polylepis
Hydrodynastes gigas
Hydrops triangularis
Imantodes cenchoa
Imantodes lentiferus
Leptodeira annulata
Leptophis ahaetulla
Liophis almadensis
Liophis andinus
Liophis anomalus
Liophis breviceps
Liophis ceii
Liophis cobellus
Liophis dilepis
Liophis flavifrenatus
Liophis guentheri
Liophis jaegeri
Liophis meridionalis
Liophis miliaris
Liophis poecilogyrus
Liophis reginae
Liophis sagittifer
Liophis steinbachi
Liophis taeniurus
Liophis typhlus
Lystrophis pulcher
Lystrophis semicinctus
Mastigodryas bifossatus
Mastigodryas boddaerti
Oxybelis aeneus
Oxybelis fulgidus
Oxyrhopus formosus
Oxyrhopus guibei
Oxyrhopus melanogenys
Oxyrhopus petola
Oxyrhopus rhombifer
Oxyrhopus sp. nov.
Oxyrhopus trigeminus
Phalotris lemniscatus
Phalotris tricolor
Philodryas aestiva
Philodryas baroni
Philodryas boliviana
Philodryas mattogrossensis
Philodryas olfersii
Philodryas patagoniensis
Philodryas psammophidea
Philodryas varia
Philodryas viridissima
Phimophis guerini
Phimophis vittatus
Pseudoboa coronata
Pseudoboa nigra
Pseudoeryx plicatilis
Pseustes poecilonotus
Pseustes sulphureus
Psomophis genimaculatus
Psomophis obtusus
Rhinobothryum lentiginosum
Sibynomorphus lavillai
Sibynomorphus turgidus
Siphlophis cervinus
Siphlophis compressus
Spilotes pullatus
Tachymenis attenuata
Tachymenis elongata
Tachymenis peruviana
Tachymenis tarmensis
Tantilla melanocephala
Tantilla sp. nov.
Thamnodynastes chaquensis
Thamnodynastes pallidus
Thamnodynastes sp.
Tomodon orestes
Waglerophis merremi
Xenodon neuwiedi
Xenodon rabdocephalus
Xenodon severus
Xenopholis scalaris
Xenoxybelis argenteus

Familia VIPERIDAE

Bothriopsis bilineata
Bothriopsis oligolepis
Bothriopsis taeniata
Bothrocophias hyoprora
Bothrocophias microptalmus
Bothrops andianus
Bothrops atrox
Bothrops jonathani
Bothrops matogrossensis
Bothrops moojeni
Bothrops sanctae crucis
Crotalus durissus
Lachesis muta
3.2 Species Accounts

**TURTLES**

*Figure 8 Geochelone denticulata*

*Figure 9 Kinosternon scorpioides*

*Figure 10 Phrynops vanderhaegei*

*Figure 11 Platemys platycephala*
3.2.1 Chelidae

*Acanthochelys macrocephala* (RHODIN, MITTERMEIER & MC MORRIS)

**Figure 12 Extrapolated Distribution of Acanthochelys macrocephala**

**Figure 13 Fragmentation of Habitat of Acanthochelys macrocephala**

**Map Quality:** High confidence

**Global distribution:** Brazil, Paraguay, Argentina, Bolivia (Beni, Chuquisaca, La Paz, Pando, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 34902: 0

Distr. Total = 40427; EDC 1 = 26579; EDC 2 = 8323 EDC 3 = 3352; EDC 4 = 1673; EDC 5 = 500

**Fragmentation:** SOME: 1

Some fragmentation by habitat destruction near Santa Cruz and by highways.

**Distribution in good National parks:** VERY STRONG: 0


**Use:** SOME: 2

**Rarity:** VERY COMMON: 0

0+1+0+2+0 = 1

**Conservation status:** Least concern
Conservation status IUCN: **Least concern**  
Official IUCN Conservation Status: LR/nt ver 2.3 (1994)  
Comments: Type locality: Rio Paraguay, Mato Grosso, Brazil (16° 03'S, 57° 43'W). Holotype: NMW 1293

*Acanthochelys pallidipectoris* (Freiberg)

**Map Quality:** High confidence  
**Global distribution:** Argentina, Paraguay, Bolivia (Chuquisaca, Santa Cruz, Tarija)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** SENSIBLE  
**Distribution Value:** 1453: 2  
Distr. Total = 1599; EDC 1 = 959; EDC 2 = 494; EDC 3 = 97; EDC 4 = 49; EDC 5 = 0  
**Fragmentation:** NONE: 0  
**Distribution in good National parks:** SOME: 2  
31 grid cells in Parks: Aguarague  
**Use:** SOME: 2  
**Rarity:** RARE: 3

\[2+0+2+2+3 = 9\]

**Conservation status:** Near threatened

Conservation status IUCN: **Least concern**  
Official IUCN Conservation Status: VU A1c, D1 ver. 2.3 (1994)  
Comments: Holotype: MACN 1731. Terra typica: Pres. Roque Saenz Peña, Chaco, Argentina
**Chelus fimbriatus** (FERMIN)

**Map Quality:** High confidence

**Global distribution:** Peru, Ecuador, Colombia, Venezuela, Guyana, French Guiana, Surinam, Brazil, Trinidad, Bolivia (Beni, Cochabamba?, La Paz, Pando, Santa Cruz)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 18131: 0

Distr. Total = 20962; EDC 1 = 13067; EDC 2 = 5064; EDC 3 = 2146; EDC 4 = 498; EDC 5 = 187

**Fragmentation:** SOME: 1

Some fragmentation by highways.

**Distribution in good National parks:** VERY STRONG: 0

2681 grid cells in Parks: Apolobamba, Cotapata, Isiboro Sécure, Itènez, Madidi, Manuripi-Heath, NKM, Pilón Lajas

**Use:** NONE: 0

**Rarity:** VERY COMMON: 0

0+1+0+0+0 = 1

**Conservation status:** Least concern

**Conservation status IUCN:** Least concern

**Official IUCN Conservation Status:** NE

**Comments:** Terra typica: Uprouague and Remire Island, French Guiana
*Phrynops geoffroanus* (SCHWEIGER)

**Map Quality**: Medium confidence
Isolated distribution in southeastern and southern Bolivia is doubtful but possible as the species is known from Paraguay, Argentina and Brazil.

**Global distribution**: Venezuela, Colombia, Ecuador, Peru, Brazil, Paraguay, Argentina, Guyana, Bolivia (Beni, Chuquisaca?, Cochabamba, La Paz, Pando, Santa Cruz, Tarija?)

**Taxonomic status**: OK

**Sensibility for habitat alteration**: SENSIBLE

**Distribution Value**: 31536: 0
Distr. Total = 38379; EDC 1 = 23563; EDC 2 = 7973; EDC 3 = 4159; EDC 4 = 2007; EDC 5 = 677

**Fragmentation**: SOME: 1
Some fragmentation by strong habitat destruction near Santa Cruz and the Chapare region and by highways.

**Distribution in good National parks**: VERY STRONG: 0
7039 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñao, Isiboro Sécure, Iténez, Madidi, Manuripí-Heath, NKM, Pilón Lajas, San Matías, Tucavaca, Tariquía

**Use**: SOME: 2

**Rarity**: VERY COMMON: 0

0+1+0+2+0 = 1
**Conservation status: Least concern**

Conservation status IUCN: [Least concern](#)

Official IUCN Conservation Status: [NE](#)

**Phrynops gibbus** *(SCHWEIGGER)*

![Figure 20 Extrapolated Distribution of Phrynops gibbus](image1)

![Figure 21 Fragmentation of Habitat of Phrynops gibbus](image2)

**Map Quality:** Medium confidence

Isolated distribution in southern Bolivia is doubtful but does not alter the results. If it is true it would propose also distribution in northern Argentina.

**Global distribution:** Peru, Ecuador, Colombia, Venezuela, Trinidad, Guyana, Surinam, Paraguay, Brazil, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)

**Taxonomic status:** [OK](#)

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 40706: 0

Distr. Total = 48995; EDC 1 = 30962; EDC 2 = 9744; EDC 3 = 4787; EDC 4 = 2627; EDC 5 = 875

**Fragmentation:** SOME: 1

Some fragmentation by strong habitat destruction near Santa Cruz, Trinidad, Rurrenabaque and the Chapare region and by highways.

**Distribution in good National parks:** VERY STRONG: 0


**Use:** SOME: 2
Rarity: RARE: 3
0+1+0+2+3 = 6

Conservation status: Near Threatened

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: "Patria ignota (= locality unknown); Designated as "Amerique meridionale" (= South America) by Dumeril & Dumeril 1851: 20. Restricted to near "Cayenne, Guyane francaise" by Bour & Pauler 1987: 7. Holotype: MNHN 8756

*Phrynops nasutus* (SCHWEIGGER)

Map Quality: High confidence
Global distribution: Colombia, Peru, Brazil, Guyana, French Guiana, Surinam, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 26367: 0
Distr. Total = 32077; EDC 1 = 19229; EDC 2 = 7138; EDC 3 = 3723; EDC 4 = 1479; EDC 5 = 508
Fragmentation: SOME: 1
Some fragmentation by strong habitat destruction near Santa Cruz, Trinidad, Rurrenabaque and the Chapare region and by highways.

**Distribution in good National parks: VERY STRONG: 0**

4904 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure, Iténez, Madidi, Manuripi-Heath, Pilón Lajas

**Use:** SOME: 2

**Rarity:** NORMAL: 1

\[0+1+0+2+1 = 4\]

**Conservation status: Least concern**

**Conservation status IUCN:** Least concern

**Official IUCN Conservation Status:** NE

**Comments:** *Phrynops nasutus wermuthi* has been given species status (*Phrynops raniceps*, *Phrynops wermuthi*) by Iverson (1992) and others.

**Phrynops raniceps** (GRAY)

Figure 24 Extrapolated Distribution of *Phrynops raniceps*

Figure 25 Fragmentation of Habitat of *Phrynops raniceps*

**Map Quality:** Medium confidence

**Global distribution:** Colombia, Peru, Brazil, Venezuela, Bolivia (Beni, Cochabamba, La Paz, Pando)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value: 4085: 0**
Distr. Total = 5423; EDC 1 = 2822; EDC 2 = 1263; EDC 3 = 811; EDC 4 = 393; EDC 5 = 134

**Fragmentation: SOME: 1**
Some fragmentation by highways and habitat destruction near Trinidad and Rurrenabaque

**Distribution in good National parks: VERY STRONG: 0**
722 grid cells in Parks: Apolobamba, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilón Lajas

**Use: SOME: 2**

**Rarity: RARE: 3**

0+1+0+2+3 = 6

**Conservation status: Near Threatened**

**Conservation status IUCN: Least concern**

**Official IUCN Conservation Status: NE**

**Platemys platycephala** *(SCHNEIDER)*

**Map Quality:** High confidence

**Global distribution:** Venezuela, Guyana, French Guiana, Surinam, Ecuador, Peru, Colombia, Brazil, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE
Distribution Value: 9864: 0
Distr. Total = 12259; EDC 1 = 7771; EDC 2 = 2093; EDC 3 = 1419; EDC 4 = 733; EDC 5 = 243

Fragmentation: SOME: 1
Some fragmentation by strong habitat destruction in the Chapare region and near Trinidad and by highways.

Distribution in good National parks: VERY STRONG: 0
2763 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilón Lajas

Use: NONE: 0
Rarity: VERY COMMON: 0

0+1+0+0+0 = 1

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: "Ost-Indien" (in error); restricted to "Cayenne, French Guiana" by Ernst (1983).

3.2.2 Kinosternidae

*Kinosternon scorpioides* (Linnaeus)

Figure 28 Extrapolated Distribution of *Kinosternon scorpioides*

Figure 29 Fragmentation of Habitat of *Kinosternon scorpioides*
Map Quality: Medium confidence
Global distribution: Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Brazil, Argentina, Paraguay, Peru, Trinidad, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 30327: 0
Distr. Total = 34967; EDC 1 = 23483; EDC 2 = 6844; EDC 3 = 2667; EDC 4 = 1513; EDC 5 = 460
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0
Use: NONE: 0
Rarity: VERY COMMON: 0
0+0+0+0+0 = 0

Conservation status: Least Concern
Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Surinam
3.2.3 Podocnemididae

*Podocnemis expansa* (SCHWEIGER)

**Figure 30 Extrapolated Distribution of *Podocnemis expansa***

**Figure 31 Fragmentation of Habitat of *Podocnemis expansa***

**Map Quality:** High confidence

**Global distribution:** Guyana, Venezuela, Peru, Colombia, Venezuela, Brazil, Trinidad, Bolivia (Beni, La Paz?, Pando)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 13758: 0

Distr. Total = 15916; EDC 1 = 9410; EDC 2 = 4348; EDC 3 = 1836; EDC 4 = 283; EDC 5 = 39

**Fragmentation:** NONE: 0

**Distribution in good National parks:** VERY STRONG: 0

2191 grid cells in Parks: Apolobamba, Cotapata, Isiboro Sécure, Itènez, Madidi, Manuripi-Heath, NKM, Pilón Lajas

**Use:** SOME: 2

**Rarity:** RARE: 3

0+0+0+2+3 = 5

**Conservation status:** Least concern

**Conservation status IUCN:** least concern

**Official IUCN Conservation Status:** LR/cd ver. 2.3 (1994)

*Podocnemis unifilis* TROSCHEL IN SCHOMBURGK

**Map Quality:** High confidence
**Global distribution:** Guyana, French Guiana, Venezuela, and Colombia, Trinidad ?, Tobago ?, Colombia, Ecuador, Peru, Venezuela, Brazil, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)
**Taxonomic status:** OK
**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 29313: 0
Distr. Total = 35653; EDC 1 = 21802; EDC 2 = 7511; EDC 3 = 3975; EDC 4 = 1755; EDC 5 = 610
**Fragmentation:** SOME: 1
Some fragmentation by strong habitat destruction near Santa Cruz, Trinidad, Rurrenabaque and the Chapare region and by highways.
**Distribution in good National parks:** VERY STRONG: 0
5980 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñao, Isiboro Sécure, Itènez, Madidi, Manuripi-Heath, NKM, Pilón Lajas
**Use:** SOME: 2
Rarity: VERY COMMON: 0

0+1+0+2+0 = 3

**Conservation status: Least concern**

Conservation status IUCN: **Least concern**
Official IUCN Conservation Status: [VU A1acd ver. 2.3 (1994)]

**Comments:** CITES Appendix II. "Terra typica: "Rupununi und Takutu" rivers, Guyana. Mittermeier and Wilson (1974) and Wermuth and Mertens (1977:121) believe *Emys cayennensis* Schweigger 1812 may be an older name applicable to this species. Holotype: ZMB 142, now lost (fide King & Burke (1989))" (Uetz 2005).

### 3.2.4 Testudinidae

**Geochelone carbonaria** *(SPIX)*

![Extrapolated Distribution of Geochelone carbonaria](image1)

![Fragmentation of Habitat of Geochelone carbonaria](image2)

**Map Quality:** Medium confidence
It is not probable that the species enters the inter Andean valleys as extrapolated north of La Paz.

**Global distribution:** Panama, Colombia, Venezuela, Guyana, French Guiana, Surinam, Brazil, Peru, Paraguay, Argentina, Trinidad, Virgin Islands, Nicaragua, Bolivia (Beni, Chuquisaca, Cochabamba?, La Paz, Pando, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 39542: 0
Distr. Total = 46795; EDC 1 = 29883; EDC 2 = 9659; EDC 3 = 4362; EDC 4 = 2231; EDC 5 = 660

**Fragmentation:** SOME: 1
Some fragmentation by strong habitat destruction near Santa Cruz, Trinidad, Rurrenabaque and by highways.

**Distribution in good National parks:** VERY STRONG: 0

**Use:** SOME: 2
Species collected occasionally for its meat

**Rarity:** VERY COMMON: 0

0+1+0+2+0 = 3

**Conservation status:** Least concern

**Conservation status IUCN:** Least concern

**Official IUCN Conservation Status:** VU A1cd+2cd ver 2.3 (1994)

**Comments:** CITES Appendix II. Terra typica: "Habitat sub cognomine "Capitary" (?) ad flumen Amazonum," South America (cited in King & Burke (1989)). Types: Originally in ZSM, now lost; Hoogmoed and Gruber (1983:354), selected as lectotype plate XVI of Spix (1824).

**Geochelone chilensis** (GRAY)

*Figure 36 Extrapolated Distribution of Geochelone chilensis*

*Figure 37 Fragmentation of Habitat of Geochelone chilensis*
**Map Quality:** High confidence

**Global distribution:** Paraguay, Argentina, Bolivia (Chuquisaca, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 5213: 0

Distr. Total = 5695; EDC 1 = 3830; EDC 2 = 1383; EDC 3 = 296; EDC 4 = 155; EDC 5 = 31

**Fragmentation:** NONE: 0

**Distribution in good National parks:** VERY STRONG: 0

1602 grid cells in Parks: Aguarague, Iñao, Kaa-Iya, Otuquis

**Use:** SOME: 2

Species collected occasionally for its meat

**Rarity:** VERY COMMON: 0

0+0+0+2+0 = 2

**Conservation status:** Least concern

**Conservation status IUCN:** Least concern

**Official IUCN Conservation Status:** NE

**Comments:** CITES Appendix II. Terra typica: Mendoza, "Chile", Argentina. Two Syntypes: BMNH 1947.3.5.8 and 1947.3.5.9 (both formerly BMNH 70.12.18.2).

*Geochelone denticulata* (LINNAEUS)
Map Quality: High confidence

Global distribution: Venezuela, Guyana, French Guiana, and Surinam, Brazil, Ecuador, Colombia, Peru, Trinidad, Guadeloupe, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz)

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Distribution Value: 38137: 0
Distr. Total = 45946; EDC 1 = 28799; EDC 2 = 9338; EDC 3 = 4632; EDC 4 = 2417; EDC 5 = 760

Fragmentation: SOME: 1
Some fragmentation by strong habitat destruction near Santa Cruz, Trinidad, Rurrenabaque and the Chapare region and by highways.

Distribution in good National parks: VERY STRONG: 0

Use: SOME: 2
Species collected occasionally for its meat

Rarity: VERY COMMON: 0

0+1+0+2+0 = 3

Conservation status: Least concern

Conservation status IUCN: Least concern

Official IUCN Conservation Status: NE

Caimans

**Figure 40** *Caiman yacare*

**Figure 41** *Paleosuchus palpebrosus*

**Figure 42** *Melanosuchus niger*

**Figure 43** *Melanosuchus niger, juv.*
3.2.5 Alligatoridae

*Caiman latirostris* (Daudin)

**Global distribution:** Brazil, Paraguay, Argentina, Bolivia (Beni, Santa Cruz, Tarija). The distribution in Beni was given by Medem but there is no reliable report existing (pers. comment Luis Pacheco).

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** not available

**Fragmentation:** not available

**Distribution in good National parks:** not available. It may be present in Otuquis (pers. comment Luis Pacheco).

**Use:** STRONG: 10

Principally used for its skin, but eventually also killed for its meat. Also killed because of fear. People from Chaco report the species attacking and killing pigs and other small cattle (pers. comment Luis Pacheco).

**Rarity:** RARE: 3

0+0+0+10+3 => 13

**Conservation status:** Vulnerable

The given category is its minimum category as further values (which were not included because lack of data) would probably elevate the species to a higher category.

**Conservation status IUCN:** DD

**Official IUCN Conservation Status:** NE

**Comments:** CITES Appendix I, populations. CITES Appendix II. As distribution data was not available several values have not been possible to consider. 1996 Pacheco & Aparicio considered the species as Critically endangered (“En peligro de extincion”) reason why Pacheco (1996) proposed the following actions for the species: Evaluation of populations, a special protection program, long term studies, repopulation programs. In 1998 it was considered as commercially extinct in Bolivia (King & Videz-Roca, 1989).
**Caiman yacare (DAUDIN)**

**Map Quality:** Medium confidence
The extrapolation includes higher altitudes surely not inhabited by the species (pers. comment Luis Pacheco). This reduces slightly the distribution value but has no effect on the result.

**Global distribution:** Argentina, Paraguay, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** TOLERANT

**Distribution Value:** 57070: 0
Distr. Total = 62898; EDC 1 = 39191; EDC 2 = 12252; EDC 3 = 5627; EDC 4 = 3313; EDC 5 = 2515

**Fragmentation:** SOME: 1
Some fragmentation near Santa Cruz and by Highways.

**Distribution in good National parks:** VERY STRONG: 0

**Use:** STRONG: 10
The principal use of this species is for its leather, although it is also hunted for its meat. In the years 1983 to 1988 491.00 skins were exported legally (Pacheco 1992). In 1997 a small-scale experimental harvest was carried out, and in the following years between 30,000 (1999) and 59,000 (2003) individuals were harvested (Llobet et al. 2004). Actually the hunting of the species is somewhat controlled by the state although illegal hunting still is a considerable problem for many populations of this species.

**Rarity:** VERY COMMON: 0
Conservation status: Vulnerable (only populations)

Conservation status IUCN: Least concern

Official IUCN Conservation Status: NE

Comments: CITES Appendix II. Pacheco & Aparicio (1996) do not consider this species as threatened but consider its population size reduced all over Bolivia. They propose a pilot program for sustainable use following the example of Venezuela and evolve and stabilize long term studies. A good abstract of legislation concerning this species can be found in Ergueta & de Morales (1996) and in Llobet et al. (2004). Terra typica: Pres. Roque Saenz Peña, Chaco, Argentina. Llobet et al. (2004) state that “the sustainable use of the crocodilians has proven, in many situations, to be a successful activity from the point of view of the conservation of some species and also for its habitats. According to the situation of the populations of Caiman yacare in Bolivia, a program of use of the species can be carried out in a sustainable way (....)“, but see still several problems which only could be solved by legal modifications, capacity building, improvement of the control systems and inspection mechanisms, design and implementation of a comprehensive and reliable monitoring program, and administration and management of spatially defined units.

Melanosuchus niger (SPIX)

Figure 46 Extrapolated Distribution of Melanosuchus niger

Figure 47 Fragmentation of Habitat Melanosuchus niger

Map Quality: Medium confidence
The extrapolation includes higher altitudes surely not inhabited by the species (pers. comment Luis Pacheco). This reduces slightly the distribution value but has no effect on the result.
Global distribution: Peru, Ecuador, Colombia, Venezuela, Guyana, French Guiana, Surinam, Brazil, ¿Trinidad?, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Luis Pacheco sees the species as sensible for hunting but not too sensible for other threats (pers. comment).

Distribution Value: 18131: 0

Distr. Total = 20962; EDC 1 = 13067; EDC 2 = 5064; EDC 3 = 2146; EDC 4 = 498; EDC 5 = 187

Fragmentation: SOME: 1

Strong fragmentation by habitat destruction and by highways.

Distribution in good National parks: VERY STRONG: 0

2681 grid cells in Parks: Apolobamba, Cotapata, Isiboro Sécure, Itènez, Madidi, Manuripi-Heath, NKM, Pilón Lajas

Use: STRONG: 10

Frequently hunted for its leather, but also for its meat and oil. Also this species is killed because of fear.

Rarity: NORMAL: 1

0+1+0+10+1 = 12

Conservation status: Vulnerable

Conservation status IUCN: Least concern

Official IUCN Conservation Status: LR cd ver 2.3 (1994)

Comments: CITES Appendix I, populations. CITES Appendix II. Terra typica: Uprouague and Remire Island, French Guiana. A good resume of the legislation concerning the species can be found in Ergueta & de Morales (1996).
**Paleosuchus palpebrosus** (CUVIER)

![Extrapolated Distribution of Paleosuchus palpebrosus](image1)

![Fragmentation of Habitat Paleosuchus palpebrosus](image2)

Map Quality: Medium confidence
The extrapolation includes higher altitudes surely not inhabited by the species (pers. comment Luis Pacheco). This reduces slightly the distribution value but has no effect on the result.

Global distribution: Venezuela, Colombia, Ecuador, Peru, Brazil, Paraguay, Argentina, Guyana, Bolivia (Beni, Chuquisaca?, Cochabamba, La Paz, Pando, Santa Cruz, Tarija?)

Taxonomic status: OK

Sensibility for habitat alteration: VERY SENSIBLE

Distribution Value: 31536: 0
Distr. Total = 38379; EDC 1 = 23563; EDC 2 = 7973; EDC 3 = 4159; EDC 4 = 2007; EDC 5 = 677

Fragmentation: SOME:1
Some fragmentation by strong habitat destruction near Santa Cruz and the Chapare region and by highways.

Distribution in good National parks: VERY STRONG: 0
7039 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñaó, Isiboro Sécure, Itènez, Madidi, Manuripi-Heath, NKM, Pilón Lajas, San Matías, Tucavaca, Tariquía

Use: NONE: 0
Rarity: NORMAL: 1

0+1+0+0+1 = 2
**Conservation status: Least concern**

**Conservation status IUCN:** Least concern  
**Official IUCN Conservation Status:** NE  
**Comments:** CITES Appendix II. Pacheco & Aparicio (1996) consider the fact that the species is normally found in low population numbers as a possible threat for this species. A recent study by Villaca (2004) showed that at least in comparison with *Caiman crocodilus* and *Paleosuchus trigonatus*, *P. palpebrosus* is more tolerant concerning certain forms of habitat alteration.

**Paleosuchus trigonatus** (*SCHNEIDER*)

![Figure 50 Extrapolated Distribution of Paleosuchus trigonatus](image1)  
![Figure 51 Fragmentation of Habitat Paleosuchus trigonatus](image2)

**Map Quality:** High confidence  
**Global distribution:** Peru, Ecuador, Colombia, Venezuela, Trinidad, Guyana, Surinam, Paraguay, Brazil, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** VERY SENSIBLE  
**Distribution Value:** 40706: 0  
Distr. Total = 48995; EDC 1 = 30962; EDC 2 = 9744; EDC 3 = 4787; EDC 4 = 2627; EDC 5 = 875  
**Fragmentation:** SOME: 1  
Some fragmentation by strong habitat destruction near Santa Cruz, Trinidad, Rurrenabaque and the Chapare region and by highways.  
**Distribution in good National parks:** VERY STRONG: 0
Use: NONE: 0
Rarity: RARE: 3

0+1+0+0+3 = 4

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: CITES Appendix II. Pacheco & Aparicio (1996) consider this species a not threatened in Bolivia but also as the least known caiman species in the country and propose intensive and long term studies. Terra typica: "Patria ignota (= locality unknown); Designated as "Amerique meridionale" (= South America) by Dumeril & Dumeril (1851). Restricted to near "Cayenne, Guyane francaise" by Bour & Pauler (1987). Holotype: MNHN 8756.
Lizards

3.2.6 Hoplocercidae

*Enyalioides palpebralis* (BOULENGER)

**Map Quality:** High confidence
**Global distribution:** Peru, Brazil, Bolivia (Beni, Cochabamba, La Paz, Pando)
**Taxonomic status:** OK
**Sensibility for habitat alteration:** VERY SENSIBLE
**Distribution Value:** 12623: 0
Distr. Total = 21036; EDC 1 = 12623; EDC 2 = 5063 EDC 3 = 2516; EDC 4 = 664; EDC 5 = 169
**Fragmentation:** SOME: 1
Some fragmentation by habitat destruction near Trinidad and Rurrenabaque and by highways.
**Distribution in good National parks:** VERY STRONG: 0
2841 grid cells in Parks: Apolobamba, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilon Lajas
**Use:** NONE: 0
**Rarity:** VERY COMMON: 0

0+1+0+0+0 = 1
Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Cashiboya, eastern Peru.

Hoplocercus spinosus FITZINGER

Figure 54 Extrapolated Distribution of Hoplocercus spinosus

Map Quality: High confidence
Global distribution: Brazil, Bolivia (Beni, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 6334: 0
Distr. Total = 7479; EDC 1 = 5099; EDC 2 = 1235; EDC 3 = 617; EDC 4 = 422; EDC 5 = 106
Fragmentation: SOME: 1
Some fragmentation by highways.
Distribution in good National parks: VERY STRONG: 0
1393 grid cells in Parks: NKM, San Matías?
Use: NONE: 0
Rarity: NORMAL: 1

0+1+0+0+1 = 2
Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: America and Brazil.

3.2.7 Iguanidae

Iguana iguana (LINNAEUS)

Map Quality: Medium confidence
Distribution probably not as disjunctive as extrapolated. Also probable that species occupies more habitat than actually shown.

Global distribution: USA, Mexico, Nicaragua, Guatemala, El Salvador, Honduras, Belize, Costa Rica, Panama, Colombia, Brazil, Venezuela, Guyana, Surinam, French Guiana, Peru, Paraguay, Antilles, Bolivia (Beni, La Paz, Pando, Santa Cruz)

Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE

Distribution Value: 10788: 0
Distr. Total = 12931; EDC 1 = 7084; EDC 2 = 3704; EDC 3 = 1664; EDC 4 = 376; EDC 5 = 103
Fragmentation: NONE: 0

Distribution in good National parks: VERY STRONG: 0
1560 grid cells in Parks: Amboró, Apolobamba, Cotapata, Iñao, Madidi, Manuripi-Heath, NKM, Pilon Lajas, San Matias, Tucavaca

Use: SOME: 1
Rarity: VERY COMMON: 0
0+0+0+1+0 = 1

**Conservation status: Least concern**

**Conservation status IUCN:** Least concern  
**Official IUCN Conservation Status:** NE  
**Comments:** CITES Appendix II. *Iguana Iguana* from West Indies has been observed to feed on eggs of the Cattle Egret *Bubulcus ibis* (Arendt 1986). Terra typica: "Indiis" Popular pet animal. Columbia intended to export more than 600,000 specimens alone (cited in Wüster 1998 without a time span). Syntypes: One specimen in the SMNH, another in the Gyllenborg collection in Uppsala.

### 3.2.8 Polychridae

*Dactyloa punctata* (DAUDIN)

**Map Quality:** High confidence  
**Global distribution:** Brazil, Venezuela, French Guiana (?), Suriname (?), Guyana, Peru, Ecuador, Colombia, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** SENSIBLE  
**Distribution Value:** 20605: 0  
Distr. Total = 25496; EDC 1 = 14806; EDC 2 = 5799 EDC 3 = 3174; EDC 4 = 1325; EDC 5 = 392
**Fragmentation: SOME: 1**
Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.

**Distribution in good National parks: VERY STRONG: 0**
4238 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilon Lajas

**Use: NONE: 0**

**Rarity: VERY COMMON: 0**

\[0+1+0+0+0 = 1\]

**Conservation status: Least concern**

Conservation status IUCN: **Least concern**

Official IUCN Conservation Status: **NE**

**Comments:** Terra typica: South America

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**Norops fuscoauratus** *(D’Orbignyi in Dumeril & Bibron)*

**Map Quality:** High confidence

**Global distribution:** Panama, Ecuador, Peru, Venezuela, Brazil, Colombia, Guiana, Surinam, French Guiana, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)

**Taxonomic status:** **OK**

Sensibility for habitat alteration: **SENSIBLE**
**Distribution Value: 22371: 0**
Distr. Total = 27933; EDC 1 = 16152; EDC 2 = 6219 EDC 3 = 3478; EDC 4 = 1594; EDC 5 = 490

**Fragmentation: SOME: 1**
Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.

**Distribution in good National parks: VERY STRONG: 0**
4891 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñao, Isiboro Sécure, Madidi, Manuripi-Heath, NKM, Pilon Lajas

**Use: NONE: 0**

**Rarity: VERY COMMON: 0**

0+1+0+0+0 = 1

**Conservation status: Least concern**

**Conservation status IUCN: Least concern**

**Official IUCN Conservation Status: NE**

**Comments:** Terra typica: corrected by D'Orbignyi (1847) to Río Mamoré, between Loreto and "le confluent du Río Sara", Bolivia, and by Bocourt (1873) to Provincia Moxas, Bolivia [cited after Peters & Donoso-Barros 1970]. The type locality given by D'Orbignyi 1837 ("Chile") is erroneous.
Norops meridionalis (Boettger)

Map Quality: High confidence
Global distribution: Brazil, Paraguay, Bolivia (Beni, Cochabamba, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 11247: 0
Distr. Total = 14220; EDC 1 = 8594; EDC 2 = 2653; EDC 3 = 1612; EDC 4 = 1027; EDC 5 = 334
Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Santa Cruz, Trinidad, Chapare region and by highways.
Distribution in good National parks: VERY STRONG: 0
3229 grid cells in Parks: Amboró, Carrasco, Iñao, Isiboro Sécure, Itenez, NKM
Use: NONE: 0
Rarity: NORMAL: 1
0+1+0+0+1 = 2

Conservation status: Least concern
Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Paraguay.
**Norops ortonii** (COPE)

Map Quality: High confidence

Global distribution: Brazil, French Guiana, Suriname, Guyana, Ecuador, Colombia, Peru, Venezuela, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Distribution Value: 20606: 0

Distr. Total = 24703; EDC 1 = 14961; EDC 2 = 5645; EDC 3 = 2884; EDC 4 = 916; EDC 5 = 297

Fragmentation: SOME: 1

Some fragmentation by habitat destruction near Trinidad and Rurrenabaque and the Chapare region and by highways.

Distribution in good National parks: VERY STRONG: 0

4127 grid cells in Parks: Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilon Lajas

Use: NONE: 0

Rarity: VERY COMMON: 0

0+1+0+0+0 = 1

**Conservation status:** Least concern

Conservation status IUCN: Least concern

Official IUCN Conservation Status: NE
Comments: Terra typica: Río Napo or Upper Río Marañón, Ecuador or Peru

Norops scapularis (BOULENGER)

Map Quality: High confidence
Global distribution: Peru, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 18444: 0
Distr. Total = 22932; EDC 1 = 13253; EDC 2 = 5191 EDC 3 = 2732; EDC 4 = 1265; EDC 5 = 491
Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.
Distribution in good National parks: VERY STRONG: 0
4462 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure,
Madidi, Manuripi-Heath, Pilon Lajas
Use: NONE: 0
Rarity: RARE: 3

0+1+0+0+3 = 4

Conservation status: Least concern
Conservation status IUCN: Least concern
**Official IUCN Conservation Status:** NE
**Comments:** Terra typica: Provincia del Sara, eastern Bolivia, 600 m.

*Polychrus acutirostris* SPIX

**Map Quality:** High confidence

**Global distribution:** Brazil, Uruguay, Paraguay, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 37384: 0
Distr. Total = 44804; EDC 1 = 29046; EDC 2 = 8338; EDC 3 = 3958; EDC 4 = 2596; EDC 5 = 866

**Fragmentation:** SOME: 1
Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.

**Distribution in good National parks:** VERY STRONG: 0

**Use:** NONE: 0

**Rarity:** VERY COMMON: 0

\[0 + 1 + 0 + 0 + 0 = 1\]
Conservation status: Least concern

Conservation status IUCN: **Least concern**
Official IUCN Conservation Status: **NE**
Comments: Terra typica: Bahia, Brazil.

*Polychrus liogaster* BOULENGER

**Map Quality:** High confidence

**Global distribution:** Peru, Brazil, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)

**Taxonomic status:** **OK**

**Sensibility for habitat alteration:** **SENSIBLE**

**Distribution Value:** \(26069: 0\)

Distr. Total = 28555; EDC 1 = 16120; EDC 2 = 6348; EDC 3 = 3601; EDC 4 = 1833; EDC 5 = 653

**Fragmentation:** **SOME:** 1

Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.

**Distribution in good National parks:** **VERY STRONG:** 0

4338 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilon Lajas

**Use:** **NONE:** 0

**Rarity:** **VERY COMMON:** 0

\(0+1+0+0+0 = 1\)
Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Province Sara, Bolivia, 750 m elevation, and Chanchamayo, eastern Peru.

*Urostrophus gallardoi* Etheridge & Williams

Map Quality: High confidence
Global distribution: Argentina, Bolivia (Chuquisaca, Cochabamba, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 6381: 0
Distr. Total = 8475; EDC 1 = 4434; EDC 2 = 1947; EDC 3 = 724; EDC 4 = 629; EDC 5 = 741
Fragmentation: SOME: 1
Some fragmentation by habitat destruction by highways.
Distribution in good National parks: VERY STRONG: 0
1190 grid cells in Parks: Aguarague, Amboró, El Palmar, Ñiño, Kaa-Iya, Tariquia
Use: NONE: 0
Rarity: VERY COMMON: 0

0+1+0+0+0 = 1
Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments:

3.2.9 Tropiduridae

*Stenocercus aculeatus* (O'SHAUGHNESSY)

**Map Quality:** High confidence

**Global distribution:** Ecuador, Peru, Bolivia (Beni, Cochabamba, La Paz, Pando)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 11950: 0

Distr. Total = 14073; EDC 1 = 8826; EDC 2 = 3124; EDC 3 = 1594; EDC 4 = 439; EDC 5 = 90

**Fragmentation:** NONE: 0

**Distribution in good National parks:** VERY STRONG: 0

3309 grid cells in Parks: Apolobamba, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, Pilón Lajas

**Use:** NONE: 0

**Rarity:** VERY COMMON: 0

\[0+0+0+0+0 = 0\]
Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Moyobamba, Peru [Department San Martín]

Stenocercus caducus (COPE)

Map Quality: High confidence
Global distribution: Brazil, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 44594: 0
Distr. Total = 54188; EDC 1 = 33997; EDC 2 = 10597; EDC 3 = 4850; EDC 4 = 3013; EDC 5 = 1731
Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.
Distribution in good National parks: VERY STRONG: 0
Use: NONE: 0
Rarity: VERY COMMON: 0

0+1+0+0+0 = 1

**Conservation status: Least concern**

Conservation status IUCN: Least concern

Official IUCN Conservation Status: NE

Comments: Terra typica: Paraguay

*Stenocercus marmoratus* (DUMÉRIL & BIBRON)

**Map Quality:** High confidence

**Global distribution:** Argentina, Bolivia (Chuquisaca, Cochabamba, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 4334: 0

Distr. Total = 9262; EDC 1 = 2909; EDC 2 = 1425; EDC 3 = 800; EDC 4 = 928; EDC 5 = 3200

**Fragmentation:** SOME: 1

Some fragmentation by highways.

**Distribution in good National parks:** STRONG: 1

738 grid cells in Parks: Aguarague, Amboró, Carrasco, Iñao, Sama, Tariquia, Tunari

**Use:** NONE: 0

**Rarity:** VERY COMMON: 0
Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: "province de Rio-Rande" (in error); Pampa Ruiz, between Valle Grande and El Pescado, De La Laguna Province, east of Chuquisaca, Bolivia (D'Orbigny (1847)). Holotype: MNHN Paris 2513

*Stenocercus prionotus* CADLE

**Map Quality:** High confidence
**Global distribution:** Peru, Bolivia (Beni, Cochabamba, La Paz)
**Taxonomic status:** OK
**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 2648: 0
- Distr. Total = 2933; EDC 1 = 2248; EDC 2 = 400; EDC 3 = 250; EDC 4 = 32; EDC 5 = 3
**Fragmentation:** NONE: 0
**Distribution in good National parks:** STRONG: 1
- 524 grid cells in Parks: Isiboro Sécure, Madidi
**Use:** NONE: 0
**Rarity:** RARE: 3
Conservation status: Least concern

Stenocercus roseiventris D'ORBIGNYI IN DUMÉRIL & BIBRON

Map Quality: High confidence
Global distribution: Peru, Argentina, Brazil, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: **41519: 0**
Distr. Total = 50477; EDC 1 = 31683; EDC 2 = 9836; EDC 3 = 4975; EDC 4 = 2768; EDC 5 = 1215
Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.
Distribution in good National parks: **VERY STRONG: 0**

Use: **NONE**: 0
Rarity: **VERY COMMON**: 0

\[0 + 1 + 0 + 0 + 0 = 1\]

**Conservation status: Least concern**

Conservation status IUCN: [Least concern](#)
Official IUCN Conservation Status: NE
Comments: Terra typica: Bolivia

*Tropidurus callathelys* HARVEY & GUTBERLET

![Figure 84 Extrapolated Distribution of *Tropidurus callathelys*](image1)

**Map Quality**: High confidence
**Global distribution**: Bolivia (Santa Cruz)
**Taxonomic status**: OK
**Sensibility for habitat alteration**: SENSIBLE
**Distribution Value**: 117: 5
Distr. Total = 129; EDC 1 = 90; EDC 2 = 27; EDC 3 = 10; EDC 4 = 2; EDC 5 = 0
**Fragmentation**: **NONE**: 0
**Distribution in good National parks**: **VERY STRONG**: 0 (More than 50%)
119 grid cells in Parks: NKM
Use: NONE: 0
Rarity: VERY RARE: 8

5+0+0+0+8 = 13

**Conservation status: Vulnerable**

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: rock outcrops on northern slope of Serrania de Huanchaca, Bolivia (13 36'S, 60 54'W), 500-600 m.a.s.l.

*Tropidurus chromatops* Harvey & Gutberlet

Figure 86 Extrapolated Distribution of *Tropidurus chromatops*
Figure 87 Fragmentation of Habitat *Tropidurus chromatops*

Map Quality: High confidence
Global distribution: Bolivia (Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 763: 2
Distr. Total = 791; EDC 1 = 637; EDC 2 = 126; EDC 3 = 27; EDC 4 = 1; EDC 5 = 0
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0 (more than 50%)
639 grid cells in Parks: NKM
Use: NONE: 0
Rarity: RARE: 3

\[2+0+0+0+3 = 5\]

**Conservation status: Least concern**

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: rocky outcrops along the trail ascending the northern slope of Serrania de Huanchaca, Parque Nacional Noel Kempff Mercado. Provincia Velasco, Dept. Santa Cruz, Bolivia.

*Tropidurus etheridgei* CEI

![Extrapolated Distribution of *Tropidurus etheridgei*](image1)

![Fragmentation of Habitat *Tropidurus etheridgei*](image2)

Map Quality: High confidence
Global distribution: Argentina, Brazil, Paraguay, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Potosi, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 24829: 0
Distr. Total = 30071; EDC 1 = 19789; EDC 2 = 5040; EDC 3 = 1774; EDC 4 = 1542; EDC 5 = 1926
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0

Use: NONE: 0
Rarity: VERY COMMON: 0

0+0+0+0+0 = 0

**Conservation status: Least concern**

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Argentina, Cordoba, Mina Claveros, 1200 m.

*Tropidurus melanopleurus* BOULENGER

**Map Quality:** High confidence
Global distribution: Peru, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Santa Cruz, Tarija)

**Taxonomic status:** UNCERTAIN
Examined Populations show partially strong differences in the coloration of the females. The species is at the moment under revision by Enrique Domic (Bolivia).

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 12724; 0
Distr. Total = 18469; EDC 1 = 9448; EDC 2 = 3276; EDC 3 = 1972; EDC 4 = 2055; EDC 5 = 1718
Distribution, diversity and conservation status of Bolivian Reptiles

Dirk Embert

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Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Santa Cruz, Rurrenabaque and the Chapare region and by highways.

Distribution in good National parks: VERY STRONG: 0
3692 grid cells in Parks: Aguarague, Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñao, Isiboro Sécure, Kaa-Iya, Madidi, Pilón Lajas, Tariquia, Tunari

Use: NONE: 0
Rarity: VERY COMMON: 0

0+1+0+0+0 = 1 TAXONOMIC STATUS UNCERTAIN

Conservation status: Near Threatened

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE

Comments: T. melanopleurus: Bolivia, La Paz. T. pictus: S-Bolivia, adjacent Argentina; Terra typica: "Gebiet des oberen Pilcomayo, zwischen Tarija und S. Francisco, Bolivien". Terra typica: Tamampoya, Bolivia, elevation 1200 m. Tropidurus pictus is considered a subspecies of Tropidurus melanopleurus.

Tropidurus plica (LINNAEUS)

Figure 92 Extrapolated Distribution of Tropidurus plica
Figure 93 Fragmentation of Habitat Tropidurus plica

Map Quality: High confidence
Global distribution: Colombia, Venezuela, Guyana, Surinam, French Guiana, Trinidad, Brazil, Peru, Ecuador Bolivia (Beni, La Paz, Pando)

Taxonomic status: OK

Sensibility for habitat alteration: VERY SENSIBLE

Distribution Value: 6115: 0
Distr. Total = 11081; EDC 1 = 6115; EDC 2 = 3318 EDC 3 = 1424; EDC 4 = 204; EDC 5 = 20

Fragmentation: SOME: 1
Some fragmentation by habitat destruction and by highways.

Distribution in good National parks: VERY STRONG: 0
753 grid cells in Parks: Manuripi-Heath, NKM

Use: NONE: 0
Rarity: VERY COMMON: 0

0+1+0+0+0 = 1

Conservation status: Least concern

Conservation status IUCN: Least concern

Official IUCN Conservation Status: NE

Comments: Terra typica: "Indiis".

Tropidurus spinulosus (COPE)
Global distribution: Brazil, Paraguay, Argentina, Bolivia (Beni?, Chuquisaca, Cochabamba, Santa Cruz, Tarija)

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Distribution Value: 20876: 0
Distr. Total = 24327; EDC 1 = 16566; EDC 2 = 4310; EDC 3 = 1525; EDC 4 = 1204; EDC 5 = 722

Fragmentation: SOME: 1

Some fragmentation by habitat destruction near Santa Cruz and by highways.

Distribution in good National parks: VERY STRONG: 0

6010 grid cells in Parks: Aguarague, Amboró, Carrasco, Iñaó, Kaa-Iya, NKM, Otuquis, San Matias, Tariquia, Tucavaca

Use: NONE: 0

Rarity: VERY COMMON: 0

0+1+0+0+0 = 1

Conservation status: Least concern

Conservation status IUCN: Least concern

Official IUCN Conservation Status: NE

Comments: Terra typica: "Paraguay".

*Tropidurus torquatus* (WIED-NEUWIED)

Figure 96 Extrapolated Distribution of *Tropidurus torquatus*

Figure 97 Fragmentation of Habitat *Tropidurus torquatus*

Map Quality: High confidence
Global distribution: Brazil, Guyana, Surinam, French Guiana, Colombia, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Santa Cruz, Tarija)

Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE

Distribution Value: 20504: 0
Distr. Total = 24456; EDC 1 = 16579; EDC 2 = 3925; EDC 3 = 1544; EDC 4 = 1319; EDC 5 = 1089

Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Santa Cruz and by highways.

Distribution in good National parks: VERY STRONG: 0
5996 grid cells in Parks: Aguarague, Amboró, Apolobamba, Carrasco, Cotapata, Iñao, Kaa-Iya, Madidi, NKM, Otuquis, San Matías, Tariquía, Tucavaca, Tunari

Use: NONE: 0
Rarity: VERY COMMON: 0

0+1+0+0+0 = 1

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments:

_Tropidurus umbra_ (LINNAEUS)
Map Quality: High confidence

Global distribution: Colombia, Venezuela, Guyana, Surinam, French Guiana, Brazil, Peru, Ecuador Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)

Taxonomic status: OK

Sensibility for habitat alteration: **VERY SENSIBLE**

Distribution Value: **19045: 0**

Distr. Total = 31476; EDC 1 = 19045; EDC 2 = 7010; EDC 3 = 3647; EDC 4 = 1380; EDC 5 = 394

Fragmentation: **SOME: 1**

Some fragmentation by habitat destruction near Santa Cruz, Trinidad and Rurrenabaque and the Chapare region and by highways.

Distribution in good National parks: **VERY STRONG: 0**

4589 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Isiboro Sécure, Itènez, Madidi, Manuripi-Heath, NKM, Pilón Lajas

Use: **NONE: 0**

Rarity: **VERY COMMON: 0**

0+1+0+0+0 = 1

Conservation status: **Least concern**

Conservation status IUCN: **Least concern**

Official IUCN Conservation Status: **NE**

Comments: Terra typica: "in Meridionalibus".
**Tropidurus xanthochilus** Harvey & Gutberlet

Figure 100 Extrapolated Distribution of *Tropidurus xanthochilus*

Figure 101 Fragmentation of Habitat *Tropidurus xanthochilus*

Map Quality: High confidence
Global distribution: Bolivia (Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 310: 5
Distr. Total = 320; EDC 1 = 246; EDC 2 = 64; EDC 3 = 9; EDC 4 = 1; EDC 5 = 0
Fragmentation: NONE: 0
Distribution in good National parks: STRONG: 1
153 grid cells in Parks: NKM
Use: NONE: 0
Rarity: VERY RARE: 8

5+0+1+0+8 = 14

Conservation status: Vulnerable

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: grounds of Estancia El Refugio (14 45'S, 61 00'W), El Refugo Biological Reserve, Province Velasco, Dept. Santa Cruz, Bolivia.
Uranoscodon superciliosus (Linnaeus)

Map Quality: High confidence
Global distribution: Brazil, Guyana, Surinam, French Guiana, Venezuela, Colombia, Peru, Bolivia (Beni, La Paz, Pando)
Taxonomic status: OK
Sensibility for habitat alteration: VERY SENSIBLE
Distribution Value: 5830: 0
Distr. Total = 10678; EDC 1 = 5830; EDC 2 = 3274; EDC 3 = 1357; EDC 4 = 200; EDC 5 = 17
Fragmentation: SOME: 1
Some fragmentation by habitat destruction and by highways.
Distribution in good National parks: VERY STRONG: 0
676 grid cells in Parks: Manuripi-Heath
Use: NONE: 0
Rarity: RARE: 3
0+1+0+0+3 = 4

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: "Indiis"
3.2.10 Liolaemidae

*Liolaemus alticolor* BARBOUR

Map Quality: High confidence

Global distribution: Chile, Peru, Argentina, Bolivia (Cochabamba, La Paz, Oruro, Potosi, Santa Cruz)

Taxonomic status: **OK**

Sensibility for habitat alteration: **TOLERANT**

Distribution Value: **8162: 0**

Distr. Total = 14914; EDC 1 = 1882; EDC 2 = 1687; EDC 3 = 1787; EDC 4 = 2806; EDC 5 = 6752

Fragmentation: **STRONG: 5**

Strong fragmentation of habitat mainly in the Highlands caused by agriculture and deforestation, partially historical.

Distribution in good National parks: **STRONG: 1**

465 grid cells in Parks: Aguarague, Amboró, Apolobamba, Carrasco, Cordillera de Sama, Cotapata, El Palmar, Iñao, Madidi, Tariquia, Tunari

Use: **NONE: 0**

Rarity: **VERY COMMON: 0**

0+5+1+0+0 = 6
Conservation status: Near Threatened

Conservation status IUCN: **Least concern**
Official IUCN Conservation Status: **NE**
Comments: High Andes of Tarapaco, Chile, S Peru, NW Argentina; Terra typica: Tihauanacu, Bolivia, elevation 13,100 feet.

*Liolaemus chacoensis* **SHREVE**

**Map Quality:** High confidence
**Global distribution:** Paraguay, Argentina, Bolivia (Chuquisaca, Santa Cruz, Tarija)
**Taxonomic status:** **OK**
**Sensibility for habitat alteration:** **SENSIBLE**
**Distribution Value:** **1453: 2**
Distr. Total = 1599; EDC 1 = 959; EDC 2 = 494; EDC 3 = 97; EDC 4 = 40; EDC 5 = 0
**Fragmentation:** **NONE: 0**
**Distribution in good National parks:** **LOW: 2**
13 grid cells in Parks: Aguarague
**Use:** **NONE: 0**
**Rarity:** **VERY COMMON: 0**

2+0+2+0+0 = 4
**Conservation status: Least concern**

**Conservation status IUCN:** Least concern  
**Official IUCN Conservation Status:** NE  
**Comments:** Terra typica: Argentina, Cordoba, Salares de Totoralejo  
Terra typica: Fortin Guachalla, rio Pilcomayo, 580 km west of Asunción, Chaco Paraguayo, Paraguay (fide Cei 1993).

**Liolaemus cranwelli** (DONOSO-BARROS)

![Figure 108 Extrapolated Distribution of Liolaemus cranwelli](image1)  
![Figure 109 Fragmentation of Habitat of Liolaemus cranwelli](image2)

**Map Quality:** High confidence  
**Global distribution:** Bolivia  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** SENSIBLE  
**Distribution Value:** 18: 10  
Distr. Total = 230; EDC 1 = 0; EDC 2 = 18 EDC 3 = 53; EDC 4 = 127; EDC 5 = 32  
**Fragmentation:** VERY STRONG: 12  
Strong fragmentation by habitat destruction near Santa Cruz  
**Distribution in good National parks:** NONE: 3  
**Use:** NONE: 0  
**Rarity:** VERY RARE: 8

10+12+3+0+8 = 33
**Conservation status: Critically endangered**

Conservation status IUCN: EN ab(iii)
Official IUCN Conservation Status: NE

Comments: Terra typica: Bolivia, Santa Cruz, Nueva Moka. Etheridge (2000) synonymizes *Liolaemus cranwelli* with *L. wiegmanni* although he states that the status of *L. cranwelli* remains unclear. Belongs to the wiegmanni group of *Liolaemus*

*Liolaemus dorbignyi* KOSLOWSKY

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Map Quality: High confidence
Global distribution: Argentina, Chile, Bolivia (Potosi, Oruro, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: TOLERANT
Distribution Value: 2827: 0
Distr. Total = 3169; EDC 1 = 933; EDC 2 = 685; EDC 3 = 655; EDC 4 = 554; EDC 5 = 342
Fragmentation: SOME: 1
Some fragmentation by habitat destruction near Tarija.
Distribution in good National parks: STRONG: 1
325 grid cells in Parks: Eduardo Avaroa
Use: NONE: 0
Rarity: RARE: 3

0+1+1+0+3 = 5
**Conservation status: Least concern**

Conservation status IUCN: Least concern  
Official IUCN Conservation Status: NE  
Comments: Terra typica: Provincia de Catamarca, Argentina

*Liolaemus fittkaui* LAURENT

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**Map Quality:** High confidence  
**Global distribution:** Bolivia (Cochabamba)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** TOLERANT  
**Distribution Value:** 0: 13  
Distr. Total = 6; EDC 1 = 0; EDC 2 = 0; EDC 3 = 0; EDC 4 = 0; EDC 5 = 6  
**Fragmentation:** VERY STRONG: 12  
**Distribution in good National parks:** NONE: 3  
**Use:** NONE: 0  
**Rarity:** RARE: 3

13+12+3+0+3 = 31

**Conservation status: Critically endangered**

Conservation status IUCN: CR ab(iii)  
Official IUCN Conservation Status: NE
**Liolaemus forsteri** LAURENT

**Figure 114 Extrapolated Distribution of Liolaemus forsteri**

**Figure 115 Fragmentation of Habitat of Liolaemus forsteri**

**Map Quality:** High confidence  
**Global distribution:** Bolivia (La Paz)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** TOLERANT  
**Distribution Value:** 85: 5  
Distr. Total = 116; EDC 1 = 7; EDC 2 = 21; EDC 3 = 33; EDC 4 = 24; EDC 5 = 31  
**Fragmentation:** NONE: 0  
**Distribution in good National parks:** LOW: 2  
11 grid cells in Parks: Cotapata  
**Use:** NONE: 0  
**Rarity:** RARE: 3  

5+0+2+0+3 = 10

**Conservation status:** Near Threatened  
**Conservation status IUCN:** Least concern  
**Official IUCN Conservation Status:** NE  
**Comments:** Terra typica: Bolivia, Chacaltaya, nr. La Paz, 1700 m.
**Liolaemus islugensis** ORTIZ & MARQUET

Map Quality: High confidence  
Global distribution: Chile, Bolivia (Chuquisaca, Potosi, Oruro, Tarija)  
Taxonomic status: OK  
Sensibility for habitat alteration: TOLERANT  
Distribution Value: 4934: 0  
Distr. Total = 5285; EDC 1 = 2174; EDC 2 = 1274; EDC 3 = 858; EDC 4 = 628; EDC 5 = 351  
Fragmentation: SOME: 1  
Some fragmentation by habitat destruction near Tarija.  
Distribution in good National parks: VERY STRONG: 0  
488 grid cells in Parks: Cordillera de Sama, Eduardo Avaroa  
Use: NONE: 0  
Rarity: VERY COMMON: 0  
0+1+0+0+0 = 1

Conservation status: Least concern

Conservation status IUCN: Least concern  
Official IUCN Conservation Status: NE  
Comments: *Liolaemus islugensis erguetae*: Chilean Highlands between 22° S and 22° 25' S, in Bolivia near the Chilean border.
Liolaemus janesi (BOULENGER)

Map Quality: High confidence
Global distribution: Chile, Bolivia (Potosi, Oruro)
Taxonomic status: OK
Sensibility for habitat alteration: TOLERANT
Distribution Value: 1233; 2
Distr. Total = 1263; EDC 1 = 624; EDC 2 = 359; EDC 3 = 165; EDC 4 = 85; EDC 5 = 30
Fragmentation: NONE; 0
No fragmentation by habitat destruction. Disjunctive distribution areas probably connected through Chile.
Distribution in good National parks: STRONG: 1
347 grid cells in Parks: Eduardo Avaroa, Sajama
Use: NONE; 0
Rarity: RARE; 3
2+0+1+0+3 = 6

Conservation status: Near Threatened
Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Andes of Tarapaca, Chile, elevation 3300-4000 m.
**Liolaemus orientalis** MÜLLER

Map Quality: High confidence  
Global distribution: Argentina, Bolivia (Chuquisaca, Cochabamba, La Paz, Potosi, Oruro, Tarija)  
Taxonomic status: OK  
Sensibility for habitat alteration: TOLERANT  
Distribution Value: 7663: 0  
Distr. Total = 11308; EDC 1 = 1799; EDC 2 = 1719; EDC 3 = 1789; EDC 4 = 2256; EDC 5 = 3745  
Fragmentation: STRONG: 5  
Strong fragmentation of habitat, mainly causing reduction of original distribution but also separating some smaller areas from the main block.  
Distribution in good National parks: STRONG: 1  
310 grid cells in Parks: Cordillera de Sama, Eduardo Avaroa, El Palmar  
Use: NONE: 0  
Rarity: VERY COMMON: 0  

0+5+1+0+0 = 6

Conservation status: Near Threatened

Conservation status IUCN: Least concern  
Official IUCN Conservation Status: NE
**Liolaemus ornatus** KOSLOWSKY

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**Comments:** Terra typica: “Oberen Pilcomayo, zwischen Tarija und San Francisco, Bolivien”

**Map Quality:** High confidence

**Global distribution:** Chile, Peru, Argentina, Bolivia (Chuquisaca, Cochabamba, La Paz, Oruro, Potosi)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** TOLERANT

**Distribution Value:** 8386: 0

Distr. Total = 13281; EDC 1 = 1728; EDC 2 = 1850; EDC 3 = 2024; EDC 4 = 2784; EDC 5 = 4895

**Fragmentation:** STRONG: 5

Strong fragmentation of habitat, mainly causing reduction of original distribution but also separating some smaller areas from the main block.

**Distribution in good National parks:** LOW: 2

93 grid cells in Parks: Apolobamba, Carrasco, Cordillera de Sama, Cotapata, Eduardo Avaroa, Sajama, Tunari

**Use:** NONE: 0

**Rarity:** NORMAL: 1

0+5+2+0+1 = 8

**Conservation status:** Near Threatened
Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Cordilleras de la provincia de Jujuy, Argentina (Koslowsky 1898).

Liolaemus pantherinus PELLEGRIN

Map Quality: High confidence
Global distribution: Peru, Chile, Bolivia (Cochabamba, La Paz, Oruro, Potosi)
Taxonomic status: OK
Sensibility for habitat alteration: TOLERANT
Distribution Value: 1816: 0
Distr. Total = 3920; EDC 1 = 230; EDC 2 = 304; EDC 3 = 466; EDC 4 = 816; EDC 5 = 2104
Fragmentation: VERY STRONG: 12
Very strong fragmentation by habitat destruction in the Bolivia Highlands not just reducing the habitat size extremely but separating the habitat in two big blocks separated by a wide gap.
Distribution in good National parks: LOW: 2
35 grid cells in Parks: Tunari
Use: NONE: 0
Rarity: RARE: 3

0+12+2+0+3 = 17

Conservation status: Endangered
Conservation status IUCN: **Least concern**
Official IUCN Conservation Status: **NE**
Comments:

*Liolaemus schmidti* (MARX)

**Map Quality:** High confidence
**Global distribution:** Chile, Bolivia (Potosi)
**Taxonomic status:** **OK**
**Sensibility for habitat alteration:** **TOLERANT**
**Distribution Value:** 269: 5
Distr. Total = 272; EDC 1 = 98; EDC 2 = 119 EDC 3 = 33; EDC 4 = 19; EDC 5 = 3
**Fragmentation:** **NONE:** 0
**Distribution in good National parks:** **NONE:** 3
**Use:** **NONE:** 0
**Rarity:** **RARE:** 3

5+0+3+0+3 = 11

Conservation status: **Vulnerable**

Conservation status IUCN: **Least concern**
Official IUCN Conservation Status: **NE**
Comments: Terra typica: Forty miles east of San Pedro de Atacama, Antofagasta, Chile.
**Liolaemus signifer** (DUMÉRIL & BIBRON)

Map Quality: High confidence  
**Global distribution:** Chile, Argentina, Peru, Bolivia (Chuquisaca, Cochabamba, La Paz, Oruro, Potosi, Tarija)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** TOLERANT  
**Distribution Value:** 10498: 0  
Distr. Total = 17673; EDC 1 = 2411; EDC 2 = 2289; EDC 3 = 2432; EDC 4 = 3366; EDC 5 = 7175  
**Fragmentation:** STRONG: 5  
Strong fragmentation of habitat in some areas mainly causing reduction of original distribution but not separating the main block.  
**Distribution in good National parks:** VERY STRONG: 0  
845 grid cells in Parks: Cotapata, Tunari, Carrasco, Amboro, Torotoro, Sajama, El Palmar, Cordillera de Sama, Tariquia, Aguarague, Iñaos, Madidi, Apolobamba  
**Use:** NONE: 0  
**Rarity:** VERY COMMON: 0  
0+5+0+0+0+0 = 5  
**Conservation status:** Least concern  
**Conservation status IUCN:** Least concern
Liolaemus variegatus LAURENT

Map Quality: High confidence  
Global distribution: Bolivia (Cochabamba)  
Taxonomic status: OK  
Sensibility for habitat alteration: TOLERANT  
Distribution Value: 22: 10  
Distr. Total = 198; EDC 1 = 0; EDC 2 = 1 EDC 3 = 0; EDC 4 = 21; EDC 5 = 176  
Fragmentation: SOME: 1  
Habitat size reduced but not producing wide gaps.  
Distribution in good National parks: NONE: 3  
1 grid cells in Parks: Carrasco  
Use: NONE: 0  
Rarity: RARE: 3  

10+1+3+0+3 = 17

Conservation status: Endangered

Conservation status IUCN: EN1ab(iii)  
Official IUCN Conservation Status: NE  
Comments: Terra typica: Bolivia, Cochabamba, Tiraque, 3100 m.