**Oxybelis aeneus (WAGLER)**

Map Quality: High confidence
Global distribution: USA, Mexico, Guatemala, El Salvador, Honduras, Belize, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Brazil, Peru, Guyana, Surinam, French Guiana, Trinidad, Tobago, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz)

Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE

Distribution Value: 23536: 0
Distr. Total = 29185; EDC 1 = 16712; EDC 2 = 6824; EDC 3 = 3486; EDC 4 = 1614; EDC 5 = 549

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
4036 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñao, Isiboro Sécure, Itenez, 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
**Oxybelis fulgidus** (DAUDIN)

**Map Quality:** Medium confidence
The distribution has been extrapolated very disjunctive which may be an error, although the easternmost area of distribution may be connected through Brazil.

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

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 10469: 0

Distr. Total = 12359; EDC 1 = 6897; EDC 2 = 3572; EDC 3 = 1574; EDC 4 = 254; EDC 5 = 62

**Fragmentation:** NONE: 0

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

2011 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, Iñao, Isiboro Sécure, Madidi, Manuripi-Heath, NKM, Otuquis, Pilon Lajas

**Use:** NONE: 0

**Rarity:** VERY COMMON: 0

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

**Oxyrhopus formosus (WIED)**

![Figure 456 Extrapolated Distribution of Oxyrhopus formosus](image1)  
![Figure 457 Fragmentation of Habitat of Oxyrhopus formosus](image2)

**Map Quality**: Medium confidence  
The distribution has been extrapolated very disjunctive which may be an error, although the easternmost area of distribution may be connected through Brazil.  
**Global distribution**: Colombia, Venezuela, Ecuador, Peru, Guyana, Surinam, French Guiana, Brazil, Argentina, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)  
**Taxonomic status**: **OK**  
**Sensibility for habitat alteration**: **SENSIBLE**  
**Distribution Value**: 13039: 0  
Distr. Total = 15844; EDC 1 = 8689; EDC 2 = 4350; EDC 3 = 2100; EDC 4 = 547; EDC 5 = 158  
**Fragmentation**: **SOME: 1**  
Some fragmentation by habitat destruction by highways.  
**Distribution in good National parks**: **VERY STRONG: 0**  
2602 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**
Conservation status: Least concern

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

*Oxyrhopus guibe*i Hoge & Romano

**Map Quality:** High confidence

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

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 40303: 0
Distr. Total = 48670; EDC 1 = 30748; EDC 2 = 9555; EDC 3 = 4475; EDC 4 = 2734; EDC 5 = 1158

**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
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:

**Oxyrhopus melanogenys (TSCHUDI)**

Map Quality: Medium confidence  
Distribution in central parts of La Paz Department is questionable.  
**Global distribution:** Peru, Brazil, Ecuador, Colombia, Bolivia (Beni, Cochabamba, La Paz, Pando)  
Taxonomic status: **OK**  
Sensibility for habitat alteration: **SENSIBLE**

**Distribution Value: 8960: 0**  
Distr. Total = 10581; EDC 1 = 5765; EDC 2 = 3195; EDC 3 = 1389; EDC 4 = 208; EDC 5 = 24  
**Fragmentation: NONE: 0**

**Distribution in good National parks: VERY STRONG: 0**  
1604 grid cells in Parks: Apolobamba, Cotapata, Isiboro Sécure, Madidi, Manuripi-Heath, Pilon Lajas
Oxyrhopus petola (Linnaeus)

**Map Quality:** Medium confidence
Distribution in Departments of Chuquisaca and Tarija is based on extrapolation and questionable as there are no collections of this species from these Departments

**Global distribution:** Mexico, Guatemala, El Salvador, Trinidad, Tobago, Honduras, Belize, Nicaragua, Costa Rica, Panama, French Guiana, Colombia, Venezuela, Ecuador, Brazil, Peru, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 36400: 0
Distr. Total = 44331; EDC 1 = 27264; EDC 2 = 9136; EDC 3 = 4651; EDC 4 = 2392; EDC 5 = 888

**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


**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: "Africa" (fide Linnaeus 1758; in error). In Bolivia subspecies: *Oxyrhopus petola digitalis* (Reuss, 1834)

**Oxyrhopus rhombifer** (*DUMÉRIL, BIBRON & DUMÉRIL*)

**Map Quality:** High confidence

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

**Taxonomic status:** OK

**Sensibility for habitat alteration:** TOLERANT
**Distribution Value:** 34382: 0  
Distr. Total = 41538; EDC 1 = 26374; EDC 2 = 8008; EDC 3 = 3249; EDC 4 = 2134; EDC 5 = 1773  
**Fragmentation:** SOME: 1  
Some fragmentation by strong habitat destruction near Santa Cruz 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:** In Bolivia two subspecies: *Oxyrhopus rhombifer rhombifer* (DUMÉRIL, BIBRON & DUMÉRIL) and *Oxyrhopus rhombifer inaequifasciatus* WERNER.

**Oxyrhopus sp. nov**

Figure 466 Extrapolated Distribution of *Oxyrhopus sp. nov*  
Figure 467 Fragmentation of Habitat of *Oxyrhopus sp. nov*

**Map Quality:** High confidence  
**Global distribution:** Bolivia (Chuquisaca, Cochabamba, La Paz, Santa Cruz)
**Distribution, diversity and conservation status of Bolivian Reptiles**

Dirk Embert

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**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 5312: 0

Distr. Total = 7851; EDC 1 = 4096; EDC 2 = 1216; EDC 3 = 647; EDC 4 = 613; EDC 5 = 1279

**Fragmentation:** SOME: 1

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

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

2057 grid cells in Parks: Aguarague, Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, El Palmar, Iñao, Isiboro Sécure, Madidi, Pilon Lajas, Torotoro, Tunari

**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: Bolivia, Santa Cruz, Florida,

**Oxyrhopus trigeminus** (DUMERIL, BIBRON & DUMERIL)

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**Map Quality:** Medium confidence
Although several specimens are known in collections just one specimen was found with exact locality. Other specimens have been collected from „Beni Department“ . The extrapolation is based on one specimen from the locality “Warnes“ which causes the restricted distribution.

**Global distribution:** Brazil, Venezuela, Paraguay, Peru, Bolivia (Santa Cruz)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 1136: 2

- Distr. Total = 2788; EDC 1 = 592; EDC 2 = 544; EDC 3 = 544; EDC 4 = 835; EDC 5 = 273

**Fragmentation:** STRONG: 5

Very strong fragmentation by strong habitat destruction near Santa Cruz

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

336 grid cells in Parks: Amboró, Carrasco, Otuquis

**Use:** NONE: 0

**Rarity:** NORMAL: 1

2+5+1+0+1 = 9

**Conservation status:** Near threatened

**Conservation status IUCN:** [VU B1ab(i)]

Species has an extrapolated distribution including less than 20,000 km², habitat is strongly fragmented and habitat destruction in these areas are very rapid and strong, reducing its distribution continuously.

**Official IUCN Conservation Status:** NE

**Comments:** Terra typica: Distrito Federal, Brazil
**Phalotris tricolor (DUMÉRIL, BIBRON & DUMÉRIL)**

**Map Quality:** High confidence

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

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 14846: 0

Distr. Total = 16619; EDC 1 = 11722; EDC 2 = 3124; EDC 3 = 938; EDC 4 = 688; EDC 5 = 147

**Fragmentation:** SOME: 1

Some fragmentation by highways.

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

5472 grid cells in Parks: Aguarague, Amboró, El Palmar, Iñao, Kaa-Iya, Otuquis, San Matías, Tucavaca, Tariquia

**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:
**Philodryas aestiva** *(DUMERIL, BIBRON & DUMERIL)*

Map Quality: Medium confidence
The extrapolation shows naturally very disjunctive habitat. The isolated spots in eastern Santa Cruz are regarded as an extrapolation error as there are no collections from there (out of a total of 17 collections from western Santa Cruz and eastern Cochabamba). On the other hand the species is known from Brazil which would support distribution in these areas.

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

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Distribution Value: 7073: 0

Distr. Total = 10262; EDC 1 = 5115; EDC 2 = 1958; EDC 3 = 878; EDC 4 = 762; EDC 5 = 1549

Fragmentation: SOME: 1
Some fragmentation by highways.

Distribution in good National parks: VERY STRONG: 0

2132 grid cells in Parks: Aguarague, Amboró, Carrasco, Cordillera de Sama, El Palmar, Iñao, Kaa-Iya, NKM, Oturquis, San Matías, Tucavaca, Tariquía, Torotoro, 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:

*Philodryas baroni* BERG

Figure 474 Extrapolated Distribution of *Philodryas baroni*

Figure 475 Fragmentation of Habitat of *Philodryas baroni*

Map Quality: High confidence
Global distribution: Argentina, Paraguay, Bolivia (Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 2241: 0
Distr. Total = 2296; EDC 1 = 1695; EDC 2 = 546; EDC 3 = 26; EDC 4 = 9; EDC 5 = 20
Fragmentation: NONE: 0
Distribution in good National parks: STRONG: 1
910 grid cells in Parks: Kaa-Iya
Use: NONE: 0
Rarity: RARE: 3

0+0+1+0+3 = 4

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Bahia, Brazil
Philodryas mattogrossensis KOSLOWSKY

Figure 476 Extrapolated Distribution of Philodryas mattogrossensis
Figure 477 Fragmentation of Habitat of Philodryas mattogrossensis

Map Quality: High confidence
Global distribution: Brazil, Paraguay, Argentina, Bolivia (Chuquisca, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 5379: 0
Distr. Total = 6282; EDC 1 = 4013; EDC 2 = 1366; EDC 3 = 366; EDC 4 = 292; EDC 5 = 245
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0
1581 grid cells in Parks: Aguarague, El Palmar Iñao, Kaa-Iya, Otuquis, San Matías, Tucavaca
Use: NONE: 0
Rarity: NORMAL: 1

0+0+0+0+1 = 1

Conservation status: Least Concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments:
**Philodryas olfersii** (LICHTENSTEIN)

Map Quality: High confidence  
Global distribution: Brazil, Peru, Paraguay, Uruguay, Argentina, Colombia, French Guiana, Venezuela, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)  
Taxonomic status: **OK**  
Sensibility for habitat alteration: **TOLERANT**  
Distribution Value: 48362: 0  
Distr. Total = 52196; EDC 1 = 33010; EDC 2 = 10312; EDC 3 = 5040; EDC 4 = 2739; EDC 5 = 1095  
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  
Use: **NONE**: 0  
Rarity: **VERY COMMON**: 0  
0+1+0+0+0 = 1  
Conservation status: Least concern  
Conservation status IUCN: **Least concern**
**Philodryas patagoniensis** (GIRARD)

**Map Quality:** High confidence

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

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 34208: 0

Distr. Total = 42708; EDC 1 = 26764; EDC 2 = 7444; EDC 3 = 3717; EDC 4 = 2844; EDC 5 = 1939

**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

10242 grid cells in Parks: Aguarague, Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cordillera de Sama, Cotapata, El Palmar, EBB, Iñao, Isiboro Sécure, Kaa-Iya, Madidi, NKM, Otuquis, Pilón Lajas, San Matías, Tucavaca, Tariquia, 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:

*Philodryas psammophidea* GÜNTHER

**Map Quality:** High confidence
**Global distribution:** Brazil, Paraguay, Uruguay, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Santa Cruz, Tarija)
**Taxonomic status:** UNCERTAIN
**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 21496: 0
Distr. Total = 24826; EDC 1 = 15619; EDC 2 = 4239; EDC 3 = 1638; EDC 4 = 1457; EDC 5 = 1873
**Fragmentation:** SOME: 1
Some fragmentation by strong habitat destruction south of Amboro y Carrasco National parks which widens the gap between a big eastern block from a small western block.
**Distribution in good National parks:** VERY STRONG: 0
5600 grid cells in Parks: Aguarague, Amboró, Apolobamba, Carrasco, Cordillera de Sama, Cotapata, El Palmar, Iñao, Isiboro Sécure, Kaa-Iya, Madidi, NKM, Otuquis, Pilon Lajas, San Matias, Tucavaca, Tariquía, Torotoro, Tunari
**Use:** NONE: 0
**Rarity:** VERY COMMON: 0
0+1+0+0+0 = 1 \hspace{1cm} \text{TAXONOMIC STATUS UNCERTAIN}

Conservation status: Near threatened

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Tucumán, Argentina. Hussam Zaher together with the author of the present work are working at the moment on a revision of the species and have found some significant differences in the populations of the inter Andean dry valleys.

**Philodryas varia** (JAN)

![Figure 484 Extrapolated Distribution of Philodryas varia](image1)

![Figure 485 Fragmentation of Habitat of Philodryas varia](image2)

Map Quality: High confidence
Global distribution: Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, Santa Cruz, Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 9394: 0
Distr. Total = 14819; EDC 1 = 6560; EDC 2 = 2834; EDC 3 = 1517; EDC 4 = 1800; EDC 5 = 2108
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
2520 grid cells in Parks: Aguarague, Amboró, Carrasco, Cavernas del Repechón, Cordillera de Sama, El Palmar, Iñao, Isiboro Sécure, Kaa-Iya, Tariquía, Torotoro, 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:

Philodryas viridissima (LINNAEUS)

Map Quality: High confidence
The extrapolated distribution shows some separated areas of distribution, all of them missing collections to prove that the species occurs there. As the species occurs in Brazil, Paraguay and Argentina distribution there is possible if not probable.

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

Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: **34015: 0**
Distr. Total = 41373; EDC 1 = 25477; EDC 2 = 8538; EDC 3 = 4433; EDC 4 = 2186; EDC 5 = 739

**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**

**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: "Surinami"**

**Phimophis vittatus** *(BOULENGER)*

**Map Quality: High confidence**
**Global distribution: Argentina, Paraguay, Bolivia (Santa Cruz, Tarija)**
**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 9904: 0

Distr. Total = 13019; EDC 1 = 7351; EDC 2 = 2553; EDC 3 = 883; EDC 4 = 776; EDC 5 = 1456

**Fragmentation:** SOME: 1

Some fragmentation by highways.

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

3056 grid cells in Parks: Aguarague, Amboró, Cordillera de Sama, El Palmar, Iñao, Kaa-Iya, Otuquis, Tucavaca, Tariquia

**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:**

*Pseudoboa coronata* SCHNEIDER

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**Map Quality:** High confidence

**Global distribution:** Guyana, Surinam, French Guiana, Brazil, Colombia, Venezuela, Ecuador, Peru, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: **OK**  
Sensibility for habitat alteration: **SENSIBLE**  
**Distribution Value:** 20113: 0  
Distr. Total = 24809; EDC 1 = 14025; EDC 2 = 6088; EDC 3 = 3024; EDC 4 = 1250; EDC 5 = 422  
**Fragmentation:** **SOME:** 1  
Some fragmentation, mainly by strong habitat destruction near Santa Cruz separating naturally connected areas. Further fragmentation in the Chapare region and by highways.  
**Distribution in good National parks:** **VERY STRONG:** 0  
4324 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cotapata, EBB, Iñao, Isiboro Sécure, Itenez, 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: "America"

**Pseudoboa nigra** *(DUMÉRIL, BIBRON & DUMÉRIL)*

**Figure 492 Extrapolated Distribution of Pseudoboa nigra**  
**Figure 493 Fragmentation of Habitat of Pseudoboa nigra**

**Map Quality:** High confidence
Global distribution: Argentina, Brazil, Paraguay, Bolivia (Chuquisaca, Cochabamba, Santa Cruz, Tarija)

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Distribution Value: 5864: 0

Distr. Total = 6585; EDC 1 = 4815; EDC 2 = 1049; EDC 3 = 370; EDC 4 = 285; EDC 5 = 66

Fragmentation: SOME: 1

Some fragmentation by highways.

Distribution in good National parks: VERY STRONG: 0

2171 grid cells in Parks: Aguarague, El Palmar, Iñao, Kaa-Iya, Otuquis, San Matías, 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: Surinam

Pseudoeryx plicatilis (LINNAEUS)

Figure 494 Extrapolated Distribution of Pseudoeryx plicatilis

Figure 495 Fragmentation of Habitat of Pseudoeryx plicatilis

Map Quality: High confidence
The extrapolated distribution shows some separated areas of distribution, all of them missing collections to prove that the species occurs there. As the species occurs in Brazil, Paraguay and Argentina distribution there is possible if not probable.

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

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

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

**Distribution Value:** **31930: 0**

Distr. Total = 38895; EDC 1 = 23806; EDC 2 = 8124; EDC 3 = 4238; EDC 4 = 2053; EDC 5 = 674

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

Some fragmentation by strong habitat destruction near Santa Cruz. Further fragmentation in 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: "Ternataeis"
**Pseustes poecilonotus** (GÜNTHER)

**Map Quality:** High confidence

**Global distribution:** Mexico, Guatemala, El Salvador, Honduras, Belize, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Brazil, Ecuador, Peru, Trinidad, Guyana, Surinam, French Guiana, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE

**Distribution Value:** 30458: 0

Distr. Total = 37438; EDC 1 = 22525; EDC 2 = 7933; EDC 3 = 4242; EDC 4 = 2034; EDC 5 = 704

**Fragmentation:** SOME: 1

Some fragmentation by strong habitat destruction near Santa Cruz. Further fragmentation in the Chapare region and by highways.

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

6850 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Ñuao, Isiboro Sécure, Itenez, 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:

**Pseustes sulphureus** (WAGLER)

Figure 498 Extrapolated Distribution of *Pseustes sulphureus*
Figure 499 Fragmentation of Habitat of *Pseustes sulphureus*

Map Quality: High confidence
Global distribution: Peru, Ecuador, Brazil, Guyana, Surinam, French Guiana, Trinidad, Colombia, Venezuela, Bolivia (Bení, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 32123: 0
Distr. Total = 39296; EDC 1 = 23991; EDC 2 = 8132; EDC 3 = 4310; EDC 4 = 2124; EDC 5 = 739
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
7630 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Ñuñoa, Isiboro Sécure, Itenez, 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: Rio Japura, Brazil

Psomophis genimaculatus (BOETTGER)

Map Quality: High confidence
Global distribution: Brazil, Paraguay, Argentina, Bolivia (Beni, Cochabamba, La Paz, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 5841: 0
Distr. Total = 8427; EDC 1 = 4005; EDC 2 = 1836; EDC 3 = 1287; EDC 4 = 973; EDC 5 = 326
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
1200 grid cells in Parks: Amboró, Carrasco, Cavernas del Repechón, EBB, Isiboro Sécure, Otuquis, 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

*Psommophis obtusus* (COPE)

**Map Quality:** High confidence  
**Global distribution:** Brazil (Rio Grande do Sul), S Paraguay, Argentina (Chaco, Entre Rios ?, Corrientes ?), Uruguay, Bolivia (Beni, Cochabamba, La Paz, Santa Cruz)  
**Taxonomic status:** UNCERTAIN  
**Distribution status:** OK  
**Sensibility for habitat alteration:** SENSIBLE  
**Distribution Value:** 5087: 0  
Distr. Total = 6285; EDC 1 = 3955; EDC 2 = 1132; EDC 3 = 779; EDC 4 = 315; EDC 5 = 104  
**Fragmentation:** NONE: 0  
**Distribution in good National parks:** VERY STRONG: 0  
1200 grid cells in Parks: Amboró, Apolobamba, Carrasco, EBB, Isiboro Sécure, Madidi, Pilón Lajas  
**Use:** NONE: 0  
**Rarity:** RARE: 3

0+0+0+0+3 = 3  
TAXONOMIC STATUS UNCERTAIN
Conservation status: Near Threatened

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Paysandœ, Uruguay

*Rhinobothryum lentiginosum* (SCOPOLI)

**Map Quality:** High confidence
**Global distribution:** Paraguay, Brazil, Venezuela, French Guiana, Colombia, Ecuador, Peru, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
**Taxonomic status:** OK
**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 25946: 0
Distr. Total = 31499; EDC 1 = 18964; EDC 2 = 6982; EDC 3 = 3669; EDC 4 = 1454; EDC 5 = 430
**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
7146 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Iñao, Isiboro Sécure, Itenez, Madidi, Manuripi-Heath, NKM, Pilon Lajas, Tariquia
**Use:** NONE: 0
**Rarity:** VERY COMMON: 0
Conservation status: Least concern

Conservation status IUCN: Least concern  
Official IUCN Conservation Status: NE  
Comments: Terra typica not given by Scopoli (1785)

*Sibynomorphus lavillai* SCROCCHI, PORTO & REY

Map Quality: High confidence  
Global distribution: Argentina, Paraguay, Bolivia (Chuquisaca, Cochabamba, Santa Cruz, Tarija)

Taxonomic status: OK  
Sensibility for habitat alteration: SENSIBLE

Distribution Value: 9937: 0  
Distr. Total = 12499; EDC 1 = 7515; EDC 2 = 2422; EDC 3 = 1001; EDC 4 = 1011; EDC 5 = 550

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

2959 grid cells in Parks: Aguarague, Amboró, El Palmar, Iñao, Kaa-Iya, Otuquis, Tucavaca, Tariquia

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**

*Sibynomorphus turgidus** (COPE)

**Map Quality:** High confidence

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

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

**Sensibility for habitat alteration:** **TOLERANT**

**Distribution Value: 22530: 0**

Distr. Total = 26738; EDC 1 = 18222; EDC 2 = 4308; EDC 3 = 1936; EDC 4 = 1651; EDC 5 = 621

**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**

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**

*Siphlophis compressus* (Daudin)

**Map Quality**: High confidence
**Global distribution**: Costa Rica, Panama, French Guiana, Peru, Brazil, Colombia, Ecuador, Venezuela, Trinidad, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
**Taxonomic status**: OK
**Sensibility for habitat alteration**: SENSIBLE

**Distribution Value**: 22267: 0
Distr. Total = 27604; EDC 1 = 16200; EDC 2 = 6067; EDC 3 = 3380; EDC 4 = 1501; EDC 5 = 456

**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
6102 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, EBB, Isiboro Sécure, Madidi, Manuripi-Heath, NKM, Otuquis, Pilon Lajas, 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: Terra typica: Surinam

*Spilotes pullatus* (Linnaeus)

**Figure 512** Extrapolated Distribution of *Spilotes pullatus*

**Figure 513** Fragmentation of Habitat of *Spilotes pullatus*

Map Quality: High confidence

Global distribution: Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Trinidad, Tobago, Colombia, Venezuela, Brazil, Ecuador, Peru, Argentina, Guyana, Surinam, French Guiana, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)

Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE

Distribution Value: 27691: 0
Distr. Total = 32903; EDC 1 = 20423; EDC 2 = 7268; EDC 3 = 3329; EDC 4 = 1425; EDC 5 = 458
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**


**Use: NONE: 0**

**Rarity: VERY COMMON: 0**

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

**Conservation status: Least concern**

**Conservation status IUCN:** Least concern

**Official IUCN Conservation Status:** NE

**Comments:** Terra typica: "Asia" (fide Linnaeus 1758; in error).

*Tachymenis attenuata* WALKER

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**Figure 514 Extrapolated Distribution of Tachymenis attenuata**

**Figure 515 Fragmentation of Habitat of Tachymenis attenuata**

**Map Quality:** High confidence

**Global distribution:** Peru, Bolivia (Cochabamba, Santa Cruz)

**Taxonomic status:** OK

**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 4744: 0
Distr. Total = 5810; EDC 1 = 3957; EDC 2 = 787; EDC 3 = 408; EDC 4 = 270; EDC 5 = 388

**Fragmentation:** NONE: 0

**Distribution in good National parks:** VERY STRONG: 0
2848 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, Isiboro Sécure, Madidi, Pilon Lajas, Tunari

**Use:** NONE: 0

**Rarity:** NORMAL: 1

0+0+0+0+1 = 1

**Conservation status:** Least concern

**Conservation status IUCN:** Least concern

**Official IUCN Conservation Status:** NE

**Comments:** Terra typica: Peru (Dep. Madre de Dios)

*Tachymenis elongata* DESPAX

**Map Quality:** High confidence

**Global distribution:** Peru, Bolivia (La Paz, Cochabamba, Oruro)

**Taxonomic status:** OK

**Distribution status:** OK

**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 339: 5  
Distr. Total = 2213; EDC 1 = 106; EDC 2 = 233; EDC 3 = 379; EDC 4 = 688; EDC 5 = 807  
**Fragmentation:** VERY STRONG: 12  
Very strong fragmentation by strong habitat destruction near Oruro, Cochabamba and La Paz.  
**Distribution in good National parks:** LOW: 2  
30 grid cells in Parks: Apolobamba, Tunari  
**Use:** NONE: 0  
**Rarity:** RARE: 3  
5+12+2+0+3 = 22  
**Conservation status:** Critically endangered  
**Conservation status IUCN:** EN B1ab(i)  
Species distribution is below 5000km², strongly fragmented and underlies very fast and strong habitat destruction.  
**Official IUCN Conservation Status:** NE  
**Comments:** Elevation 2600-2980 m. Terra typica: Tablazo de Payta, Peru, 30 m.  

**Tachymenis peruviana** WIEGMANN  

![Figure 518 Extrapolated Distribution of Tachymenis peruviana](image1)  
![Figure 519 Fragmentation of Habitat of Tachymenis peruviana](image2)  

**Map Quality:** High confidence  
**Global distribution:** Peru, Chile, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Potosi, Tarija)  
**Taxonomic status:** OK
Sensibility for habitat alteration: **SENSIBLE**
Distribution Value: 7657: 0
Distr. Total = 14463; EDC 1 = 5602; EDC 2 = 2055; EDC 3 = 1312; EDC 4 = 1525; EDC 5 = 3969

**Fragmentation: STRONG: 5**
Strong fragmentation by strong habitat destruction near Cochabamba.

**Distribution in good National parks:** **VERY STRONG: 0**
3070 grid cells in Parks: Aguarague, Amoró, Apolobamba, Carrasco, Cordillera de Sama, Cotapata, El Palmar, Inao, Isiboro Sécure, Madidi, Pilon Lajas, Tariquia, Torotoro, Tunari

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

0+5+0+0+0 = 5

**Conservation status: Least concern**

Conservation status IUCN: **Least concern**
Official IUCN Conservation Status: NE
Comments: Elevation 2600-2980 m.

*Tachymenis tarmensis* WALKER

**Map Quality:** High confidence
**Global distribution:** Peru, Bolivia (Cochabamba, La Paz)
**Taxonomic status:** OK
Sensibility for habitat alteration: **SENSIBLE**

**Distribution Value: 1515: 2**

Distr. Total = 1689; EDC 1 = 1258; EDC 2 = 257; EDC 3 = 47; EDC 4 = 39; EDC 5 = 88

**Fragmentation: NONE: 0**

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

532 grid cells in Parks: Apolobamba, Carrasco, Cotapata, Isiboro Sécure, Madidi, Pilon Lajas, Tunari

**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: Tarma, Dep. de Junin, Peru

*Tantilla melanocephala* (**LINNAEUS**)

**Map Quality:** High confidence

**Global distribution:** Mexico?, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Trinidad, Tobago, Colombia, Venezuela, Brazil, Argentina, Uruguay, Guyana, Surinam, French Guiana, Ecuador, Peru, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija).
Taxonomic status: **OK**  
Sensibility for habitat alteration: **SENSIBLE**  
Distribution Value: **45346: 0**  
Distr. Total = 54005; EDC 1 = 34734; EDC 2 = 10612; EDC 3 = 5108; EDC 4 = 2734; EDC 5 = 817  
**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  
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: "America".

*Tantilla* sp. nov.
Map Quality: High confidence
Global distribution: Bolivia (Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: TOLERANT
Distribution Value: 7: 10
Distr. Total = 43; EDC 1 = 2; EDC 2 = 1; EDC 3 = 4; EDC 4 = 10; EDC 5 = 26
Fragmentation: STRONG: 5
Some fragmentation of the very limited habitat. Although habitat reduced drastically no wide gaps or strongly separated distribution areas are to be found.
Distribution in good National parks: NONE: 3
Use: NONE: 0
Rarity: VERY COMMON: 0

10+5+3+0+0 = 18

Conservation status: Endangered

Conservation status IUCN: EN B2ab(iii)
Specimens from the inter Andean dry valleys have been found to be significantly different to specimens from the lowlands supposing them to belong to a new species which would be endemic to a small area in the inter Andean dry valleys. This area underlies a high anthropogenic pressure by fast habitat destruction for agriculture. Although the species seems to be quite tolerant, as it has been found in quite degenerated habitat the evaluation in this work found it to be endangered. The same result has been obtained using the Official IUCN methodology. It is known from a very small area with few localities known for this species. Habitat destruction and reduction of habitat quality are the main reasons for the result.

Official IUCN Conservation Status: NE
Comments:
**Thamnodynastes chaquensis** BERGNA & ALVAREZ

Map Quality: High confidence

Global distribution: Argentina, Paraguay, Uruguay, Bolivia (Tarija)

Taxonomic status: **OK**

Sensibility for habitat alteration: **SENSIBLE**

Distribution Value: **478: 5**

Distr. Total = 603; EDC 1 = 371; EDC 2 = 107; EDC 3 = 67; EDC 4 = 38; EDC 5 = 20

Fragmentation: **NONE: 0**

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

283 grid cells in Parks: Aguarague, Tariquia

Use: **NONE: 0**

Rarity: **RARE: 3**

\[
5+0+0+0+3 = 8
\]

**Conservation status: Near Threatened**

Conservation status IUCN: **Least concern**

Official IUCN Conservation Status: **NE**

Comments: Viviparous
**Thamnodynastes pallidus** (Linnaeus)

Map Quality: High confidence

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

Taxonomic status: OK

Sensibility for habitat alteration: SENSIBLE

Distribution Value: **38302**: 0

Distr. Total = 46320; EDC 1 = 28901; EDC 2 = 9401; EDC 3 = 4661; EDC 4 = 2425; EDC 5 = 932

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


Use: NONE: 0

Rarity: VERY COMMON: 0

0+1+0+0+0+0 = 1

**Conservation status: Least concern**

Conservation status IUCN: Least concern
**Thamnodynastes sp.**

**Map Quality:** High confidence

**Global distribution:**
- **Taxonomic status:** OK
- **Sensibility for habitat alteration:** SENSIBLE
- **Distribution Value:** 19816: 0
  - Distr. Total = 23238; EDC 1 = 16388; EDC 2 = 3428; EDC 3 = 1251; EDC 4 = 1108; EDC 5 = 1063
- **Fragmentation:** SOME: 1
- Some fragmentation by highways.
- **Distribution in good National parks:** VERY STRONG: 0
  - 6797 grid cells in Parks: Amboró, Carrasco, El Palmar, Iñao, Kaa-Iya, NKM, Otuquis, San Matías, 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:

**Tomodon orestes** Harvey & Muñoz

Figure 532 Extrapolated Distribution of Tomodon orestes

Map Quality: High confidence
Global distribution: Bolivia (Tarija)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 0: 13
Distr. Total = 0; EDC 1 = 0; EDC 2 = 0; EDC 3 = 0; EDC 4 = 0; EDC 5 = 2
Fragmentation: NONE: 0
All habitat (7.2km²) is in worst condition (EDC5) and that fore no habitat better than EDC3 is left over.
Distribution in good National parks: NONE: 3
Use: NONE: 0
Rarity: RARE: 3

13+0+3+0+3 = 19

Conservation status: Endangered

Conservation status IUCN: CR 1ab(iii)
Official IUCN Conservation Status: NE
**Waglerophis merremi** \ WAGLER

**Comments:** Terra typica: close to the Río Erquis, Reserva de Sama, Méndez province, Tarija, Bolivia, 2754 m elevation (21° 28' 56" S, 64° 50' 32" W). Named after the Greek noun in apposition, meaning an inhabitant of mountains. Holotype: CBF 2316.

**Map Quality:** High confidence
**Global distribution:** Guyana, Surinam, French Guiana, Brazil, Venezuela, Paraguay, Argentina, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)
**Taxonomic status:** OK
**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 39525: 0
Distr. Total = 48485; EDC 1 = 30534; EDC 2 = 8991; EDC 3 = 3994; EDC 4 = 2912; EDC 5 = 2054
**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
**Use:** SOME: 2
This false Bothrops is regarded as very venomous and killed by occasion.
**Rarity:** VERY COMMON: 0
0+1+0+2+0 = 3

**Conservation status: Least concern**

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Bahia, Brazil. In Bolivia two different subspecies may occur, one unknown to the science until now.

*Xenodon neuwiedi* GÜNTHER

Map Quality: High confidence
Global distribution: Brazil, Paraguay, Argentina, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 8662: 0
Distr. Total = 11107; EDC 1 = 6356; EDC 2 = 2306; EDC 3 = 1462; EDC 4 = 724; EDC 5 = 259
Fragmentation: SOME: 1
Some fragmentation by highways.
Distribution in good National parks: VERY STRONG: 0
1975 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, EBB, Isiboro Sécure, Madidi, Otuquis, 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:

*Xenodon rabdocephalus* (WIED)

**Map Quality:** High confidence
**Global distribution:** Mexico, Guatemala, Honduras, Nicaragua, Belize, El Salvador, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Brazil, Peru, Guyana, Surinam, French Guiana, Bolivia (Beni, La Paz, Pando)

**Taxonomic status:** OK
**Sensibility for habitat alteration:** SENSIBLE
**Distribution Value:** 11727: 0
Distr. Total = 13721; EDC 1 = 8409; EDC 2 = 3318; EDC 3 = 1594; EDC 4 = 342; EDC 5 = 58
**Fragmentation:** NONE: 0
**Distribution in good National parks:** VERY STRONG: 0
2920 grid cells in Parks: Apolobamba, EBB, Madidi, Manuripi-Heath, Pilon Lajas
**Use:** NONE: 0
**Rarity:** RARE: 3
Conservation status: Least concern

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

Xenodon severus (LINNAEUS)

Map Quality: High confidence
Global distribution: Brazil, Venezuela, Colombia, Ecuador, Peru, French Guiana, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 23073: 0
Distr. Total = 29171; EDC 1 = 16572; EDC 2 = 6501; EDC 3 = 3654; EDC 4 = 1807; EDC 5 = 637
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
5681 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Ñiaoa, Isiboro Sècure, Madidi, Manuripi-Heath, NKM, Pilon Lajas, 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: "Asia" (in error)

**Xenopholis scalaris** *(WUCHERER)*

**Map Quality:** High confidence  
**Global distribution:** Peru, Ecuador, Brazil, French Guiana, Colombia, Bolivia (Beni, Cochabamba, La Paz, Pando)  
**Taxonomic status:** **OK**  
**Sensibility for habitat alteration:** **SENSIBLE**  
**Distribution Value:** **18135: 0**  
Distr. Total = 21600; EDC 1 = 12936; EDC 2 = 5199; EDC 3 = 2592; EDC 4 = 702; EDC 5 = 171  
**Fragmentation:** **SOME: 1**  
Some fragmentation by highways.  
**Distribution in good National parks:** **VERY STRONG: 0**  
41128 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: Canaviras, Matta de Sao Joao, Brazil

**Xenoxybelis argenteus** *(DAUDIN)*

**Map Quality:** High confidence  
**Global distribution:** Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Venezuela, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** SENSIBLE  
**Distribution Value:** 10034: 0  
**Distr. Total = 11804; EDC 1 = 6543; EDC 2 = 3491; EDC 3 = 1474; EDC 4 = 251; EDC 5 = 45  
**Fragmentation:** NONE: 0  
**Distribution in good National parks:** VERY STRONG: 0  
1820 grid cells in Parks: Apolobamba, Cotapata, Isiboro Sécure, Madidi, Manuripi-Heath, Pilon Lajas, San Matías  
**Use:** NONE: 0
Rarity: RARE: 3

0+0+0+0+3 = 3

Conservation status: Least concern

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

**Figure 545** *Bothrops sanctaecruzis*  
**Figure 546** *Lachesis muta*

**Figure 547** *Bothrops mattrgossensis*  
**Figure 548** *Bothrops andianus*

**Figure 549** *Crotalus durissus*  
**Figure 550** *Crotalus durissus*
**Bothriopsis bilineata** *(Wied)*

**Map Quality:** High confidence  
**Global distribution:** Brazil, Venezuela, Colombia, Ecuador, Peru, Guyana, Surinam, French Guiana, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)  
**Taxonomic status:** OK  
**Sensibility for habitat alteration:** VERY SENSIBLE  
**Distribution Value:** **35072:** 0  
Distr. Total = 55192; EDC 1 = 35072; EDC 2 = 10679; EDC 3 = 5236; EDC 4 = 2924; EDC 5 = 1281  
**Fragmentation:** **SOME:** 1  
Some fragmentation of habitat because of Highways and alteration of habitat near Santa Cruz, Trinidad and in the Chapare region.  
**Distribution in good National parks:** VERY STRONG: 0  
**Use:** SOME: 2  
Species killed by occasion because it is known as venomous  
**Rarity:** VERY COMMON: 0  

\[0+1+0+2+0 = 3\]

**Conservation status:** Least concern
Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Marobá, Rio Peruhype, Estado da Bahia, Brazil

*Bothriopsis oligolepis* (WERNER)

Map Quality: High confidence
Global distribution: Peru, Bolivia (Beni, La Paz, Pando)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 3765: 0
Distr. Total = 4364; EDC 1 = 3116; EDC 2 = 649; EDC 3 = 296; EDC 4 = 139; EDC 5 = 164
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0
1963 grid cells in Parks: Apolobamba, Cotapata, Madidi, Pilón Lajas
Use: SOME: 2
Species killed by occasion because it is known as venomous
Rarity: RARE: 3

0+0+0+2+3 = 5

Conservation status: Least concern
**Comments:** Terra typica: Bolivia

**Bothriopsis taeniata** *WAGLER*

**Map Quality:** High confidence

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

**Taxonomic status:** OK

**Sensibility for habitat alteration:** VERY SENSIBLE

**Distribution Value:** 13253: 0

Distr. Total = 21863; EDC 1 = 13253; EDC 2 = 5188; EDC 3 = 2563; EDC 4 = 685; EDC 5 = 173

**Fragmentation:** SOME: 1

Some fragmentation of habitat because of Highways and alteration of habitat near Trinidad and Rurrenabaque.

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

4222 grid cells in Parks: Apolobamba, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi, Pilón Lajas

**Use:** SOME: 2

Species killed by occasion because it is known as venomous

**Rarity:** RARE: 3

0+1+0+2+3 = 6

**Conservation status:** Near Threatened
Bothrocophias hyoprora (AMARAL)

Map Quality: High confidence
Global distribution: Colombia, Ecuador, Peru, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 5321: 0
Distr. Total = 6193; EDC 1 = 4352; EDC 2 = 969; EDC 3 = 598; EDC 4 = 226; EDC 5 = 48
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0
2381 grid cells in Parks: Apolobamba, Cotapata, Isiboro Sècure, Madidi, Manuripi, Pilon Lajas
Use: SOME: 2
Species killed by occasion because it is known as venomous
Rarity: RARE: 3
0+0+0+2+3 = 5

Conservation status: Least concern
Conservation status IUCN: **Least concern**

Official IUCN Conservation Status: **NE**

Comments: Species is not reported for Bolivia by Uetz (2000).

**Bothrocophias microptalmus** *(COPE)*

Map Quality: High confidence

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

Taxonomic status: **OK**

Sensibility for habitat alteration: **SENSIBLE**

Distribution Value: **16892: 0**

Distr. Total = 21042; EDC 1 = 12019; EDC 2 = 4873; EDC 3 = 2615; EDC 4 = 1139; EDC 5 = 396

Fragmentation: **SOME: 1**

Some fragmentation of habitat because of Highways and alteration of habitat near Santa Cruz, Trinidad and in the Chapare region.

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

4543 grid cells in Parks: Amborò, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Isiboro Sécure, Madidi, Manuripi, Pilón Lajas

Use: **SOME: 2**

Species killed by occasion because it is known as venomous

Rarity: **RARE: 3**

0+1+0+2+3 = 6
**Conservation status: Near Threatened**

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

*Bothrops andianus* AMARAL

![Figure 561 Extrapolated Distribution of *Bothrops andianus*](image1)
![Figure 562 Fragmentation of Habitat of *Bothrops andianus*](image2)

Map Quality: High confidence
Global distribution: Peru, Bolivia (Beni, Cochabamba, Chuquisaca, La Paz, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 4573: 0
Distr. Total = 5533; EDC 1 = 3837; EDC 2 = 736; EDC 3 = 392; EDC 4 = 239; EDC 5 = 329
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0
2539 grid cells in Parks: Amboró, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, Iñao, Isiboro Sécure, Madidi, Pilón Lajas, Tunari
Use: SOME: 2
species killed by occasion because it is known as venomous
Rarity: COMMON: 0

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

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Machu Pichu, Department Cuzco, Peru, 8000-10,000 ft. (Uetz 2005)

Bothrops atrox (LINNAEUS)

Map Quality: High confidence
Global distribution: Guyana, Surinam, French Guiana, Venezuela, Brazil, Colombia, Ecuador, Peru, Trinidad, Bolivia (Cochabamba, Beni, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 32209: 0
Distr. Total = 39552; EDC 1 = 23955; EDC 2 = 8254; EDC 3 = 4307; EDC 4 = 2168; EDC 5 = 868
Fragmentation: SOME: 1
Some fragmentation of habitat because of Highways and alteration of habitat near Santa Cruz, Trinidad and in the Chapare region.
Distribution in good National parks: VERY STRONG: 0
8354 grid cells in Parks: Amborò, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Ñaño, Isiboro Sécure, Iténez, Madidi, Manuripi, NKM, Pilón Lajas, Tunari
Use: SOME: 2
Species killed by occasion because it is known as venomous
Rarity: VERY COMMON: 0
0+1+0+2+0 = 3

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: „Terra typica: "Asia". This species may include a number of other nominal species, especially B. colombiensis, B. isabelae, B. leucurus, B. marajoensis, B. moojeni, B. pradoi. In addition, B. atrox has often been confused with B. asper. Bothrops isabelae has been synonymized with B. atrox by several authors but used as a valid species by Kornacker (1999). See also McDiarmid et al. (1999) for discussion.“ (Uetz 2005).

Bothrops jonathani HARVEY

Figure 565 Extrapolated Distribution of Bothrops jonathani
Figure 566 Fragmentation of Habitat of Bothrops jonathani

Map Quality: High confidence
Global distribution: Bolivia (Chuquisaca, Cochabamba, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 1177: 2
Distr. Total = 1853; EDC 1 = 912; EDC 2 = 265; EDC 3 = 125; EDC 4 = 169; EDC 5 = 382
Fragmentation: NONE: 0
Distribution in good National parks: VERY STRONG: 0
974 grid cells in Parks: Amborò, Carrasco, El Palmar, Iñao
Use: SOME: 2
Species killed by occasion because it is known as venomous
Rarity: **NORMAL: 1**

\[2+0+0+2+1 = 5\]

**Conservation status: Least concern**

Conservation status IUCN: **Least Concern**

Official IUCN Conservation Status: **NE**

**Bothrops matogrossensis** **AMARAL**

Figure 567 Extrapolated Distribution of *Bothrops matogrossensis*

Figure 568 Fragmentation of Habitat of *Bothrops matogrossensis*

**Map Quality:** Medium confidence

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

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

**Sensibility for habitat alteration:** **TOLERANT**

**Distribution Value:** **31794:** 0

Distr. Total = 36402; EDC 1 = 22352; EDC 2 = 6603; EDC 3 = 2839; EDC 4 = 2384; EDC 5 = 2224

**Fragmentation:** **NONE:** 0

the species shows tolerance for habitat alteration, enters into plantations and is frequently found within human urbanizations.

**Distribution in good National parks:** **VERY STRONG:** 0
7727 grid cells in Parks: Aguarague, Amborò, Apolobamba, Carrasco, Cordillera de Sama, Cotapata, El Palmar, EBB, Ñao, Kaa-Iya, Madidi, NKM, Otuquis, Pilón Lajas, San Matías, Tucavaca, Tariquia, Torotoro, Tunari

Use: SOME: 2
species killed by occasion because it is known as venomous
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:

Bothrops moojeni (HOGE)

Map Quality: Low confidence
This extrapolation is based on the collection of only 3 specimens. The very isolated areas in the Departments of Tarija, Chuquisaca, La Paz and Cochabamba are surely not correct as shown. Distribution in Santa Cruz and Beni Department could be as shown but has to be proven by collection of more material.

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

Taxonomic status: OK
Sensibility for habitat alteration: **SENSIBLE**

Distribution Value: 7688: 0

Distr. Total = 8638; EDC 1 = 6356; EDC 2 = 1332; EDC 3 = 488; EDC 4 = 333; EDC 5 = 129

**Fragmentation: SOME: 1**

Some fragmentation of habitat because of Highways

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

13262 grid cells in Parks: Aguarague, Amborò, Cotapata, Ñaño, Ñànez, Kaa-Iya, NKM, Otuquis, San Matías, Tucavaca, Tariquía

**Use: SOME: 2**

Species killed by occasion because it is known as venomous

**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: Brasilia, Federal District, Brazil.

**Bothrops sanctaecruzis** HOGE, 1966

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**Figure 571 Extrapolated Distribution of Bothrops sanctaecruzis**

**Figure 572 Fragmentation of Habitat of Bothrops sanctaecruzis**

**Map Quality:** High confidence

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

**Taxonomic status:** OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 4008: 0
Distr. Total = 5850; EDC 1 = 3172; EDC 2 = 836; EDC 3 = 710; EDC 4 = 841; EDC 5 = 291
Fragmentation: SOME: 1
Some fragmentation of habitat because of Highways and alteration of habitat near Santa Cruz and in the Chapare region.
Distribution in good National parks: VERY STRONG: 0
1782 grid cells in Parks: Amborò, Carrasco, Cavernas del Repechón, Isiboro Sécure
Use: SOME: 2
species killed by occasion because it is known as venomous
Rarity: COMMON: 0

0+1+0+2+0 = 3

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

*Crotalus durissus* LINNAEUS

Figure 573 Extrapolated Distribution of *Crotalus durissus*

Figure 574 Fragmentation of Habitat of *Crotalus durissus*

Map Quality: High confidence
Global distribution: Mexico, Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Brazil, Venezuela, Guyana, Surinam, French Guiana, Argentina, Paraguay, Uruguay, Aruba I, Colombia, Bolivia (Beni, Chuquisaca, Cochabamba, La Paz, Pando, Santa Cruz, Tarija)

Taxonomic status: OK

Sensibility for habitat alteration: VERY TOLERANT

Distribution Value: 39722: 0
Dist. Total = 40672; EDC 1 = 26406; EDC 2 = 8119; EDC 3 = 3380; EDC 4 = 1817; EDC 5 = 950

Fragmentation: NONE: 0

Distribution in good National parks: VERY STRONG: 0

Use: SOME: 2
Species killed by occasion because it is known as venomous

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 III. Terra typica: "America"

_Lachesis muta_ (Linnaeus)

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Figure 575 Extrapolated Distribution of _Lachesis muta_  
Figure 576 Fragmentation of Habitat of _Lachesis muta_
Map Quality: High confidence
Global distribution: Colombia, Ecuador, Brazil, Venezuela, Surinam, French Guiana, Guyana, Trinidad, Peru, Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz)
Taxonomic status: OK
Sensibility for habitat alteration: SENSIBLE
Distribution Value: 28641: 0
Distr. Total = 35441; EDC 1 = 21062; EDC 2 = 7579; EDC 3 = 4070; EDC 4 = 2032; EDC 5 = 698
Fragmentation: SOME: 1
Some fragmentation of habitat because of highways and alteration of habitat near Santa Cruz, Trinidad and in the Chapare region.
Distribution in good National parks: VERY STRONG: 0
6317 grid cells in Parks: Amborô, Apolobamba, Carrasco, Cavernas del Repechón, Cotapata, EBB, Isiboro Sécure, Iténez, Madidi, Manuripi, Pilón Lajas
Use: SOME: 2
Species killed by occasion because it is known as venomous
Rarity: COMMON: 0
0+1+0+2+0 = 3

Conservation status: Least concern

Conservation status IUCN: Least concern
Official IUCN Conservation Status: NE
Comments: Terra typica: Surinam; restricted to “Vitória, ES, Brazil“.
3.3 Abstract of the Results

A total of 269 reptile species have been evaluated for its conservation status. 211 of them are evaluated 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 Caimans, 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. Chapter 3.4 gives a more exact comparison of the results of these two methodologies. 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”.

Finally 23 species have been found to be listed in CITES II, one species in CITES I and one species in CITES III.

In the observation column of Table 4 are also mentioned the 14 Species which have been “raised” into the category “Near Threatened” because of taxonomic problems.

In the following table the results of the evaluations are listed in detail for all 269 species. The results have been splinted for Ophidians, Sauria, Caimans and Turtles. The first column shows the species names, the second shows the detailed values given in the evaluation which led to the Conservation status result listed in the third column. The fourth column shows the results using the IUCN methodology, the fifth column the official IUCN Conservation status (ver 3.1 (2001)) and the last column shows comments and if the species is included in one of the CITES appendices. The order of the values in the first column is: Distribution + Fragmentation + Distribution in Protected Areas + Use + Rarity.
<table>
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<th>Species name</th>
<th>Points</th>
<th>Conservation status</th>
<th>Conservation status IUCN</th>
<th>Official Conservation status IUCN</th>
<th>Observations</th>
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### Polychridae

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<th>Diversity</th>
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### Tropiduridae

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<td><em>Tropidurus callathelys</em></td>
<td>8 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Tropidurus chromatops</em></td>
<td>5 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Tropidurus etheridgei</em></td>
<td>0 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Tropidurus melanopleurus</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
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</tr>
<tr>
<td><em>Tropidurus plica</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
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</tr>
<tr>
<td><em>Tropidurus spinulosus</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Tropidurus torquatus</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Tropidurus umbra</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Tropidurus xanthochilus</em></td>
<td>14 LC, 1 LC,</td>
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<td>1 NE</td>
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</table>

### Liolaemidae

<table>
<thead>
<tr>
<th>Species</th>
<th>Statuses</th>
<th>Distribution</th>
<th>Diversity</th>
<th>Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Liolaemus alticolor</em></td>
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<td>1 NE</td>
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</tr>
<tr>
<td><em>Liolaemus chacoensis</em></td>
<td>4 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
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<tr>
<td><em>Liolaemus cranwelli</em></td>
<td>33 CR, 1 EN</td>
<td></td>
<td>1 NE</td>
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</tr>
<tr>
<td><em>Liolaemus dorbignyi</em></td>
<td>5 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Liolaemus fittkau</em></td>
<td>31 CR, 1 CR</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
<tr>
<td><em>Liolaemus forsteri</em></td>
<td>10 NT, 1 LC,</td>
<td></td>
<td>1 NE</td>
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</tr>
<tr>
<td><em>Liolaemus islugensis</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
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<tr>
<td><em>Liolaemus jamesi</em></td>
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<td></td>
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<td><em>Liolaemus orientalis</em></td>
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<td></td>
<td>1 NE</td>
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<tr>
<td><em>Liolaemus ornatus</em></td>
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<td></td>
<td>1 NE</td>
<td></td>
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<tr>
<td><em>Liolaemus pantherinus</em></td>
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<td></td>
<td>1 NE</td>
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<tr>
<td><em>Liolaemus schmidtii</em></td>
<td>11 VU, 1 LC,</td>
<td></td>
<td>1 NE</td>
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<td><em>Liolaemus signifer</em></td>
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<td>1 NE</td>
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<tr>
<td><em>Liolaemus variegatus</em></td>
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<td>1 NE</td>
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### Gekkonidae

<table>
<thead>
<tr>
<th>Species</th>
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<th>Distribution</th>
<th>Diversity</th>
<th>Conservation</th>
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<tr>
<td><em>Gonatodes hasemani</em></td>
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</tr>
<tr>
<td><em>Gonatodes humeralis</em></td>
<td>1 LC, 1 LC,</td>
<td></td>
<td>1 NE</td>
<td></td>
</tr>
</tbody>
</table>
### Distribution, diversity and conservation status of Bolivian Reptiles

**Dirk Embert**

#### Hemidactylus mabouia
- **Status**: LC
- **TAXONOMIC STATUS**: NE

#### Homonota fasciata
- **Status**: LC
- **TAXONOMIC STATUS**: NE

#### Lygodactylus wetzeli
- **Status**: LC
- **TAXONOMIC STATUS**: NE

#### Phyllopezus pollicaris
- **Status**: LC
- **TAXONOMIC STATUS**: NE

#### Thecadactylus rapicauda
- **Status**: LC
- **TAXONOMIC STATUS**: NE

#### Gymnophthalmidae

- **Alopoglossus angulatus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Arthrosaura kockii**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Bachia dorbignyi**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Cnemidophorus lacertoides**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Cnemidophorus ocellifer**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Gymnophthalmidae**

- **Iphisa elegans**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Micrablepharus maximiliani**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Potamites ecleopus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Potamites ocellatus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Opheutea xestus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Cercosaura (Pantodactylus) schrebersii**
  - **Status**: NT
  - **TAXONOMIC STATUS**: LC
  - **TAXONOMIC STATUS**: NE

- **Cercosaura (Prionodactylus) argentus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Cercosaura (Prionodactylus) eigenmannii**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Cercosaura (Prionodactylus) manicatus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Proctoporus bolivianus**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Proctoporus guentheri**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Vanzosura rubricaudo**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

#### Teiidae

- **Ameiva ameiva**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Ameiva vittata**
  - **Status**: CR
  - **TAXONOMIC STATUS**: EN lab (iii)

- **Cercosaura ocellata**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Dracaena paraguayensis**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Kentropyx altamazonica**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Kentropyx calcara**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Kentropyx pauliensis**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Kentropyx pelviceps**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Kentropyx vannzi**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Kentropyx viridistriga**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Teius cyanogaster**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Teius teyou**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Tupinambis melianae**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Tupinambis rufescens**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Tupinambis teguixin**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

#### Scincidae

- **Mabuya cochabambae**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

- **Mabuya dorsivittata**
  - **Status**: LC
  - **TAXONOMIC STATUS**: NE

---

**Note:** The table above lists the distribution, diversity, and conservation status of various Bolivian reptile species. The data includes species names, distribution data in the form of a formula representing population size, and their conservation status (LC = Least Concern, NE = Near Threatened). The table also indicates the taxonomic status as either certain or uncertain.
### Distribution, diversity and conservation status of Bolivian Reptiles

**Dirk Embert**

---

<table>
<thead>
<tr>
<th>Taxon</th>
<th>IUCN Status</th>
<th><strong>Conservation Status</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mabuya frenata</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Mabuya guaporicola</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Mabuya nigropunctata</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
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</table>

#### Anguidae

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Diploglossus fasciatus</strong></td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Ophiodes intermedius</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>NT</td>
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#### Amphisbaenidae

<table>
<thead>
<tr>
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<th>IUCN Status</th>
<th><strong>Conservation Status</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Amphisbaena alba</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Amphisbaena angustifrons</strong></td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Amphisbaena bolivica</strong></td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Amphisbaena camara</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Amphisbaena cegei</strong></td>
<td>5+5+2+0+0 = 12</td>
<td>VU</td>
</tr>
<tr>
<td><strong>Amphisbaena darwinii</strong></td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Amphisbaena fuliginosa</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Amphisbaena silvestrii</strong></td>
<td>10+12+3+0+3 = 28</td>
<td>CR</td>
</tr>
<tr>
<td><strong>Amphisbaena slateri</strong></td>
<td>5+0+0+0+3 = 8</td>
<td>NT</td>
</tr>
<tr>
<td><strong>Amphisbaena vernicularis</strong></td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Cercolophia borelli</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Cercolophia steindachneri</strong></td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Leposternon microcephalum</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
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</table>

#### Infraorden SERPENTES

#### Leptotyphlopidae

<table>
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<tbody>
<tr>
<td><strong>Leptotyphlops melanotermus</strong></td>
<td>0+1+0+0+0 = 1</td>
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<tr>
<td><strong>Leptotyphlops septemstriatus</strong></td>
<td>0+1+0+0+1 = 2</td>
<td>NT</td>
</tr>
<tr>
<td><strong>Leptotyphlops striatula</strong></td>
<td>0+0+1+0+5 = 6</td>
<td>NT</td>
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<tr>
<td><strong>Leptotyphlops undecimstriatus</strong></td>
<td>13+12+3+0+3 = 31</td>
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</tr>
<tr>
<td><strong>Leptotyphlops unguirostris</strong></td>
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<td>LC</td>
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</table>

#### Typhlopidae

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<td><strong>Typhlops brongersmianus</strong></td>
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</tr>
<tr>
<td><strong>Typhlops reticulatus</strong></td>
<td>0+1+0+0+0 = 4</td>
<td>NT</td>
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</table>

#### Boidae

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<tbody>
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<td><strong>Boa constrictor</strong></td>
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<td>LC</td>
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<tr>
<td><strong>Corallus caninus</strong></td>
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<td>LC</td>
</tr>
<tr>
<td><strong>Corallus hortulanus</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
<tr>
<td><strong>Epicrates cenchria</strong></td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
</tr>
</tbody>
</table>

**CITES Appendice II**
| Distribution, diversity and conservation status of Bolivian Reptiles | Dirk Embert | 354 |

| **Eunectes beniensis** | 0+1+0+2+3 = 6 | NT | LC | NE | CITES Appendice II |
| **Eunectes murinus** | 0+1+0+2+0 = 3 | LC | LC | NE | CITES Appendice II |
| **Eunectes notaeus** | 0+1+0+2+1 = 4 | LC | LC | NE | CITES Appendice II |

**Elapidae**

| Eunectes beniensis | 0+1+0+2+3 = 6 | NT | LC | NE | CITES Appendice II |
| Eunectes murinus | 0+1+0+2+0 = 3 | LC | LC | NE | CITES Appendice II |
| Eunectes notaeus | 0+1+0+2+1 = 4 | LC | LC | NE | CITES Appendice II |

**Colubridae**

| Micrurus annellatus | 0+1+0+2+0 = 3 | LC | LC | NE |
| Micrurus diana | 0+1+0+2+3 = 6 | NT | NT | NE |
| Micrurus hemprichii | 0+0+0+2+3 = 5 | LC | LC | NE |
| Micrurus lemniscatus | 0+1+0+2+0 = 3 | LC | LC | NE |
| Micrurus narducii | 0+1+0+0+1 = 2 | LC | LC | NE |
| Micrurus obscurus | 0+1+0+2+1 = 4 | LC | LC | NE |
| Micrurus pyrrhocryptus | 0+1+0+2+1 = 4 | LC | LC | NE |
| Micrurus serranus | 0+0+1+2+0 = 3 | LC | LC | NE |
| Micrurus spixii | 0+1+0+2+1 = 4 | LC | LC | NE |
| Micrurus surinamensis | 0+0+1+2+1 = 4 | LC | LC | NE |

**Colubridae**

| Apostolepis ambiniger | 0+0+0+2+3 = 6 | NT | LC | NE |
| Apostolepis breviceps | 5+0+3+0+1 = 9 | NT | LC | NE |
| Apostolepis dorbignyi | 0+2+2+0+3 = 7 | NT | LC | NE |
| Apostolepis multicincta | 10+12+3+2+0 = 27 | CR | VU (D2) | NE |
| Apostolepis nigroterminata | 0+1+0+0+0 = 1 | NT | LC | NE | TAXONOMIC STATUS UNCERTAIN |
| Apostolepis phillipsi | 5+0+1+0+8 = 14 | VU | LC | NE |
| Apostolepis tenuis | 0+1+0+0+3 = 4 | LC | LC | NE |
| Apostolepis vittata | 0+1+0+0+3 = 4 | NT | LC | NE | TAXONOMIC STATUS UNCERTAIN |

**Elapidae**

<p>| Atractus balzani | 5+5+3+0+8 = 21 | EN | EN B1ab (iii) | NE |
| Atractus bocki | 10+5+3+0+8 = 26 | CR | EN B1ab (iii) | NE |
| Atractus boettgeri | 0+1+0+0+3 = 4 | LC | LC | NE |
| Atractus latifrons | 0+1+0+2+1 = 4 | LC | LC | NE |
| Atractus major | 0+1+0+0+3 = 4 | LC | LC | NE |
| Atractus snethlageae | 0+1+0+3 = 4 | LC | LC | NE |
| Atractus taeniatus | 13+12+3+0+8 = 36 | CR | CR 1ab (iii) | NE |
| Boiruna maculata | 0+1+0+0+3 = 4 | LC | LC | NE |
| Clelia bicolor | 0+1+0+0+3 = 4 | LC | LC | NE |
| Clelia clelia | 0+1+0+0+0 = 1 | LC | LC | NE | CITES Appendice II |</p>
<table>
<thead>
<tr>
<th>Species</th>
<th>Distribution</th>
<th>Conservation Status</th>
<th>IUCN</th>
<th>CITES Status</th>
</tr>
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<td>Clelia langeri</td>
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<td>NT</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Dendrophidion dendrophis</td>
<td>0+1+0+0+0 = 1</td>
<td>NT</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Dipsas catesbyi</td>
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<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Dipsas chaparensis</td>
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<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Dipsas indica</td>
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<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Dipsas pavonina</td>
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<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Drepanoides anomalus</td>
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<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Drymarchon corais</td>
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<td>NE</td>
</tr>
<tr>
<td>Drymobius rhombifer</td>
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<td>NE</td>
</tr>
<tr>
<td>Drepanoidea occipitalis</td>
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<td>NE</td>
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<tr>
<td>Erythrolamprus aesculapii</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
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<td>NE</td>
</tr>
<tr>
<td>Helicops angulatus</td>
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<td>NE</td>
</tr>
<tr>
<td>Helicops leopardinus</td>
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<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Helicops polyplepis</td>
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<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Hydrodynastes gigas</td>
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<td>LC</td>
<td>LC</td>
<td>SE</td>
</tr>
<tr>
<td>Hydrops triangularis</td>
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<td>NE</td>
</tr>
<tr>
<td>Imanodes cenchoa</td>
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<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Imanodes lentiferus</td>
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<td>LC</td>
<td>NE</td>
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<tr>
<td>Leptodeira annulata</td>
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<td>NE</td>
</tr>
<tr>
<td>Leptophis ahaetulla</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis almadensis</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis andinus</td>
<td>5+1+0+0+8 = 14</td>
<td>VU</td>
<td>VU</td>
<td>B2ab(iii)</td>
</tr>
<tr>
<td>Liophis anomalus</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis cetti</td>
<td>0+1+1+0+0 = 2</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis cobellus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis dilepis</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis flavifrenatus</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis jaegeri</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis meridionalis</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis miliaris</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis poecilogyrus</td>
<td>0+0+0+0+0 = 0</td>
<td>NT</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis reginae</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis sagittifer</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Liophis taeniurus</td>
<td>5+12+1+0+1 = 19</td>
<td>EN</td>
<td>EN</td>
<td>B1ab(i,ii,iii)</td>
</tr>
<tr>
<td>Liophis typhlus</td>
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<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Lystrophis pulcher</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Lystrophis semicinctus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Mastigodryas bifossatus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Mastigodryas boddartii</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Oxybelis aeneus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Oxybelis fulgidus</td>
<td>0+0+0+0+0 = 0</td>
<td>LC</td>
<td>LC</td>
<td>NE</td>
</tr>
<tr>
<td>Species</td>
<td>Distribution</td>
<td>Diversity</td>
<td>Conservation Status</td>
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<tr>
<td>---------------------------------</td>
<td>--------------</td>
<td>-----------</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus formosus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus guibei</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus melanogenys</td>
<td>0+0+0+0+0 = 0</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus petola</td>
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<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus rhombifer</td>
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<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus sp. nov</td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Oxyrhopus trigeminus</td>
<td>2+5+1+0+1 = 9</td>
<td>NT</td>
<td>VU B1ab (i)</td>
<td></td>
</tr>
<tr>
<td>Phalotris tricolor</td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas aestivus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas baroni</td>
<td>0+0+1+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas mattragrossensis</td>
<td>0+0+0+0+1 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas olfersii</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas patagoniensis</td>
<td>0+1+0+0+1 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas psammophidesus</td>
<td>0+1+0+0+0 = 1</td>
<td>NT</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas varius</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Philodryas viridissimus</td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Phimiphis vittatus</td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Pseudoboa coronata</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Pseudoboa nigra</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Pseudeoeryx plicatilis</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Pseustes poecilonotus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Pseustes sulphureus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Psomophis genimaculatus</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Psomophis obtusus</td>
<td>0+0+0+0+3 = 3</td>
<td>NT</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Rhinobothryum lentiginosum</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Sibynomorphus lavillai</td>
<td>0+1+0+0+1 = 2</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Sibynomorphus turgidus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Siphilophis compressus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Spilotes pullatus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Tachymenis attenuata</td>
<td>0+0+0+0+1 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Tachymenis elongata</td>
<td>5+12+2+0+3 = 22</td>
<td>CR</td>
<td>EN B1ab (i)</td>
<td></td>
</tr>
<tr>
<td>Tachymenis peruviana</td>
<td>0+5+0+0+0 = 5</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Tachymenis tarmensis</td>
<td>2+0+0+0+3 = 5</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Tantilla melanoccephala</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Tantilla sp nov??</td>
<td>10+5+3+0+0 = 18</td>
<td>EN</td>
<td>EN B1ab (iii)</td>
<td></td>
</tr>
<tr>
<td>Thamnodynastes chaquensis</td>
<td>5+0+0+0+3 = 8</td>
<td>NT</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Thamnodynastes pallidus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Thamnodynastes sp1</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Tomodan orestes</td>
<td>13+0+3+0+3 = 19</td>
<td>EN</td>
<td>CR 1ab(iii)</td>
<td></td>
</tr>
<tr>
<td>Waglerophis merrei</td>
<td>0+1+0+2+0 = 3</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Xenodon newaldi</td>
<td>0+1+0+0+3 = 4</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Xenodon radocephalus</td>
<td>0+0+0+0+3 = 3</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Xenodon severus</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Xenophilus scalaris</td>
<td>0+1+0+0+0 = 1</td>
<td>LC</td>
<td>LC</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4 Results of the evaluations for all 269 species evaluated

<table>
<thead>
<tr>
<th>Family</th>
<th>Conservation status</th>
<th>Conservation status IUCN</th>
<th>Official Conservation status IUCN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turtles (14)</strong></td>
<td>11 LC, 3 NT</td>
<td>14 LC</td>
<td>8 NE, 2 LR, 4 VU</td>
</tr>
<tr>
<td>Chelidae (8)</td>
<td>5 LC, 3 NT</td>
<td>8 LC</td>
<td>6 NE, 1 LR, 1 VU</td>
</tr>
<tr>
<td>Kinosternidae (1)</td>
<td>1 LC</td>
<td>1 LC</td>
<td>1 NE</td>
</tr>
<tr>
<td>Podocnemidae (2)</td>
<td>2 LC</td>
<td>2 LC</td>
<td>1 LR, 1 VU</td>
</tr>
<tr>
<td>Testudinidae (3)</td>
<td>3 LC</td>
<td>3 LC</td>
<td>1 NE, 2 VU</td>
</tr>
<tr>
<td><strong>Caimanes (5)</strong></td>
<td>2 LC, 3 VU</td>
<td>5 LC</td>
<td>5 LR</td>
</tr>
<tr>
<td>Alligatoridae (5)</td>
<td>2 LC, 3 VU</td>
<td>5 LC</td>
<td>5 LR</td>
</tr>
<tr>
<td><strong>Sauria (99)</strong></td>
<td>80 LC, 9 NT, 4 VU, 2 EN, 4 CR</td>
<td>95 LC, 3 EN, 1 CR</td>
<td>99 NE</td>
</tr>
<tr>
<td>Amphibiaenidae (13)</td>
<td>10 LC, 1 NT, 1 VU, 1 CR</td>
<td>13 LC</td>
<td>13 NE</td>
</tr>
<tr>
<td>Anguidae (2)</td>
<td>1 LC, 1 NT</td>
<td>2 LC</td>
<td>2 NE</td>
</tr>
<tr>
<td>Gymnophthalmidae (17)</td>
<td>16 LC, 1 NT</td>
<td>17 LC</td>
<td>17 NE</td>
</tr>
<tr>
<td>Gekkonidae (12)</td>
<td>12 LC</td>
<td>12 LC</td>
<td>12 NE</td>
</tr>
<tr>
<td>Iguanidae (1)</td>
<td>1 LC</td>
<td>1 LC</td>
<td>1 NE</td>
</tr>
<tr>
<td>Liolaemidae (14)</td>
<td>4 LC, 5 NT, 1 VU, 2 EN, 2 CR</td>
<td>11 LC, 2 EN, 1 CR</td>
<td>14 NE</td>
</tr>
<tr>
<td>Polychrotidae (3)</td>
<td>3 LC</td>
<td>3 LC</td>
<td>3 NE</td>
</tr>
<tr>
<td>Scincidae (5)</td>
<td>5 LC</td>
<td>5 LC</td>
<td>5 NE</td>
</tr>
<tr>
<td>Teiidae (15)</td>
<td>14 LC, 1 CR</td>
<td>14 LC, 1 EN</td>
<td>15 NE</td>
</tr>
<tr>
<td>Tropiduridae (15)</td>
<td>12 LC, 1 NT, 2 VU</td>
<td>15 LC</td>
<td>15 NE</td>
</tr>
<tr>
<td>Hoplocercidae (2)</td>
<td>2 LC</td>
<td>2 LC</td>
<td>2 NE</td>
</tr>
<tr>
<td><strong>Ophidia (151)</strong></td>
<td>118 LC, 22 NT, 2 VU, 4 EN, 5 CR</td>
<td>139 LC, 1 NT, 3 VU, 5 EN, 3 CR</td>
<td>151 NE</td>
</tr>
<tr>
<td>Boidae (7)</td>
<td>6 LC, 1 NT</td>
<td>7 LC</td>
<td>7 NE</td>
</tr>
<tr>
<td>Elapidae (10)</td>
<td>9 LC, 1 NT</td>
<td>9 LC, 1 NT</td>
<td>10 NE</td>
</tr>
<tr>
<td>Family</td>
<td>LC</td>
<td>NT</td>
<td>VU</td>
</tr>
<tr>
<td>------------------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Leptotyphlopidae (5)</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Typhlopidae (2)</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Colubridae (114)</td>
<td>90</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Viperidae (13)</td>
<td>10</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL (269)</strong></td>
<td>211</td>
<td>34</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 5: Abstract of the results of the evaluations for all 269 species evaluated

![Pie chart showing conservation status](image)

Figure 577: Number and percentage of reptile species in the different Conservation categories. Conservation status present work.
Distribution, diversity and conservation status of Bolivian Reptiles

Dirk Embert

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Figure 578: Number and percentage of species in the different Conservation categories. Conservation status IUCN Methodology

Figure 579: Number and percentage of species in the different Conservation categories. Official Conservation status IUCN
3.4 Comparison of the results of the two methodologies:

269 species were evaluated using both methodologies. The methodology elaborated for this work evaluated more species in higher categories. The new methodology showed 211 species in the category “Least Concern”, the IUCN methodology 254 species. 34 species have been evaluated as “Near Threatened” using the new methodology, just 1 species using the IUCN methodology. 14 species have been raised into the “Near Threatened” category using the new methodology because of taxonomic problems. The reasons for classification in the “Near Threatened” category differed also within the families. In Boidae, Elapidae and Chelidae it is a combination of rarity and use, in Colubridae normally the distribution factor is the main reason. In Liolaemidae, mostly habitat fragmentation and in caimans it is the use of the species. The results for the other categories did not differ that strong.

![Combined Results]

**Figure 580:** Combined results of the evaluation using the new methodology, the IUCN methodology and the official IUCN conservations status.
3.5 Detailed description of results

3.5.1 Ophidia

<table>
<thead>
<tr>
<th>Family</th>
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<th>Conservation status IUCN</th>
<th>Official Conservation status IUCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ophidia (151)</td>
<td>118 LC, 22 NT, 2 VU, 4 EN, 5 CR</td>
<td>139 LC, 1 NT, 3 VU, 5 EN, 3 CR</td>
<td>151 NE</td>
</tr>
<tr>
<td>Boidae (7)</td>
<td>6 LC, 1 NT</td>
<td>7 LC</td>
<td>7 NE</td>
</tr>
<tr>
<td>Elapidae (10)</td>
<td>9 LC, 1 NT</td>
<td>9 LC, 1 NT</td>
<td>10 NE</td>
</tr>
<tr>
<td>Leptotyphlopidae (5)</td>
<td>2 LC, 2 NT, 1 CR</td>
<td>4 LC, 1 CR</td>
<td>5 NE</td>
</tr>
<tr>
<td>Typhlopidae (2)</td>
<td>1 LC, 1 NT</td>
<td>2 LC</td>
<td>2 NE</td>
</tr>
<tr>
<td>Colubridae (114)</td>
<td>90 LC, 14 NT, 2 VU, 4 EN, 4 CR</td>
<td>104 LC, 3 VU, 5 EN, 2 CR</td>
<td>114 NE</td>
</tr>
<tr>
<td>Viperidae (13)</td>
<td>10 LC, 3 NT</td>
<td>13 LC</td>
<td>13 NE</td>
</tr>
</tbody>
</table>

**Table 6** Results of the evaluation of the Conservation status for Ophidians

The Ophidia have with 151 species the highest number of species evaluated. 118 species did not show any threat. 22 species were evaluated as “Near Threatened”, ten of them have been raised into this category because of taxonomic problems. One species is a member of the Leptotyphlopidae (*Leptotyphlops striatula*), one species a member of the Typhlopidae (*Typhlops reticulatus*) and all other members of the Colubridae. The taxonomic problems mostly were probable species complexes which could result in splitting the species in two or more species, resulting in reduction of habitat and other possible negative effects on its conservation status (see also discussion).

Two species (*Apostolepis phillipsi*, *Liophis andinus*) have been evaluated as “Vulnerable”, both because of having a very limited habitat size and being extremely rare.

Four species have been evaluated as being “Endangered”. *Atractus balzani* is extremely rare, not being rediscovered in the last 107 years and shows a small strongly fragmented habitat size. *Liophis taeniurus* shows a small habitat size additionally strongly fragmented. *Tantilla* sp. nov. is an endemic inhabitant of the Interandean Dry Valleys, shows a very restricted habitat size, being strongly fragmented. *Tomodon orestes* only recently was described on base of one specimen from strongly disturbed habitat. Habitat size and quality and its rarity are the main reasons for the result as “Endangered”.

Five species resulted as being “Critically Endangered”. One Leptotyphlopidae, *Leptotyphlops undecimstriatus*, was described in 1980 from Santa Cruz de la Sierra. Just one specimen is known (the Holotype, now lost), its extrapolated habitat size is based on the one specimen and that fore naturally very restricted, and as the city of Santa Cruz is its supposed habitat, the quality of habitat is very low, resulting in a very strong fragmentation. As the type is lost its taxonomic status is at least unclear. *Apostolepis multicincta* is endemic to the Interandean Dry Valleys, resulting in a restricted habitat size being very strongly fragmented. *Atractus bocki* and *Atractus taeniatus* both are just known from one locality. *Atractus bocki* has been described from the city of Cochabamba 108 years ago. Cochabamba by then was a small town surrounded by still a lot of good habitat. Now not only the city has grown but nearly all surrounding natural habitat has been destroyed and altered resulting in very restricted and strongly fragmented possible habitat size.
The type was originally deposited in Hamburg (ZMH) but has been destroyed in World War II, making it difficult to verify its taxonomic validity. *Atractus taeniatus* has been described from Santa Cruz de la Sierra 90 years ago, resulting in the same effects as described for *Atractus bocki*. Although listed for Brazil and Argentina, Paulo Passo doubts its existence in these countries (pers. comunication). *Tachymenis elongata* suffers from a small habitat size being very strongly fragmented by human activity as agriculture.

![Pie chart showing percentage of Ophidians in different conservation categories.](image)

**Figure 581:** Number and percentage of Ophidians in the different Conservation categories. Conservation status present work
Number and percentage of Ophidians in the different Conservation categories

<table>
<thead>
<tr>
<th>Conservation status IUCN Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Least concern</td>
</tr>
<tr>
<td>3; 2%</td>
</tr>
</tbody>
</table>

**Figure 582:** Number and percentage of Ophidians in the different Conservation categories. Conservation status IUCN Methodology

### 3.5.2 Sauria

<table>
<thead>
<tr>
<th>Family</th>
<th>Conservation status</th>
<th>Conservative status IUCN</th>
<th>Oficial Conservation status IUCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sauria (99)</td>
<td>80 LC, 9 NT, 4 VU, 2 EN, 4 CR</td>
<td>95 LC, 3 EN, 1 CR</td>
<td>99 NE</td>
</tr>
<tr>
<td>Amphibienidae (13)</td>
<td>10 LC, 1 NT, 1 VU, 1 CR</td>
<td>13 LC</td>
<td>13 NE</td>
</tr>
<tr>
<td>Anguidae (2)</td>
<td>1 LC, 1 NT</td>
<td>2 LC</td>
<td>2 NE</td>
</tr>
<tr>
<td>Gymnophthalmidae (17)</td>
<td>16 LC, 1 NT</td>
<td>17 LC</td>
<td>17 NE</td>
</tr>
<tr>
<td>Gekkonidae (12)</td>
<td>12 LC</td>
<td>12 LC</td>
<td>12 NE</td>
</tr>
<tr>
<td>Iguanidae (1)</td>
<td>1 LC</td>
<td>1 LC</td>
<td>1 NE</td>
</tr>
<tr>
<td>Liolaemidae (14)</td>
<td>4 LC, 5 NT, 1 VU, 2 EN, 2 CR</td>
<td>11 LC, 2 EN, 1 CR</td>
<td>14 NE</td>
</tr>
<tr>
<td>Polychrotidae (3)</td>
<td>3 LC</td>
<td>3 LC</td>
<td>3 NE</td>
</tr>
<tr>
<td>Scincidae (5)</td>
<td>5 LC</td>
<td>5 LC</td>
<td>5 NE</td>
</tr>
<tr>
<td>Teiidae (15)</td>
<td>14 LC, 1 CR</td>
<td>14 LC, 1 EN</td>
<td>15 NE</td>
</tr>
<tr>
<td>Tropiduridae (15)</td>
<td>12 LC, 1 NT, 2 VU</td>
<td>15 LC</td>
<td>15 NE</td>
</tr>
</tbody>
</table>

**Table 7:** Results of the evaluation of the Conservation status for Sauria
With 99 species the lizards have the second highest number of species evaluated. 80 species did not show any threat. Nine species were evaluated as “Near Threatened”. Four of them have been raised into this category because of taxonomic problems. The taxonomic problems mostly were probable species complexes which could result in splitting the species in two or more species resulting in reduction of habitat and other possible negative effects on its conservation status (see also discussion). The other five species are all members of the genus Liolaemus and are suffering mainly fragmentation of habitat by very intensive human activity, resulting in strongly altered natural habitat.

Four species have been evaluated as being “Vulnerable”, One member of the family Amphisbaenidae, one Liolaemidae and two Tropiduridae. Amphisbaena cegei showed very restricted and fragmented habitat size, Liolaemus schmidtii resulted to have restricted habitat size, not being present in any protected area and being a “rare” species. Both Tropidurus, Tropidurus callathelys and Tropidurus xanthochylus are endemic to a very restricted area in the Noel Kempff Mercado National Park and are considered as rare.

Two species have been evaluated as “Endangered”, Liolaemus pantherinus and Liolaemus variegatus. The two species showed a similar pattern, big habitat size, being very strongly fragmented, absent in all protected areas and considered to be rare.

Four species have been evaluated as “Critically Endangered”, one member of the family Amphisbaenidae, one member of the Teiidae and two Liolaemidae. Amphisbaena silvestrii had been reported by Carl Gans in 1964 from Santa Cruz on base of two specimens. He himself gives some taxonomic differences to specimens from Brazil leaving some doubts if the specimens really belong to this species. Having a very restricted habitat size, strongly fragmented by the growth of the City Santa Cruz and being a very rare species not having been found for the last 43 years resulted in this high category. Ameiva vittata was described from the village Parotani in Bolivia on base of one specimen. The species has not been found for over 100 years despite recent efforts by Robert Langstroth (pers. communication). The type locality has suffered strong human impact in the last years destroying nearly all natural habitat of this species. Small habitat size, very strong fragmentation and the rarity are the main reasons for the high category of this species. Liolaemus cranwelli was described from the locality Nueva Moka in Santa Cruz Department, being near the city of Santa Cruz. Since its discovery in 1973, 33 years ago, the natural habitat has been destroyed nearly completely and the species has never been found again. Restricted habitat size, very strong fragmentation and rarity are the main reasons for the high category given to this species. Liolaemus fittkaui was described from the valleys near Cochabamba in 1986, 21 years ago. The already extremely restricted original habitat additionally had suffered strong human impacts, resulting in a high fragmentation. Additionally not being represented in protected areas and being a rare species resulted in the high category given.
Figure 583: Number and percentage of Sauria in the different Conservation categories. Conservation status present work

Figure 584: Number and percentage of Sauria in the different Conservation categories. Conservation status IUCN Methodology
3.5.3 Turtles

<table>
<thead>
<tr>
<th>Family</th>
<th>Conservation status</th>
<th>Conservation status IUCN</th>
<th>Oficial Conservation status IUCN</th>
</tr>
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<tbody>
<tr>
<td>Turtles (14)</td>
<td>12 LC, 2 NT</td>
<td>14 LC</td>
<td>8 NE, 2 LR, 4 VU</td>
</tr>
<tr>
<td>Chelidae (8)</td>
<td>6 LC, 2 NT</td>
<td>8 LC</td>
<td>6 NE, 1 LR, 1 VU</td>
</tr>
<tr>
<td>Kinosternidae (1)</td>
<td>1 LC</td>
<td>1 LC</td>
<td>1 NE</td>
</tr>
<tr>
<td>Podocnemidae (2)</td>
<td>2 LC</td>
<td>2 LC</td>
<td>1 LR, 1 VU</td>
</tr>
<tr>
<td>Testudinidae (3)</td>
<td>3 LC</td>
<td>3 LC</td>
<td>1 NE, 2 VU</td>
</tr>
</tbody>
</table>

Table 8: Results of the evaluation of the Conservation status for Turtles

The Bolivian turtles showed surprisingly good results with only two species in a category worse than “Least Concern”. *Phrynops gibbus* and *Phrynops raniceps* have been evaluated as “Near Threatened” caused mainly by a combination of rarity, use and fragmentation of habitat. Fragmentation is not very strong and overall use was not considered as threatening to the species as a whole in the country, leading to this low category. Possible underestimation of conservation status and threats to turtles are discussed in the discussion chapter.

3.5.4 Caimans

<table>
<thead>
<tr>
<th>Family</th>
<th>Conservation status</th>
<th>Conservation status IUCN</th>
<th>Oficial Conservation status IUCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caimanes (5)</td>
<td>2 LC, 3 VU</td>
<td>5 LC</td>
<td>5 LR</td>
</tr>
<tr>
<td>Alligatoridae (5)</td>
<td>2 LC, 3 VU</td>
<td>5 LC</td>
<td>5 LR</td>
</tr>
</tbody>
</table>

Table 9: Results of the evaluation of the Conservation status for Caimans

As expected the caimans resulted partially as “Vulnerable” (*Caiman yacare* [populations], *Melanosuchus niger*, *Caiman latirostris*). There was no distribution data for *Caiman latirostris* available, reason why there was no distribution extrapolated and the calculation for the conservation status is basic and has to be seen as a minimum value. The main reason for the given category is the historically very strong use of the species. *Caiman yacare*, shows a wide distribution, high tolerances for habitat alteration and high densities. Nevertheless several populations have been totally overused, reason why these populations are considered as “Vulnerable”. *Melanosuchus niger* suffers a strong historical and partially illegal actual use because of its skin, the main reason for being considered a “Vulnerable” species.
3.6 Coarse Filter evaluations

3.6.1 Species richness Ophidians

Bolivian snakes show a quite typical species richness pattern for Bolivia. Especially areas with lower temperatures (Bolivian Highlands) and with extend frost periods like the Chaco Ecoregion and the Highlands show very low species richness. Surely in some areas of the Chaco this is also a result of missing collection efforts (see discussion). The highest values for species richness can be found at the Andean foothills in the La Paz Department, in great parts of the Beni Savannas, in parts of the Amazonian lowland forest in Pando Department and partially reaching down to the City of Santa Cruz. Comparing this with the Ecoregion map elaborated by FAN, preferences for humid lowland forest habitats, eventually mixed with not flooded savannah, become clear. The biggest share of the high species rich area is in the Beni Department in an area which shows a mixture of different types of habitats as savannas, forest spots, riverside forests and palm savannas.
3.6.2 Species richness Sauria

![Species Richness of Bolivian Lizards](image)

**Figure 586: Species Richness of Bolivian Saurians**

Being represented in Bolivian Highlands by a whole family, Liolaemidae, the lizards do not show that harsh pattern of low species richness in the Highlands. Nevertheless, the general pattern is quite similar to that of the snakes. Highest species richness (between 46 and 54 species) can be found in the Beni Savannas because of the same reasons explained for the snakes. The Andean foothills show relatively lower species richness but parts of the Chiquitania Ecoregion show relative higher richness compared to the snakes. The very low species rich area in the Chaco Ecoregion, at the Paraguayan border is surely a result of missing collections (see discussion).

3.6.3 Species richness Turtles

The turtles show their highest species richness (ten to twelve species) in three different areas. One area is the upper Madidi area, a humid Amazonian rainforest habitat which reaches into the Andean foothills and partially reaching into humid valleys. The second area is in the Pando region, also a humid rainforest habitat. The third and biggest area is in north-eastern Bolivia, on the border with Brazil. This area is a combination of savannas, flooded savannas and Amazonian rainforest. In the Bolivian highlands are no species present. The species richness for the Chaco on the Paraguayan border may be underestimated.
Figure 587: Species Richness of Bolivian Turtles

3.6.4 Species richness Caimans

Figure 588: Species Richness of Bolivian Caimans
The species richness of Bolivian caimans is well defined by the presence or absence of the just in Amazonian humid forest present species of *Paleosuchus*. This causes highest diversity in northern Bolivia, mostly Amazonian rainforest habitat but also some savannah habitat. The Chaco hosts one species which has not been extrapolated because there were no data available. Including this species would rise the diversity in southern Bolivia from one (only *Caiman yacare*) to two species (with *Caiman latirostris*). Bolivian highlands, humid mountain forests and Interandean Dry Valleys do not host any Caiman species.

### 3.6.5 Species richness in Protected Areas, Ophidia

![Species Richness of Bolivian Ophidians in Protected Areas](image)

*Figure 589: Species Richness of Bolivian Ophidians in Protected Areas*

The ophidian species richest National parks in Bolivia are the Manuripi, Madidi, Isiboro Secure and the EBB. Also parts of the Amboró and Carrasco show high values. A still very good value shows the Noel Kempff National Park, the Itènez Reserve and a smaller reserve in the Chiquitania Ecoregion, called Tucavaca. Protected Areas in the Highlands naturally do not show high species richness for reptiles. The Corridor Amboró-Madidi shows here its great value for the protection of the Biodiversity.
3.6.6 Species richness Protected Areas, Sauria

The species richest areas within Protected Areas are much more disperse in lizards than in snakes. This is because several species prefer habitats as the slopes of hills which can be found as “serranias” in different places in the country. There are places with 40-53 species in the Protected Areas Iñao, Tucavaca, San Mathias, Amboró, Noel Kempff Mercado, Isiboro Sécure, Madidi, Apolobamba, EBB and Manuripi. Also in the lizards the lowest species richness are found in the protected areas placed in the Highlands.

Figure 590: Species Richness of Bolivian Sauria in Protected Areas

3.6.7 Species richness Protected Areas, Turtles

Isiboro Sécure and Manuripi show highest turtle diversities with 9 to 11 species present. The protected Areas of the Andean Cordillera still show high values, especially parts of the Madidi. Also the “Estación Biológica del Beni” shows with 7 to 8 species still high species richness. The protected areas covering mainly Chaco, Chiquitania and Pantanal habitat show up to 6 species present. One area, the Tucavaca Reserve shows parts with higher species richness, underlining its great importance for this area. Protected areas in Highlands do not host turtle species.
Figure 591: Species Richness of Bolivian Turtles in Protected Areas

3.6.8 Species richness Protected Areas, Caimans

Figure 592: Species Richness of Bolivian Caimans in Protected Areas
Madidi, Apolobamba, EBB and Manuripi show highest Caiman diversities with 4 species present. The protected Areas of the Andean Cordillera, Carrasco and Amboró still show high values on their northern parts. Also the Noel Kempff Mercado still shows good values. As already explained above, the diversity in southern Bolivia, and herewith also in the protected areas located here, will rise once extrapolation of the range of *Caiman latirostris* will be included.

### 3.6.9 Endemism richness Ophidia

Figure 593 shows the “Endemism richness” in Bolivia. 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. The highest results are given in red or brown and are located mostly along the Interandean Dry Valleys. South of the Amboró National park and west of the Carrasco National park may be the two most important endemism richness areas in Bolivia for snakes. Here are to be found several endemic species (*Clelia langeri, Echinanthera* sp nov., *Oxyrhopus* sp nov.) and some species which taxonomic status is still unclear (*Waglerophis* cf. *merremi, Tantilla* cf. *melanocephala*). The one resulting area near the Gran Chaco National park is result of one endemic colubrid snake (*Apostolepis breviceps*). Most of these “Endemism Centres” are placed outside of the protected area borders.

![Endemism Richness of Bolivian Ophidians](image).
3.6.10 Endemism richness Sauria

This map shows the “Endemism richness” for Sauria in Bolivia. The highest results can be found in very different habitats. The easternmost resulting area, in the Noel Kempff National park, is result of two endemic Tropidurus species (*Tropidurus callathelys* and *Tropidurus chromatops*). The one area north of Santa Cruz is caused by the restricted distribution of *Liolaemus cranwelli*, being an endemic species with unclear taxonomic status. The other areas are result of Liolamidae with very restricted habitat.

![Endemism richness of Bolivian Lizards](image)

*Figure 594: Endemism Richness of Bolivian Lizards*

3.6.11 Endemism richness Turtles

Endemism richness does not show a clear pattern although the presence of *Acanthochelys pallidipectoris* in the Chaco region raises the value in this area. Most bolivian turtles show wide distribution, reason for the results shown in *Figure 595.*
3.6.12 Endemism richness Ophidians in Protected Areas

**Figure 595:** Endemism Richness of Bolivian Turtles

**Figure 596:** Endemism Richness of Bolivian Ophidians in Protected Areas
Endemism richness is highest in general in the protected Areas of the Andean Cordillera, reaching southwards including the Tucuman forests and protected areas situated within this Ecoregion. The Kaa-Iya National park shows a small spot with high endemism richness, based on the presence of one colubrid snake with very restricted distribution. The Noel Kempff National park shows also high endemism richness, here based on the presence of two lizard species with very restricted distributions.

### 3.6.13 Endemism richness Lizards in Protected Areas

Four protected Areas show elevated values in endemism richness. The highest values shows the Noel Kempff National Park and the Madidi- Pilon-Lajas- Apolobamba Park complex. As explained above, the high value for the Noel Kempff Mercado National Parks is a result of two endemic lizard species for this region. In the Madidi- Pilon-Lajas- Apolobamba Parks the situation is more complex as it is a combination of several species with limited distributions.

![Endemism Richness of Bolivian Lizards in Protected Areas](image)

**Figure 597:** Endemism Richness of Bolivian Lizards in Protected Areas

### 3.6.14 Endemism richness Turtles in Protected Areas

The results shown in this map are relative results, as in all others shown. An high value does not represent a high endemism value in comparison to other taxa or other areas outside of protected areas. It shows that within protected areas, Pilón Lajas, Amboró, Carrasco, parts of Manuripi and Aguarague show the highest values for endemism richness.
Figure 598: Endemism Richness of Bolivian Turtles in Protected Areas

3.6.15 Species richness of Bolivian Reptiles

Figure 599: Species Richness of Bolivian Reptiles
Figure 599 shows the combined species richness of Bolivian reptiles. The Central Beni savannas resulted to be the potentially most species rich areas. Following Gonzalo Navarro (pers. Comment) this is a typical pattern also for the richness of ecosystems in this area, where you can find very diverse systems in a very restricted area. As animal species distribution normally is directly related with such “plant ecosystems” the diversity in this area can be seen as a logical consequence. Many reptile species are forest, others are open vegetation specialists. The Beni savannas show a pattern with open formation with forest spots, providing habitat for a variety of reptile species. Another highly species rich area is the Amazonian Rainforest in the Madidi Area north of the City of La Paz. This area is a lowland Amazonian rainforest. The species richest areas reach within the humid Interandean Valley, typical of this area. One highly diverse area can be found in the north of Bolivia at the triangle of the Departments of La Paz, Beni and Pando. This area is Amazonian Rainforest. Naturally the very cold and dry Andean Highlands do not host many reptile species. Although the Chaco Area shows a low diversity, and it is believed to be much lower than the northern parts, the species richness may be underestimated here (see discussion). The protected Area in the Chiquitania region, Tucavaca, shows still a quite high species richness, a result which has been obtained by several studies (fide Reichle 2007).

3.6.16 Species richness of Bolivian Reptiles in Protected Areas

![Species Richness of Bolivian Reptiles in Protected Areas](image)

Figure 600: Species Richness of Bolivian Reptiles in Protected Areas

The map shows a typical pattern with the Protected Areas of the Andean cordillera, the Protected Area in the Beni Savannas and the Protected Area in Amazonian lowland forest being the species
richest. The Tucava Protected Area in the Chiquitania Ecoregion and the Noel Kempff Mercado National Park still show high values for its species richness.

3.6.17 Areas with highest reptile endemism richness

Figure 601 shows the combined endemism richness for turtles, caimans, ophidians and lizards. It shows mostly a very typical pattern with endemism “Hotspots” along the andean cordillere, including mainly Yungas and Interandean Dry Valley habitat. These habitats are known from several other groups as being strongly endemism rich (see Reichle (2007) for amphibians or Naraujo et al. (in press) for orchids). North of the city Santa Cruz high endemism values can be seen. This is based on taxonomic problems (see discussion). Interesting is that endemism “Hotspots” reach southwards along the Tucuman Forest downwards to the Aguarague Nationalpark, an area with strong frost periods. The area between the Carrasco and Tunari National parks host several endemism, most of them threatened.

![Figure 601: Endemism Richness of Bolivian Reptiles](image)

3.6.18 Protected Areas with highest reptile endemism richness

Six National parks show quite high values in endemism richness. Highest values show the Madidi Nationalpark, Pilon Lajas, Apolobamba, Carrasco, Aguarague and Noel Kempff. Also the Amboró Nationalpark shows some endemism rich areas. There is a new, probably endemic, colubrid species known from this area.
3.6.19 Distribution and Species Richness of Threatened species of Ophidia in Bolivia

Figure 602: Endemism Richness of Bolivian Reptiles in Protected Areas

Figure 603: Distribution and Species Richness of threatened species of Ophidia in Bolivia
**Figure 603** shows distribution and “species richness” of ophidian species which have been evaluated at least as “Vulnerable” in this study. There is just one spot with two threatened species occurring sympatric, south of the Amboro Nationalpark, in the Interandean Valleys. One species is a small colubrid snake, *Apostolepis multicincta*, the other is a probable new species of *Tantilla*, endemic for this area. The area around the city of Santa Cruz may be result of taxonomic problems (see discussion).

### 3.6.20 Distribution and Species Richness of Threatened species of Sauria in Bolivia

This map shows distribution and “species richness” of saurian species which have been evaluated at least as “Vulnerable” in this study. Two separated areas show 2 threatened species occurring sympatric, one area even shows the presence of three species. This area, south of the Carrasco National park is one of the areas within the Interandean Dry Valley system which underlies very strong anthropogenic impacts, resulting in a severe threat for species living there. The area north of Santa Cruz again may be caused by taxonomic problems.

**Figure 604:** Distribution and Species Richness of threatened species of Sauria in Bolivia
3.6.21 Distribution and Species Richness of threatened species of Reptiles in Bolivia

Combining the results of distribution of all reptiles evaluated in the present study as threatened, one major area becomes apparent. The biggest area with 4 or even 5 threatened species occurring sympatric is in and around the city of Santa Cruz. Many of these species have been described over 100 years ago and have never been found again. Since their first description most habitat in this area has been lost. Additionally some holotypes have been lost, causing taxonomic problems as the validity of these species cannot be verified. A second area with up to 4 threatened species occurring sympatric can be found south of the Amboró National park, in the inter Andean Dry Valleys. This area underlies very strong habitat alteration and at the same time hosts a variety of endemic species. Northwest from here can be found the Interandean Dry Valleys around Cochabamba, also an area with strong human impacts and high endemism richness. Two areas, one with up to 4 threatened species, can be found in eastern Bolivia, partially being within the borders of the Noel Kempff Mercado National Park. A last area with a relative high value lies within and south of the Pilón Lajas Reserve.
3.6.22 Conservation Priority Areas

One of the area with highest species richness and endemism in ophidians and additionally lacking protected area coverage is the inter Andean dry valley south of the Amboró National Park. This area is known for endemism also in other groups of animals and plants. The conservation status of this area is very bad, especially of the dry forest habitat at the foothills. Population density is high and land change is very fast. Main threats are agriculture because of very fertile soils. This habitat does not count on protected areas. A actually undergoing study by FAN (PMOT Pampagrande) will propose some areas of this region to be protected. Another important area is northeast of La Paz. All this area combines high species richness with endemism richness. All area that combines the two values lies outside of the park borders. These species rich areas represent an inter Andean valley system, but more humid than the one mentioned south of Amboró National park.
Discussion

4. Discussion

4.1 Why use a new methodology in addition to the IUCN methodology?

The elaboration of a new methodology surely is time intensive. It is often based on trial and error and can be very subjective if elaborated by just one individual. Nevertheless, since the beginning of this work, it was clear that a new methodology will be elaborated, used, and the results compared with the results using the IUCN methodology. The Reasons for this have been information, which by the author were considered essential but are not included in the IUCN methodology. Some differences in the methodologies are certainly based on the fact that the IUCN methodology main goal is at a global level, evaluating the conservation status of a species worldwide. In contrast, the present methodology was created for a national level, in this case Bolivia. Bolivia shows some character in its taxonomic work history, which makes it necessary to extrapolate the distribution of many reptile species due to the lack of data. For this extrapolation a model (BIOM) was used that was specifically elaborated for the extrapolation of distribution ranges in Bolivia (Sommer et al. 2003). The extrapolation results may be similar to the EOO used by the IUCN, but in general should be more exact concerning suitable habitats. It can result in narrower or wider habitats than an EOO. This depends on the distribution of the collection points and demonstrating the limits of working with EOO. Another very important factor to the author’s opinion is the occurrence in protected areas. As such only National Protected Areas were considered because many departmental, municipal, or private protected areas do not grant any protection due to lack of park rangers and other protective measures. 13% of Bolivian territory is under national park protection and this huge amount of protected land can be a very important factor for the protection of a species, especially by maintaining its natural habitat.

Conservation concerns have long focused not only on the availability of a habitat but also on the structural integrity of that habitat. One index of structural integrity is habitat contiguity, which can be measured in terms of the relative isolation of forest patches or the amount of interior forest cover (Wade et al. 2003). Linking theory and data for this approach is not easy. In addition, translating fragmentation effects into terms that can be understood and used in management has been most difficult (Villard 2002). The trouble is that the ecological complexity at all scales tends to obscure research results, with patterns that are more often than not equivocal, especially when results from several studies are compared (Debinski and Holt 2000, McGarigal and Cushman 2002). Nevertheless, as the inverse of landscape fragmentation, landscape connectivity is considered as a vital element of landscape structure (Taylor et al. 1993). For, it is so critical to the population survival (Fahrig and Merriam 1985, Fahrig and Paloheimo 1988) and meta-population dynamics (Levins 1970) that the fragmentation of habitats is considered as a factor, which cannot be ignored for the evaluation of the conservation status of reptiles. A fragmentation on global scale, fragmentation may not be of as important because “global populations” may be numerous enough to survive even when totally separated from the others. Yet on a national level, a strong habitat fragmentation can have a significant negative impact on the “national conservation status” of a species. Several species have been included in the present work that have been placed in a higher category because of its habitat being severely fragmented. Using the EOO the quality of habitat is not considered in any way for the result of the distribution. The new methodology uses
a habitat conservation status map elaborated by FAN (2006), which is overlapped by the extrapolated distribution map of each species. Considering the sensibility for habitat alteration for each species the resulting distribution is then reduced to the only suitable habitat (concerning its status of conservation of habitat) for this species. The last and also in the authors opinion, a very important factor is the taxonomic status of a species. If there are taxonomic problems existing, it often results in the separation of the species (if it is species complex). Consequently this leaves the separated fractions of the species with a smaller habitat size, which can influence dramatically the status of conservation of that species. In this case the outcome is automatically raised to the status of “Near Threatened”, if the category is presently not already higher due to other reasons. A positive side effect of the new methodology is surely the possibility to crosscheck both methodologies (the present one and the IUCN methodology), find possible errors, and get new ideas.

4.2 Discussion and Problems of the methodology

4.2.1 What are important factors to identify the Conservation status?
The factors, used to evaluate the conservation status of reptiles in this work, were chosen following some standards of the IUCN methodology and by experience working with this group. In addition, some additional factors were considered as important and others, used by the IUCN that were impossible to use (because of lack of data), were left out. The factors used are:

**Taxonomic Status**
The taxonomic status of a species was given as “OK” or as “Taxonomic Status uncertain”. Taxonomic Status uncertain was given when there were reasonable doubts that the populations investigated belong as a whole to the same species; in other words, if it was a complex species. The other reason is that taxonomic data of Bolivian populations simply did not match with the original description or populations from other countries. Both cases would result normally in splitting the species, and logically, its distribution. This would have a direct effect on the evaluation of the status of conservation as this uses the distribution value as one important factor. This is why this factor was included in the evaluation and species not threatened, which showed taxonomic problems, have been raised to the category “Near Threatened”.

**Sensibility**
The first factor I used is the sensibility of a species for habitat alterations. This is also the most difficult and subjective to evaluate. The guideline for this evaluation was in general the preferred habitat and its alimentation. An exclusive forest specialist was considered as very sensible, as habitat alterations normally destroys natural forest habitats (e.g. wood extraction or complete deforestation). In this case commonly the label “sensible” was used. In addition, this label was given to all species for who it was not possible to identify the sensibility. This seems to be quite vague but it was the better alternative instead of not evaluating the species. Tolerant species were considered the species, which can normally survive in an altered habitat or when they have slight advantages. Examples are *Crotalus durissus* hunting rodents in plantations, who are attracted by the corn, or the *Ameiva ameiva*, who hunts insects and small rodents that attracted by human activity near human settlements. Also, many lizards use paved roads for heating their body temperature. A few interesting examples of more sensible forest specialist species have been observed by the author. There the effect of exposure to the sun was deadly to two snakes. *Micrurus obscurus* died within just a few minutes exposed to the sun for photo taking and
Dendrophidion dendrophis has been observed dying of overheating crossing a paved road on a very hot and sunny day. The last category is “Advantage”. Only Hemidactylus mabouia is entered in this category, as this species is only to be found in and near human settlements. All other species may be tolerant but surely would prefer natural habitats.

**Distribution**

As the distributions of the species were extrapolated, the results may cause a wide span of discussion. Is the extrapolation of distribution valid? The lack of distribution data additional to lack of data about typical habitats made the extrapolation an indispensable tool to be able to predict a species’ distribution. Of course more elaborate collections and studies will provide better data, which surely will result in a better understanding about the distribution of species. With more data even the modeled distributions probably will become more exact. But in a time with very fast habitat and species loss, an evaluation had to be done now with the best data available. The results are the extrapolated maps of distribution. Some errors occurring in the elaboration of the maps were already mentioned in the methodology section and had no effect on the conservation status of the species. Reichle (2007) compared the model BIOM with other distribution models and found that “(...) the results obtained by BIOM seem to reflect the possible distributions of most species very well.”

**Map Problems:**

*Inaccurate climate data*

Climate data (especially precipitation) is not accurate enough or is unavailable for some regions. This is especially true in the drier parts of eastern Bolivia, such as areas south of the Noel Kempff National Park, and in the area around Puerto Almacen. This results in effects described later.

*Broad ecological niche*

If a species presents a broad ecological range it becomes difficult to model. Yet, it should be taken into account that many of these species may represent species complexes or comprising taxa with ecological needs narrower than those of a species complex.

*Disjunctive area of distribution*

Disjunctive distribution is result of similar habitats separated by a habitat not inhabited by this species. Shown disjunctive areas in border areas are not necessarily disjunctive as they can be connected throughout neighboring countries. Results of extrapolation, showing disjunctive distribution, can show the real distribution or can be an extrapolation artifact. Some maps showed extremely disjunctive habitats, which are considered by the author as an extrapolation error. This is explained directly in the species account section. In none of the cases it had influence on the conservation status.

*Unnatural appearing curved distribution limits*

Unnatural appearing curved distribution limits are a result of little data and the distribution of the species limited by a range factor (historical range), which cuts the distribution in a defined distance from the next point of collection. This method, independent from its distribution logic, avoided the extrapolation of a species in all suitable habitats within the country. Without this factor a species could have been collected in Amborò National Park and the model would extrapolate it into all suitable habitats in the Andean corridor, up to Colombia.
**Straight line in the Chiquitania region**

In some maps a straight horizontal line appears in the Chiquitania region. This is an error based on scarce climate data in this area. Two weather stations, south and north of this line, showed very different climate data. As this data is part of the calculation of the distribution it takes influence on the shown results; although it did not influence the conservation status in the observed cases.

**Hole in the distribution Area**

In some cases a round hole can be noticed in the extrapolated distribution area. This is a problem of wrong or missing climate data, which inhibits extrapolating the species in this area. Also this factor did not influence the conservation status in any cases.

**Geo reference errors**

Even if the geo referenced collection data was checked for accuracy, errors in the location of the collection points may have occurred. Obviously, this type of mistake will result in incorrect extrapolation by the model and incorrect predicted distributions.

**The danger of scale dependency in extinction risk, rarity and Conservation Priority:**

Hartley & Kunin (2003) discussed this matter. Rare species are the species most at risk for extinction. This is an old and general view. The IUCN has developed a methodology to identify the relative extinction risk of a species. In absence of detailed information about population size and viability indicators used are: rarity, rates of decline, and degree of population fragmentation. Hartley and Kunin (2003) demonstrated that these indicators are very sensitive to the scale at which they are measured. Extent of Occurrence (EOO) is defined by a minimum convex polygon (MCP) that includes all known records of a species. One single point can influence the EOO dramatically. AOO (Area of Occurrence) uses defined contiguous sample units (normally grid cells or in larger scale, countries etc.) to number and outline the units that are occupied. Large sized sample units may approximate or even exceed the EOO-defined range. Small units will underestimate the range but normally correlates well with population counts (Hartley & Kunin 2003). Extrapolation of species avoids the mentioned problems by including the possible niche a species can occupy. Limiting the range somewhat more on the occupied niche, the range from the nearest point of collection will be restricted (historical range) but distribution in neighboring countries may increase its range towards that country.

**Fragmentation**

fragmentation caused by humans on a global scale. Riitters et al. (2000) quantified total forest fragmentation across multiple evaluation scales but did not identify human-caused fragmentation. Jones et al. (1999) assessed forest patch vulnerability based on edges shared with anthropogenic and natural land uses, but only examined three tropical areas. Forests may be fragmented by a number of activities or events, such as road construction, logging, conversion to agriculture, or wildfire; but ultimately, the fragmenting cause is either anthropogenic or natural in origin. Therefore, a direct measure of landscape connectivity must incorporate a measure of some aspect of organism movement through the landscape. Fahrig and Palohéimo (1988) and Henein and Merriam (1990) measured connectivity as the probability of movement between two resource patches, using mathematical models of animal movements. Fragmentation can have some side effects, which are not directly, but could be, connected to the conservation status of a species. Schmidt & Jensen (2004) report habitat fragmentation as a selective force that can be traced in mammalian body length changes. By exploring historical sources, they were able to show that the body-length of Danish mammals has altered over a period of 175 years. This is possibly a response to increasing habitat fragmentation. The rate of body-length change was generally lowest in medium-sized mammals, and increased with both smaller and larger body mass. Small mammals have generally increased, whereas large mammals have decreased in length. Previously continuous populations may be fragmented if animals avoid road surfaces or are unable to follow nonspecific trails across such surfaces, as mentioned by Shine et al. (2004). They gathered data on the effects of small (4-m wide) gravel roads on the behavior and trail-following abilities of garter snakes (Thamnophis sirtalis parietalis) in Manitoba, central Canada. As expected, the road surface had less vegetation cover, a more open canopy, and thus higher incident radiation than did the surrounding grassland. Focal sampling showed that snakes avoided the gravel road, typically changing direction when they encountered it. If they crossed the road, they did so by the shortest possible route (straight across). Mate-searching male snakes were less able to follow substrate-deposited pheromonal trails left by females if those trails crossed a road than if the trails were entirely within the surrounding grassland. Thus, roads may significantly modify snake movement patterns, as well as the ability of males to locate reproductive females. Nevertheless this behaviour is strongly influenced by the tolerance of a species for habitat alteration or the disparity from its original type of habitat. A tolerant species as Crotalus durissus crosses without problems a huge plantation or deforested areas. As open areas are part of its habitat it may even prefer these areas. A forest specialist may, as described above, already have problems crossing a paved road. A gap of at least 7.2 km (2 grid cells) was considered as only “some fragmentation”, bigger gaps were considered as strong or very strong fragmentation depending on how big the gap was, how many fragments were left or produced by the gaps, and how big these were. The fragmentation of a species’ habitat has direct influence on its Conservation status. With the Fragmentation maps, it can be shown how the sensibility for habitat alteration of a species and the EDC of the habitat can have an influence on the distribution. Reduction of the distribution area is not regarded at this time as this is part of the calculation of the Distribution value, an argument supported by Matthews et al. (2000) who recognized fragmentation as an issue separate from forest loss. Only if the occupied habitat is separated by habitat alteration it is considered as fragmentation. If the populations have a naturally disjunctive distribution only in the case the gap is widening by much was it regarded as fragmentation. The map elaboration (see also chapter 2.6) was based on the distribution of the species and its sensibility for habitat alteration. For a sensible species all habitats worse than EDC 2 was filtered. This is the normal value and has also been given to all species for who the sensibility could not be identified. Some species received the value very sensible. These are species, which are only known to come about in primary forests.
For these species all habitats worse than 1 were eliminated, since just the slightest alteration disturbs the species. Normally forest specialists have additional problems crossing gaps not covered with forest. Some forest specialist species have been observed to die within few minutes of being exposed to the sun (for example *Dendrophidion dendrophis* or *Micrurus annelatus*). Some species are tolerant for habitat alteration; and therefore, will also be found in strongly altered habitats, for example plantations, deforested areas used for cattle, etc. These species are also found sometimes within urban areas, mainly searching for prey as *Crotalus durissus* (eating mice and rats) or *Ameiva ameiva* (eating all kind of insects attracted by human presence and newly born mice). Nevertheless, strongly altered habitats will have an influence on the connectivity of populations. All habitats worse than EDC 4 were eliminated. Some species have an advantage from the habitat alteration. This is known mainly for exotic species. In Bolivia, for example the *Hemidactylus mabouia* is only found in anthropogenic areas. Even in the most isolated villages this species is found. EDC one to five were included and the fragmentation map for these species is not shown.

**Distribution in good National parks**

One potential objective in designating a protected area is to conserve elements of biodiversity that are unable to survive elsewhere (Kramer et al. 1997, Bruner et al. 2001) or to help maintaining at least parts of a species’ habitat intact. Successful conservation management requires an understanding of species’ distribution (Roy 2003), including which species are restricted to protected areas, which are partially distributed within the borders of protected areas, and which are adequately protected outside these areas. There are very few empirical studies that neither made such comparisons (but see Fabricius et al. 2003, Velazquez et al. 2003), nor compared the effectiveness of protected areas with the surrounding landscape matrix (but see Fabricius and Burger 1997, Khan et al. 1997). Nevertheless, the importance for conservation of habitats and species of the 22 National Parks in Bolivia is not questionable. 13% of the Bolivian territory is under National park protection. This is a valuable factor for the conservation of the biodiversity. Several of these protected areas are in very good protective conditions with park rangers and the necessary protective measures. 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 a species. At least the population/s distributed within the limits are supposed to be protected from most threats. Based on a study in Western Ghats, India, Bhagwat et al. (2005) proposed not only the strengthening of formal protected areas, which are here considered to be the areas included in the National Park System, but also informal ones, which could be protected areas down to private levels, also Forest Concessions (which at the least maintain the forest matrix), or Indigenous Lands (TCO’s).

**Use of the species**

Wildlife resource use that is not sustainable will lead to depletion of populations, degradation of habitats or ecosystems, loss of ecosystem services, and potentially extinction. Currently, some use of reptile and amphibian resources is sustainable; however, some use is not (PARC 2000). Committee on Policy, Regulation, and Trade states in a document, which was adapted from the position paper on sustainability of fish and wildlife resources, (2000) that “In an ideal world the use of reptiles and amphibians would be balanced by natural recruitment in adequate natural habitats, and as such wouldn’t have a detrimental effect. The issue of use cannot be separated from issues of habitat protection, the economy, market forces, research, regulations, and law enforcement capability. Policies regarding reptile and amphibian use must consider all these
issues and be based on sound science to ensure that wild populations are not negatively impacted”. The use of species as pets, for alim entation or other purposes, is one of the best-known threats, also used by the IUCN. Additionally to the use of a species the “notoriety” of the species 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, the simple killing of the individuals has the same effect on the population as the use of the individuals or parts of it.

Rarity of the species
Why are some species common and others rare? This question is at the heart of much ecological research and has reached special prominence with current concerns over species conservation and global change (Kunin and Gaston 1997). A touchstone for current discussions of commonness and rarity is the scheme by Rabinowitz (1981). She classified species are based on three criteria: geographic range, habitat specificity, and local abundance. Only one of the eight possible combinations (wide range, broad habitat specificity, and somewhere large local abundance) is classified as common. The other seven each include some form of rarity, and some of them are even questioned to exist. Benayas et al (1999) suggest a fourth form of rarity or as they call it “criterion for defining commonness vs. rarity”: the ability of that species to occupy a larger or smaller fraction of its potential suitable habitats, i.e., habitat occupancy. The extrapolation of potential distribution regarded this criterion in some way is using a factor called “Historical range”. Not all suitable habitats were included for the distribution of the species, but historic range factor was used. For evaluation of the rarity in the current work only the local abundance was considered. Generally, experience has shown that rare species are found rarely, nearly independent of their size and type of habitat. Best example is the common subterranean Leptotyphlops melanotermus, known in Bolivia from over 100 collected specimens. Comparing this to the day active huge Dracaena paraguayensis, known from only one specimen in Bolivia, it can be seen that size and form of life are just one factor for the rarity of a species. A previous revision of the frequency of species found in Bolivia showed that species considered being rare, had been found rarely, and not vice versa. Another problem occurred when a species has been described recently on base of just one specimen. These were only considered to be very rare if the species had been described at least 5 years ago and no other specimen was found since that time. Some interesting theories are existing about rarity and abundance of species, some of which will be mentioned in the following; Brown (1984) and Brown et al. (1995), a theory which was titled “the superior organism theory” by (Benayas et al. 1999), states that species vary in their abilities to exploit nature and that some species have large fundamental niches, whereas others have narrow ones. He proposes that the center of a species' range is the region where it can exploit the widest range of resource combinations and habitats; and therefore, , the species will be of high abundance. As the distance from this center increases the conditions favoring the species normally become more rare and its abundance decreases. Species that begin with a broad niche will have large geographic ranges; species with narrow niches will have small geographic ranges. Another theory (e.g., Fox and Morrow 1981, Futuyuma and Moreno 1988) is also based on the theory that species vary from having broad to narrow niches. Yet, they state that habitat specificity exists throughout the geographic range of a species and not as mentioned in the first theory, narrowing toward the edge of the range. Habitat specificity trades off with local abundance, which means the location they are found. Specialists have high abundances and generalists have lower abundances.
4.3 Discussion of results

4.3.1 Ophidians
21 species have been evaluated as “Near Threatened”. 10 of them have been raised into this category because of taxonomic problems. The taxonomic problems mostly were associated with probable species complexes which could result in splitting the species in two or more species, resulting in a reduction of habitat and other possible negative effects on its conservation status (see above).

Two species (Apostolepis phillipsi, Liophis andinus) were evaluated as “Vulnerable”.

**Apostolepis phillipsi**
The limited habitat size for Apostolepis phillipsi may be an extrapolation error as the habitat in this area is quite homogeneous; nevertheless, the species has just been found in this one locality, despite collection efforts on other nearby localities. Apostolepis phillipsi is a typical example of a species described several years ago (7 years) and since then was never found again. Therefore, the species was considered to be rare, and additionally due to the restricted habitat size, was labeled having a “vulnerable” conservation status.

**Conservation:** As the species is distributed within protected area limits and no anthropogenic threats were identified, the only actions proposed are surveys to rediscover the species and keep its potential habitat protected.

**Liophis andinus**
The species has been described in 1983 and is known only from one locality and one specimen in Cochabamba. The locality Incachaca shows strong human impact as most of the valley habitats in this area. On the positive side, the fact can be considered that over 50% of its small distribution area lies within the limits of the Carrasco National park, which should provide a basic protection.

**Conservation:** Surveys to rediscover the species and keep the remains of its natural habitat protected.

Four species have been evaluated as being “Endangered”.

**Atractus balzani**
Atractus balzani is extremely rare, not being rediscovered in the last 107 years and shows a small strongly fragmented habitat size. The probable type locality is Covendo, an area where quite a lot of fieldwork has been done without rediscovering this species. The species may have to be considered as extinct but additional efforts to rediscover the species should be undertaken.

**Conservation:** Surveys to rediscover the species and efforts to maintain the remains of its natural habitat.

**Liophis taeniurus**
The species has been found in four localities of Bolivia. All of them are in very bad condition of conservation. The category resulted from severely fragmented and restricted habitats. This is a typical result for a species, which is only known in Bolivia at very disturbed Interandean Dry Valleys. There is little known about this species. Possibly the species is more tolerant to habitat
alteration than proposed (which could have reduced the conservation status to vulnerable) but there is no data available.

Conservation: Efforts to maintain the remains of its natural habitat in the Interandean Dry Valleys.

_Tantilla sp. nov._
Specimens from the interandean dry valleys have been found to be significantly different from specimens of the lowlands, leading to the belief of them belonging to a new species, which would be endemic to a small area in the Interandean Dry Valleys. This area underlies a high anthropogenic pressure by fast habitat destruction due to agriculture. Habitat destruction and reduction of habitat quality are the main reasons for this result. Although considered as tolerant for habitat alteration (it was collected and observed several times near human settlements) the suitable habitat is enormously reduced even though it is not very strongly fragmented. Additionally it is not known to inhabit any protected area. The combination of theses factors lead to the high conservation status.

Conservation: Efforts to maintain the remains of its natural habitat in the Interandean Dry Valleys.

_Tomodon orestes_
Based on one specimen this species was only recently described from a strongly disturbed habitat. Habitat size, quality, and its rarity are the main reasons for the result as “Endangered”. Although only known from one specimen it was not considered as very rare as it only was described recently (2004). Very little is known about habitat and distribution of this species.

Conservation: Efforts to maintain the remains of its natural habitat and further studies about its distribution pattern.

Five species resulted as being “Critically Endangered”.

_Leptotyphlops undecimstriatus_
_Leptotyphlops undecimstriatus_ was described in 1980 for Santa Cruz de la Sierra. Just one specimen is known (the Holotype, now lost), its extrapolated habitat size is based on the one specimen; and therefore, very limited as the city of Santa Cruz is its supposed habitat. The quality of the habitat is very low resulting in very strong fragmentation. Additionally the species is not known to inhabit protected areas and considered a rare species. Due to the loss of the species, the taxonomic status can’t be proven. The genus is under a present revision by Carmen Boerschig, which certainly will improve taxonomic knowledge about this group, especially in Bolivia.

Conservation: Revision of the taxonomic status and if possible discover relict population and protect its habitat (e.g. Lomas de Arenas protected area).

_Apostolepis multicincta_
_Apostolepis multicincta_ is endemic to the interandean dry valleys, resulting in a very strongly fragmented and restricted habitat size. The species is considered to be sensible but may be considered, after further studies, more tolerant. If this is the case, the conservation status for this species will be reduced at least to the category “Endangered” or even to “Vulnerable”. Additionally the species distribution only was calculated with records from the Interandean Dry Valleys. Just recently it was reported at the Chaco Ecoregion. This was surprising but a typical pattern for many species of this area. It was not possible to run the calculations again with this
additional specimen. This record could widen the distribution area significantly and reduce the conservation category. This non-venomous species is considered by local people as extremely poisonous because of its color and lifting of the tail when disturbed. This leads to the belief that the tail ends in a deadly venomous spine.

**Conservation:** Efforts to maintain the remains of its natural habitat in the Interandean Dry Valleys and studies about its distribution. Educational work with local people.

**Atractus bocki**

*Atractus bocki* has been described from the city of Cochabamba 108 years ago. Cochabamba by then was a small town still surrounded by a lot of good habitats. Now, not only the city has grown but also almost all surrounding natural habitats have been destroyed and altered, resulting in a very restricted and strongly fragmented potential habitat size. The type was originally deposited in Hamburg (ZMH) but has been destroyed in World War II. This makes it difficult to verify its taxonomic validity. *Atractus bocki* represents another example of a species described long ago from a locality, whose then natural habitat was in quite a good condition. Now it is almost completely destroyed. As the species has not been rediscovered in over 100 years it may have been extinct, but following IUCN suggestions, intensive fieldwork at its locality has to be done to prove this.

**Conservation:** Surveys to rediscover the species and efforts to maintain the remains of its natural habitat.

**Atractus taeniatus** has been described from Santa Cruz de la Sierra 90 years ago, resulting in the same effects as described for *Atractus bocki*. Although listed for Brazil and Argentina, Paulo Passo doubts its existence in these countries (pers. communication). As this species has not been rediscovered for 90 years. This species may have been extinct but also intensive fieldwork, at least at its type locality, is needed to prove this.

**Conservation:** Surveys to rediscover the species and efforts to maintain the remains of its natural habitat.

**Tachymenis elongata** suffers from a small habitat size being severely fragmented by human activities, such as agriculture. Additionally, it is a rare species with only a small population in protected areas.

**Conservation:** Efforts to maintain the remains of its natural habitat.

### 4.3.2 Sauria

83 of 101 species did not are not threatened. 8 species were evaluated as “Near Threatened”. 3 of them have been moved to this category because of taxonomic problems. The taxonomic problems mostly were apparent species complexes, which could result in splitting the species in two or more species resulting in a reduction of habitat and other possible negative effects on its conservation status (see discussion above, chapter 4.2.1.). The other five species are all members of the genus *Liolaemus* and are suffering mainly from fragmentation of their habitat due to very intensive actual and historic human activity in these areas.
4 species were evaluated as “Vulnerable”.

**Amphisbaena cegei**
*Amphisbaena cegei* showed very restricted and fragmented habitat sizes being a typical element of the Interandean Dry Valleys. Although it has been considered to be tolerant for habitat alteration the evaluation resulted in this high category. As it is a subterranean species little is known about its natural history and further studies need to be done. Surprisingly, it is frequently found and seems to be quite common in that area. A taxonomic revision of the Bolivian members of this family is under process by Carmen Boerschig (ZFMK).

**Conservation**: Efforts to maintain the remains of its natural habitat

**Liolaemus schmidti**
*Liolaemus schmidti* results showed to have a restricted habitat size, not being present in any protected area, and being quite “rare”. This is an unusual combination of results, as normally fragmentation led to the higher categories. There are no signs of fragmentation of habitat. Surely, it’s up for discussion that a species should be considered only because of the mentioned factors as vulnerable, as well as, possibly having a small population size in a restricted area without being sheltered in protected areas can cause an evident vulnerability to the species. The locality is in Chile. That means it is probable for the distribution to include this country’s border area, which would result in a wider distribution within Bolivia and could reduce the conservation status.

**Conservation**: Efforts to study its distribution and maintain its still healthy habitat

**Tropidurus callathelys**
*Tropidurus callathelys* is endemic to a very restricted area in the Noel Kempff Mercado National Park and is considered to be rare. Surely, it is also distributed on the Brazilian side of the border but so far it has not been recorded.

**Conservation**: Efforts to study its distribution and maintain its still healthy habitat

**Tropidurus xanthochylus**
*Tropidurus xanthochylus* is endemic to a very restricted area in the Noel Kempff Mercado National Park and is considered as rare.

**Conservation**: Efforts to study its distribution and maintain its still healthy habitat

2 species have been evaluated as “Endangered”.

**Liolaemus pantherinus**
*Liolaemus pantherinus*. It has a big habitat size, is very strongly fragmented, is absent in all protected areas, and is rare to find are the main characteristics for the evaluation of this species. Although it is considered to be tolerant, the habitat is strongly fragmented. Even the remaining habitat is under strong anthropogenic pressure.

**Conservation**: Efforts to maintain still relatively healthy habitat

**Liolaemus variegatus**
*Liolaemus variegatus*. This species is characterized by a very reduced habitat size, being even more reduced by a bad habitat conservation status. It is absent in all protected areas and is hard to find. Although it is considered to be tolerant, the habitat lead strongly reduced results.
Conservation: Efforts to maintain the still remaining habitat. Already, the habitat is strongly altered and reduced for this species. Faster actions need to be considered to preserve it.

**4 species have been evaluated as “Critically Endangered”.**

*Amphisbaena silvestrii*
*Amphisbaena silvestrii* was reported by Carl Gans in 1964 in Santa Cruz based on two specimens. He himself mentions some taxonomic differences to specimens from Brazil, leaving some doubts to them belonging to the same species. Due to a very restricted habitat size, strongly fragmented by the growth of the City Santa Cruz, and being a very rare species, not having been found for the last 43 years, it was placed in this high-level category. The species itself is critically endangered or even may have gone extinct if it is a distinct new species.

**Conservation**: Efforts to rediscover the species and to maintain still remaining habitat (e.g. Lomas de Arenas).

*Ameiva vittata*
*Ameiva vittata* was described from the village Parotani in Bolivia on base of one specimen. The species has not been found in a 100 years despite recent efforts by Robert Langstroth (pers. comunication). In recent years, the locality has suffered strong human impact destroying nearly the entire natural habitat of this species. Small habitat size, very strong fragmentation, and its rarity are the main reasons for the high category of this species.

**Conservation**: Efforts to rediscover the species and to maintain still remaining habitat.

*Liolaemus cranwelli*
*Liolaemus cranwelli* was described from the locality Nueva Moka in Santa Cruz Department, near the city of Santa Cruz. Since its discovery, in 1973 34 years ago, the natural habitat has been almost completely destroyed and the species was never found again. Restricted habitat size, very strong fragmentation, and rarity are the main reasons for the high category given to this species.

**Conservation**: Efforts to rediscover the species and to maintain still remaining habitat.

*Liolaemus fittkau*i
*Liolaemus fittkau*i was described from the valleys near Cochabamba in 1986, 20 years ago. The already extremely restricted original habitat had additionally suffered strong human impacts, resulting in a high fragmentation. Additionally, not being represented in protected areas and being a rare species resulted in the high-level category.

**Conservation**: Efforts to rediscover the species. Following the fragmentation map all suitable habitat has been destroyed although the species is considered to be tolerant for habitat change. This species may be considered as one of the most threatened.

### 4.3.3 Turtles
The Bolivian turtles showed surprisingly good results with only 2 species in a category worse than “Least Concern”. *Phrynops gibbus* and *Phrynops raniceps* have been evaluated as “Near Threatened” caused mainly by a combination of rarity, use, and fragmentation of habitat. The fragmentation is not very strong and overall use was not considered as threatening to the species. This is leading to this low category. Unquestionably, some populations of several species suffer
stricter use, but this is not considered to be the case for the whole species. Yet, all in all the results for the turtles are considered the least reliable.

4.3.4 Caimans
The caimans resulted partially as “Endangered” (*Caiman latirostris*) or “Vulnerable” (*Caiman yacare* [populations], *Melanosuchus niger*).

Two species resulted as “Vulnerable”

*Caiman yacare*  
*Caiman yacare* shows a wide distribution, high tolerance for habitat alteration, and high densities. Nevertheless, several populations have been completely overused, which is grounds for these populations to be considered as “Vulnerable”.

**Conservation:** Conservation actions are already installed; management plans for the sustainable use of the species seem to be the most effective measures, but should be planned and measured with care and preferably by NGO’s with scientific staff. One of the best examples in Bolivia is the National Sustainable Biocommerce program managed by FAN.

*Melanosuchus niger*  
*Melanosuchus niger* suffers a strong use because of its skin, being the main reason for considering it as a “Vulnerable” species.

**Conservation:** Conservation actions are already installed; management plans for the sustainable use are forbidden as the species is included in CITES I. Control of its use and protection of its habitat should be the most effective conservation action.

One species resulted as “Endangered”

*Caiman latirostris*

There was no distribution data for *Caiman latirostris* available. The reason for no extrapolated distribution and the calculation for the conservation status are basic. They have to be seen as a minimum value. The main reason for the category (Endangered) is the very strong use of the species.

**Conservation:** Conservation actions should be the control of unsustainable use and conservation of its habitat.

4.4 Summary of conservation actions

In most cases conservation of the habitat is the best conservation action. Several species need surveys to be rediscovered. Some species need taxonomic work. Conservation of some species needs to include the education of locals.

4.5 Coarse filter

Habitat loss (a good definition of what is habitat is given in Reichle (2007)) has been identified as the primary threat to the majority of vertebrate species currently facing extinction (Reid & Miller 1989). These changes can result in fragmentation of landscapes, as well as the destruction of specific resources for species, such as shelter, food, or areas used for reproduction. This shows
the importance of studies about land use patterns in given areas as there are the PLUS (Land Use Planification) in Bolivia. It could be a guide to identifying vulnerable areas and serve as a filter for the method to identify priority areas for conservation. “Cruel twist of fate” as they call it Pimm & Lawton (1998) is the fact that the highest current rates of deforestation appear to be in areas with the greatest biodiversity (Balmford & Long 1995). In Bolivia, this is especially the case for amphibians, birds, and orchids that have their highest diversity and endemism richness in the humid mountain forests, which are the most threatened eco-regions in Bolivia. A method for identifying conservation-priority areas based on a predictive land-use change modeling approach is proposed by Menon et al. (2001). This approach proposes unprotected natural areas, most susceptible to land-use, change by virtue of their geophysical and socioeconomic characteristics. Nevertheless, this approach is only true if protected areas are not only “paper parks”. In Bolivia, prediction in this form is difficult as the conservation policy changes with every government. With it the consequent protection of National park borders changes dramatically.

The task of identifying present priority areas for conservation work needs information about hot spots of diversity, endemism, hot spots of vulnerability, etc. Biodiversity hotspots tend to be located preferentially in areas of ecological transition (Araújo & Williams 2001; Gaston et al. 2001). This is a result from areas with elevated species richness, where species overlap in their range margins between neighboring assemblages (Araújo 2002). These “edge effects” may influence the results significantly. In the present study, such “edge effects” may influence the high abundance of the species in the Beni Department. As limits of the distribution of several species have their core populations in the many neighboring Ecoregions reach into the Beni Department and overlap it leads to high abundance of the species. Yet, the “edge effect” is just one possible explanation for the high abundance of the species in this area. The diversity of habitats is another and is explained in chapter 3.6.15. Smith et al. (2001) state that the hotspot approach is a risk for species preservation, especially at a local scale, but as the present work is a national approach the more delicate local effects become marginal. The need for hotspots arises from the recognition that resources for conservation are scarce and that priorities need to be set according to the requirements for persistence of as much biodiversity as possible (Araújo 2002). In terms of conservation of biodiversity transition zones are of great importance. There are also good arguments for conservation of nontransition zones as those usually host core populations of species, which may play a fundamental role in the maintenance of viable populations (Lawton 1993). Short-term population analyses have shown that core populations are less variable than marginal ones (Lawrence 1993). This means a safer choice and a higher value for conservation. Analysis of long-term patterns of range contraction provides evidence that many species have persisted only at the edges of their historical ranges (Channel & Lomolino 2000). So, ideally both, core and marginal populations would be represented within hotspots, which in cases of wide distributed species is nearly impossible.

Endemism

Patterns in the spatial distribution of endemic species are central to our understanding and conservation of biological diversity (Green & Ostling 2003). Species with small geographical ranges are potentially at a greater risk of extinction than those with larger ranges (Bibby et al. 1992, Mittermeier et al. 1998, Myers et al. 2000). In order to identify and compare patterns of endemism across different spatial scales setting regional or national conservation priorities is a very useful method to correctly apply conservation efforts for endemic species. The C-Value used in the present work shows areas with highest concentration of species with most limited distribution. These endemism concentrations are considered priority areas for conservation, as are
areas with highest abundance of species and areas with highest concentration of threatened species.

Climate change

Slight changes of climate can have dramatic effects on composition and structure of ecosystems. Especially, the biota, which host many species with very restricted ranges, will be probably the most effected (Thomas et al. 2004, Malcolm et al. 2006). Endemic species are normally adapted only to a small niche in an ecosystem. If this small niche is changed the species loses normally its habitat, which often results in extinction. Climate change resulting from global warming will very likely affect all biota, but to different extents.

Reichle (2007) describes a different cause for climate change: “Regional and local land-use changes may exacerbate the effects of global warming, particularly at smaller spatial scales. For example, in the Inter Andean Dry Valleys of Bolivia, temperatures apparently have risen far above the average for global temperatures (Villarpando pers. com.). These steep temperature increases might be a result of quick growing urban spaces, less forest cover and the desiccation of natural wetlands, in addition to changes in climate at the global scale.”

The effect of climate change for reptiles surely will not be the same for every species. The more specialized a species is the more threatened it may become by climate change. The same is true for species with restricted ranges. Climate change, will not only threaten species, but also may cause a shift in its distribution. It is very probable that the Dry Chaco habitat will expand northwards, as will the Chiquitania Ecoregion. This will cause a shift in the distribution of the species northwards. Some species will manage to follow this habitat shift, some will not.

Human use of Reptiles

Very few reptile species suffer in reality from human use. The two species, which have suffered most are *Melanosuchus niger* and *Caiman latirostris*. Both species are now under protection and as populations have diminished dramatically the commercial use of these species become ineffective. Both species were mainly used for their skin. Actually, *Caiman yacare* is used for the use of its skin and meat. This is included in the National Sustainable Biocommerce Program and follows strict Management plans. The boid snakes are used infrequently and their use can be regarded as non-threatening. Typically, species are killed when entering into human settlements attracted by domestic animals on which they prey. Some turtle species underlie more severe threats as *Podocnemis expansa* or the two bigger *Chelonoidis* species (*Chelonoidis denticulate* and *Chelonoidis carbonaria*). The first one suffers by extraction of the eggs from the nests and the latter two through the killing of adult individuals for their meat. All in all, in Bolivia, generally populations are threatened but not the whole species. This is why the factor of human use is considered only as a secondary threat.
4.6 Comparison of the results with 2 different studies (Araujo, Mueller, Nowicky & Ibsich (eds) 2007, Reichle 2007)

In the following the results of the present study will be compared to results of 2 other recent works on conservation, distribution, abundance of species, abundance of endemism, and others. Both works concentrated on Bolivia as study area. Just one work includes reptiles in its evaluation (and here just the ophidians).

Figure 606: Alternative Conservation Strategy Proposals in priority areas with limits for its declarations as protected areas.

The map of the priority areas coincides very well with the endemism pattern for reptiles but not with the pattern of the abundance of species. Comparing it with the results for amphibians (Reichle, 2007) one can show a great correlation for abundance of species and endemism.
Two proposed areas for the National Park System would cover thoroughly the most abundant areas of species in central Beni. Also, some of the proposed departmental protected areas would cover these areas. Interesting is the situation for the endemism. Most of the endemism hot spots are outside of existing and proposed areas.
This map shows the principal results of the GAP Analysis by FAN. It demonstrates the “gaps of representativity”, threatened and endemic species outside the borders of the National Protected Areas System. The worst gap can be found in the border of La Paz and Beni Departments. Although this study included Bolivian ophidians it does not show coincidence with the results of the present study. Interesting is, that the biggest gap falls within the species richest reptile area of the present study, underlining the importance to get some of this area under protection.

The “lucky” fact that huge parts of the species richness of the threatened species are located within protected areas (GAP) is not reflected in the present study for the reptiles. Critically endangered and endangered species are mostly distributed outside of the protected areas limits. This has to be seen with caution, as being presented within a protected area or not was one factor for the evaluation resulting in species not being represented as being more threatened! This factor was not included in the GAP Analysis by FAN.
The overall pattern of this outcome is very similar. This is a very important result as it shows that abundance of the species of the reptiles seems to be representative for many groups of animals and plants; and therefore, possible actions taken to conserve the reptile diversity may have a positive effect not only on the actual group but on significant parts of the flora and fauna as a whole and vice versa. The upper Madidi area represents the area with the best correlation and hence maybe one of the most important areas for its abundance of the species. In the present study especially ophidians demonstrated one of the highest values in this area. Still, the central and southern Cochabamba Department is completely underrepresented in abundance of reptile species, but it shows a high abundance of species in the GAP Analysis. These mainly Humid Mountain Forest areas are not preferred by reptiles due to the lack of radiation caused by horizontal rain (fog), but are a preferred habitat (and endemism centers) for Amphibians, Orchids, and Birds. These three groups surely have a huge influence on the abundance of species in this area. The Central Beni shows some hot spots of species abundance in the GAP Analysis, which coincides with the highest values evaluated in the present study.
On the left, species richness of Bolivian Amphibian is shown (Reichle, 2007). Reichle concludes that “The diversest areas are predicted to be at the Andean foothills of the La Paz department and within the Madidi National Park. Also very diverse are actually most all areas at the Andean foothills and transitional areas between the Beni Savannas and Amazonian forests. Generally the predicted Amphibian diversity has a decreasing gradient from North to South and West to East”. Comparing this to the results for reptiles in the present study shows a very similar pattern. Bolivian Reptiles show the highest species richness in the center of the Beni Department, nearly identical to the amphibians. Also the area of the Andean foothills shows the same high species richness as Amphibians. Comparing the number of potential sympatric species the amphibians show same high numbers as the ophidians, with over 100 species living potentially sympatric (see Figure 585). Lizards show with a maximum of 54 species (see Figure 586) nearly half the number of species potentially living sympatric. This is an interesting result as the overall number of ophidian and lizard species are very similar. One fact is the distribution of nearly the whole lizard genus *Liolaemus* in the highlands whereas ophidians are represented with less than 5 potential species. The total number of reptile species living potentially sympatric reaches up to a maximum of 167 species.
The left map shows the result for the endemism richness pattern of Bolivian Amphibians (Reichle, 2007). Reichle states “It is very obvious that the Yungas region shows by far the highest c-value of the country. Some other high values are predicted for the southern part of the Tarija department, within the Tucuman – Bolivian Forest. The high values of the area around Cobija are an artifact (…….)”. Interesting is the fact that reptilian endemism richness “Hotspots” seem to be much more disperse and, as above mentioned for amphibians, not restricted to the humid mountain forest. Most endemism of reptiles can be found in the Inter Andean Dry Valleys. Also this study shows some artifacts, or probable artifacts, as the endemism hot spot north of Santa Cruz, caused by a supposed invalid species or the endemism hot spot in the Chaco caused by one colubrid snake which has probably a much wider distribution.
4.7 Outlook and suggestions for Reptile conservation in Bolivia

As discussed and described, several reptile species are threatened. Considering the reasons, one can see two main patterns. In the lowlands we find many species with possible taxonomic problems, species, which have been described a long time ago, probably in a City area or near the big cities and whose probable habitat has been completely destroyed since then. This is often combined with the fact that the types (or the only specimens existing) have been destroyed or lost. The second pattern is habitat destruction (actual and historic) in the Bolivian Highlands, threatening many *Liolaemus* species. So, the main threatening factor has been habitat fragmentation. Bolivia still has huge amounts of healthy forests; one the Chiquitania Dry Forest only recently has been named one of the worlds “Model Forests”. When looking at the size of this forest in comparison to the second biggest “Model Forests”, the dimensions of the still healthy habitat become clear. The Bolivian part of the Chiquitania Dry Forest are 20 Million hectares, the second biggest “Model Forests” has only 7 Million hectares!

Human use is not considered a threat for most species, although for populations of *Podocnemis expansa* the intense collection of eggs can cause dramatic reduction of population sizes.

Climate change is a probable threat and should be studied more intensively within Bolivia as it has several sensible Ecoregions with endemic species, which can be threatened seriously by climate change.

Conservation of existing habitat and avoiding fragmentation may be the most general and only realistic suggestion for the conservation of reptile diversity. As explained above, fragmentation can severely influence the survival of a species and has huge effects on the functionality of ecosystems. In addition, tremendous forest blocks have a positive effect on controlling and diminishing the effects of climate change. There are several possibilities for the conservation of the forest matrix, and especially Forest Concessions can have a very positive effect as long as their management is self-sustaining. Interesting is the fact that those concessions provide protection for the forest matrix for economic sustainable reasons and because of the same reasons they are best protected against illegal deforestation. Comparing numbers of land use change for agriculture and forest concessions, at least until 2005 (the newest data available by INE), the use of agricultural land was doubled. Nevertheless, it barely passes, with 2,3 million hectares, the forest concessions, with a total of 2 million hectares. Sadly, many protected areas do not have the necessary funding to protect their borders and suffer from illegal deforestations, hunting, and other illegal activities. TCO’s (Land of original communities) may be another possibility, as are private protected areas. Moreover, the future Land use plans will evaluate not only economic and health aspects, but also concentrate increasingly on diversity and conservation aspects. This can be seen at the moment at the one in Pampagrande (Province Santa Cruz). All in all, there is enough potential to protect Bolivians diversity.
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