Proceedings of the Second International Mongolian Biodiversity Databank Workshop: Assessing the Conservation Status of Mongolian Reptiles and Amphibians.

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Abstract

The Second International Mongolian Biodiversity Databank Workshop was held at the National University of Mongolia and Hustai National Park from 11th to 15th September 2006. Participants assessed the conservation status of all Mongolian amphibians and reptiles using the IUCN Red List Categories and Criteria. The existing Mongolian Biodiversity Databank created in 2005 and housed at the National University of Mongolia was extended to include these two vertebrate groups, complete species lists were agreed upon, distribution maps were revised and updated, and summary conservation action plans were developed for all species categorised as threatened or Data Deficient during the workshop. This article details the preliminary results of this workshop, presenting the most up-to-date species list for Mongolian amphibians and reptiles accompanied by the conservation status of each of species. A total of six amphibians and 21 reptiles were included on the native species list, along with seven possible species (not evaluated). Of the 24 species of reptiles and amphibians assessed, 25% were categorised as threatened and a further 21% were assessed as Near Threatened.

Key words: Biodiversity, extinction risk, reptile, amphibian, Mongolia, conservation

Introduction

The Second International Mongolian Biodiversity Databank Workshop was held at the National University of Mongolia and Hustai National Park from 11th September to 15th September 2006. The aim of this event was to bring together like minded experts who share a common interest in the amphibians and reptiles of Mongolia. All available data on these little known species was brought together to extend the Mongolian Biodiversity Databank established following the first Mongolian Biodiversity Databank workshop held in 2005. Taxonomic meetings of key experts were held prior to the workshop with to draft an initial species list for the workshop, and prior to conducting the assessments during the workshop, all participants were involved in a meeting to agree upon a final native species list. Two days of the workshop were devoted to training all participants in the application of the *IUCN Red List Categories and Criteria: version 3.1* (IUCN, 2001) both globally and at a regional level following the *Guidelines for application of IUCN Red List Criteria at regional levels version: 3.0* (IUCN, 2003), following which they completed regional conservation assessments for all Mongolian amphibians and reptiles. In addition, distribution maps for each species were updated, and the databank was populated with all available information on such as habitat types, conservation measures and population trends. These conservation assessment results were reviewed in a final meeting, and summary conservation action plans for each species assessed as threatened (Critically Endangered, Endangered, and Vulnerable) or Data Deficient were compiled. As a result, the conservation status of Mongolia's amphibian and reptile species have been assessed using a quantitative and objective approach, and many students and experts have been trained in the application of the IUCN Red List Categories and Criteria. As many young herpetologists of Mongolia attended this workshop, we believe that awareness of the state of Mongolia's biodiversity was raised, and that training in the application of the IUCN Red List Categories and Criteria provided an opportunity to aid the effectiveness

of conservation of Mongolia's biodiversity into the future.

Preliminary results are presented in this article on the status of Mongolian amphibians and reptiles, along with observations on trends in distribution, threats, and conservation measures for these species. All of the information contained in this article is subject to further review.

Results and Discussion

The distribution of Mongolian reptiles and amphibians. Participants were presented with distribution maps for each species based on Terbish *et al*. (2006) and produced using ArcGIS 9.0 software. Participants updated these maps to the best of their combined expert knowledge, all changes and reference sources used were recorded. Map overlays have created using ArcGIS 9.0 software to summarise distribution trends and identify key areas of herpetological diversity. Amphibian species were more commonly found in eastern and north-eastern parts of the country (Figure 1), with the highest species richness (between two and four species) occurring in Hangai Mountain Range, Hovsgol Mountains, Mongol Daguur Steppe, Middle Khalh Steppe,

Eastern Mongolia Steppe, Ikh Hyangan Mountain Range, and Hentii Mountain Range. Lower number of species were observed in central, western (Dzungarian Gobi Desert) and northern (Hovsgol Mountains) Mongolia. However, distribution of threatened amphibians (Figure 2) indicates that the species found in western and northern Mongolia are threatened, in addition to species found in areas of higher richness.

Conversely, the highest species richness of reptiles were recorded in arid southern regions (Figure 3), with as many as 9-12 species occurring in this area, decreasing northwards into central Mongolia, with few species recorded further north than the Valley of the Lakes or Northern Gobi. However, higher densities could be found further north in western Mongolia, particularly Great Lakes Depression. The distribution of threatened reptiles reflects the general distribution trend (Figure 4), the majority of threatened species inhabit areas with highest number of reptile species, such as Trans-Altai Gobi Desert, Gobi Altai Mountain Range, Alashan Gobi Desert, and Eastern Gobi semidesert. There were a few exceptions to this trend, with low numbers of threatened species occurring in Hövsgöl Mountains, Hangai Mountain Range and Hentii Mountain Range in
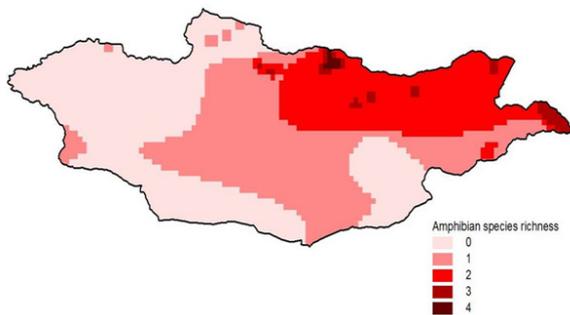

Figure 1. Distribution map overlay of amphibian species. Darker colours represent areas with higher numbers of species.
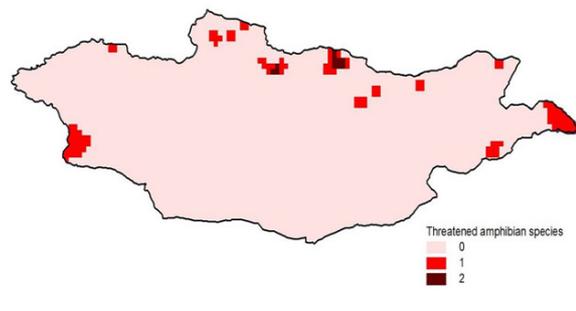

Figure 2. Distribution map overlay of threatened amphibian species. Darker colours represent areas with higher numbers of species.
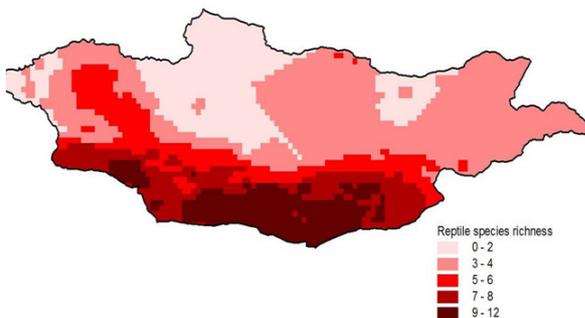

Figure 3. Distribution map overlay of reptile species. Darker colours represent areas with higher numbers of species.
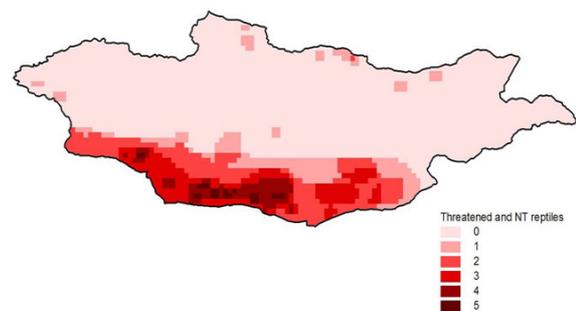

Figure 4. Distribution map overlay of threatened reptile species. Darker colours represent areas with higher numbers of species.

northern Mongolia, where only one or two species occur. As many as three threatened species have been recorded close to the Mongolian-Russian border in northern Mongol Daguur Steppe.

The status of Mongolian reptiles and amphibians. Of the 24 native Mongolian reptile and amphibian species assessed (see Appendix 1 for a complete species list), 25% are categorised as regionally threatened, Vulnerable (VU) (Figure 5). A further 21% are categorised as Near Threatened (NT). Encouragingly just 4% are categorised as Data Deficient (DD), indicating that research is active and varied for the majority of Mongolia's amphibians and reptiles. Fifty percent of amphibians and reptiles are categorised as Least Concern (LC). In certain cases, a species is categorised as Not Evaluated (NE) if the distribution in Mongolia is less than 1% of the area of the country, and the Mongolian distribution is less than 1% of the global distribution, in accordance with the *Guidelines for application of IUCN Red List Criteria at regional levels version: 3.0* (IUCN, 2003). Three reptile species, *Phrynocephalus helioscopus*, *Lacerta agilis*, and *Elaphe schrenckii* are included in the agreed species list, but are categorised as Not Evaluated for this reason. In all cases, species were assessed at the species level, despite the knowledge that in many cases distinct subspecies occur in this region.

Two thirds of Mongolia's amphibian species are categorised as VU (Figure 6). A total of six species were assessed from two taxonomic orders (Anura and Caudata), of which four have been identified as threatened, these are: *Bufo pewzowi* Bedriaga; 1898, *Hyla japonica* Güenther, 1859; *Rana chensinensis* David, 1875; and *Salamandrella keyserlingii* Dybowski, 1870. The remaining two species are categorised as LC, indicating there is no prominent risk of extinction under current circumstances, although monitoring should continue to detect any change in status as efficiently as possible.

A total of 21 reptile species from one taxonomic order (Squamata) are included in the agreed species list, and 18 were assessed (three species are NE). At least one species from each taxonomic family group in Mongolia (Agamidae, Gekkonidae, Lacertidae, Boidae, Colubridae, and Viperidae) are categorised as threatened or Near Threatened, with the exception of the family *Lacertidae*, however this group does contain *Eremias arguta* (Pallas, 1773), the single species categorised as DD, for which there is insufficient data to determine risk of extinction. Two species (11%) are assessed as threatened under the category VU, (Figure 7), *Cyrtopodion elongatus* (Blanford, 1875) and *Vipera berus* (Linnaeus, 1758). A further 28% are categorised as NT, and ten species (55%) are categorised as LC.
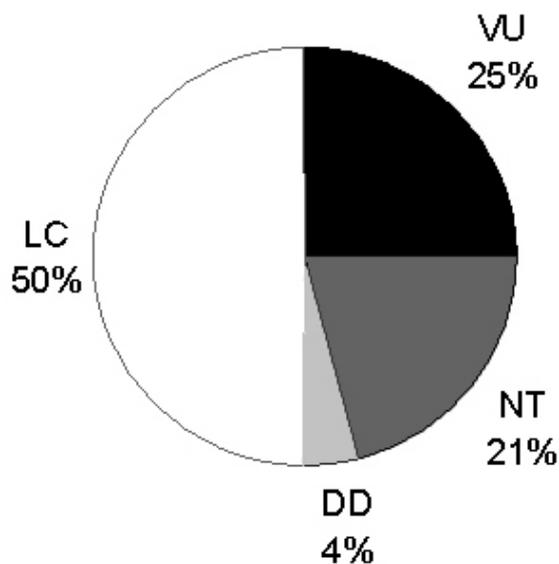

Figure 5. Regional conservation status of the 24 native Mongolian amphibians and reptiles according to the IUCN Red List Categories and Criteria. VU = Vulnerable, NT = Near Threatened, DD = Data Deficient, LC = Least Concern.
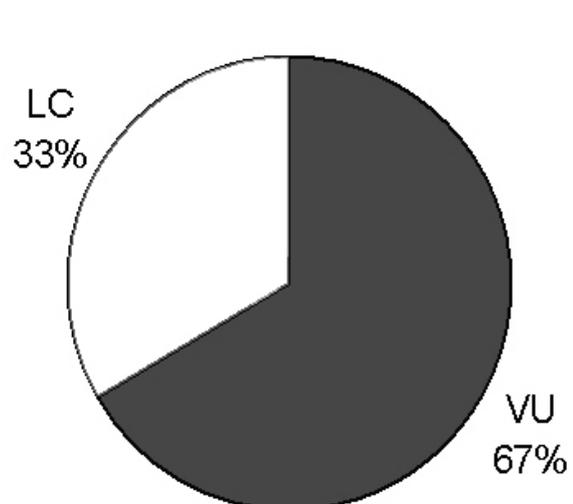

Figure 6. Comparison of the conservation status of Mongolian amphibians. VU = Vulnerable, LC = Least Concern.
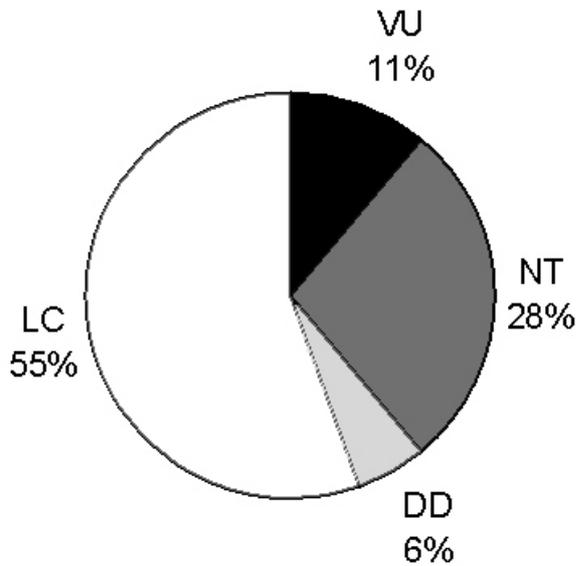
Figure 7. Comparison of the conservation status of Mongolian reptiles. VU = Vulnerable, LC = Least Concern.

Threatened species. Six of the 24 species assessed in Mongolia are categorised as threatened, and a further five species are categorised as NT (Table 1).

The Global Amphibian Assessment (GAA) has assessed all of the 5,918 described amphibian species on a global scale. Of these species 1,811 (32%) are categorised as threatened, with this figure expected to continue to increase, currently at least 43% of all amphibian species are known to be declining (GAA, 2006). Taking into account that 23% of all described species are categorised as Data Deficient, the number of threatened or declining species may in fact be much higher than this. The percentage of regionally threatened

amphibians in Mongolia is more than double the number of amphibian species threatened on a global scale, although Mongolia does hold relatively few species, this still indicates that enhanced conservation actions are required. All of the amphibian species found in Mongolia are globally categorised as Least Concern, however as many of these species are known to be declining in Mongolia and globally, preservation of biodiversity is at a critical time, and in some cases Mongolia harbours subspecies unique to Eurasia, further increasing the importance of protection.

Reptiles are somewhat less studied on a global scale, however, in July 2004, IUCN and Conservation International launched the Global Reptile Assessment (GRA), and according to the *2006 IUCN Red List of Threatened Species* (IUCN, 2006), 664 species have been assessed of the 8,240 described reptile species. A total of 341 (51%) species have been categorised as threatened. Just two of the Mongolian reptile species listed have been evaluated on a global scale, and both are categorised as LC. Overall, further research and conservation assessments on reptiles at both global and regional scales is required to reveal trends in this group of vertebrates.

In comparison ton the mammals and fishes of Mongolia, the amphibians and reptiles have a much higher proportion of species facing the risk of extinction, with 25% categorised as regionally threatened, and 21% categorised as NT (see Clark *et al.*, 2006 & Ocock *et al.,* 2006). Clearly this group of vertebrates is in need of stronger conservation efforts to reduce the risk of extinction faced by this group.

Table 1. Amphibians and reptiles categorised as regionally threatened or Near Threatened in Mongolia

Vulnerable	*Near Threatened*
Pewzow's toad *Bufo pewzowi*	Mongolian agama *Laudakia stoliczkana*
Japanese treefrog *Hyla japonica*	Przewalski's wonder gecko *Teratoscincus przewalskii*
Asiatic grass frog *Rana chensinensis*	Tatar sand boa *Eryx tataricus*
Siberian salamander *Salamandrella keyserlingii*	Slender racer *Coluber spinalis*
Yangihissar gecko *Cyrtopodion elongatus*	European grass snake *Natrix natrix*
Northern viper *Vipera berus*	

Threats to Mongolian amphibians and reptiles. The three main threat processes and their causes were identified for each species by participants. Overall, pollution is believed to be having an impact on the largest number of amphibian species (Figure 8). In all cases (three species) where pollution is identified as a threat, it is listed as the most important threat affecting the species. Pollution is affecting *Bufo pewzowi, Hyla japonica* and *Salamandrella keyserlingii* through water pollution caused by resource extraction in the form of logging in the north and mining in the west of the country, also water pollution arising from releases of domestic and agricultural waste are a problem for some species. Habitat loss and degradation are identified as influential threats to four amphibian species, with habitat loss resulting from resource extraction and formation of new human settlements, habitat degradation more often is caused by increasing numbers of livestock grazing in areas and utilising water sources. Parasites were also considered to be an important threat to two species.

Habitat loss is having an impact on the largest number of species (Figure 9), in all cases caused by resource extraction, particularly in the form of mining. This activity not only destroys habitat, but also causes water pollution, through leaching of chemicals used in the process into water systems. For reptile species, pollution is listed for seven species, in all cases it is caused by resource extraction. Climate change is also believed to be an influential threat to reptile

species, referring to changes in environmental conditions either through natural climate change or anthropogenically induced climate change.

Species categorised as threatened are of prime importance for conservation efforts, so considering the threats these species face in detail is an important part of formulating an effective conservation strategy. Table 2 details the three most important threats impacting upon the threatened amphibians and reptiles of Mongolia, as identified by the participants at the workshop. Habitat loss through resource extraction, primarily mining is an important threat, linked in the majority of cases to pollution through leaching of chemicals used for mining into water systems. Of the 11 reptiles and amphibians categorised as threatened or NT, 36% are threatened dominantly and secondarily by habitat loss and pollution, with further species threatened dominantly by either of these threat processes. It is known that this threat is having a large impact on the mammals and fishes of Mongolia also, and unfortunately the amphibians and reptiles are now revealing a similar trend of decline due to increasing resource extraction activities. Domestic and agricultural waste also causes pollution to amphibians such as *Bufo pewzowi* and *Salamandrella keyserlingii*. Climate change is identified at varying levels of threat to four threatened or NT species, primarily due to an observed trend of drying throughout the country, particularly in southern arid regions where reptiles are most often distributed. It is not yet clear if these trends are due to natural environmental
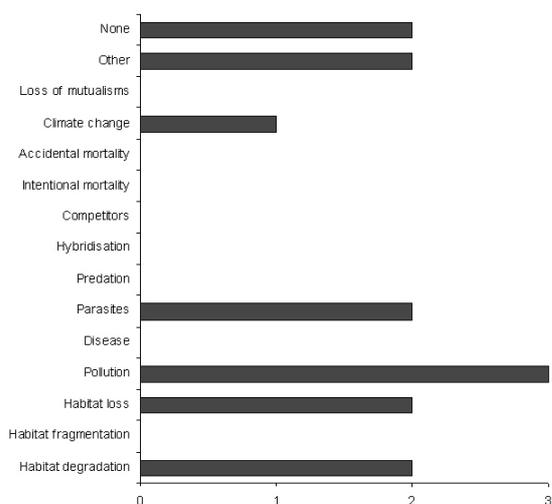

Figure 8. The dominant threats to Mongolian amphibians, as identified by participants during the workshop.
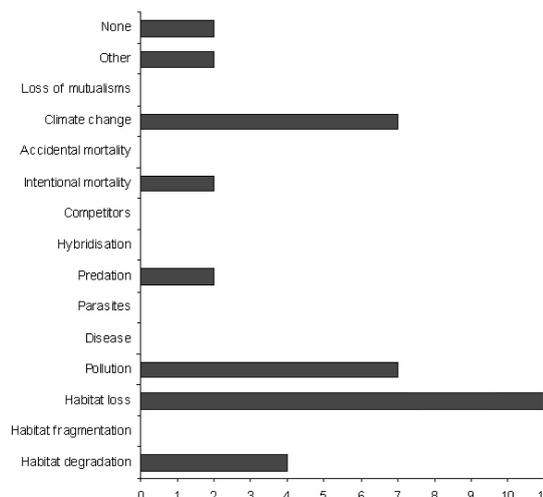

Figure 9. The dominant threats to Mongolian reptiles, as identified by participants during the workshop.

Table 2. Summary of direct threats facing threatened and Near Threatened Mongolian reptiles and amphibians, as identified by participants at the Second International Mongolian Biodiversity Databank Workshop. Primary threat represented in black, secondary threat in mid grey, and tertiary threat in light grey.

Category of threat	Species	Habitat degradation	Habitat fragmentation	Habitat loss	Pollution	Disease	Parasites	Predation	Hybridisation	Competitors	Intentional mortality	Accidental mortality	Climate change	Other	None
VU	Pewzow's toad *Bufo pewzowi*			secondary	primary								tertiary		
	Japanese treefrog *Hyla japonica*	secondary			primary		tertiary								
	Asiatic grass frog *Rana chensinensis*	secondary					tertiary							primary	
	Siberian salamander *Salamandrella keyserlingii*			secondary	primary								tertiary		
	Yangihissar gecko *Cyrtopodion elongatus*													primary	
	Northern viper *Vipera berus*			primary	secondary										
NT	Mongolian agama *Laudakia stoliczkana*														primary
	Przewalski's wonder gecko *Teratoscincus przewalskii*										primary		secondary		
	Tatar sand boa *Eryx tataricus*			primary									secondary		
	Slender racer *Coluber spinalis*												primary		
	European grass snake *Natrix natrix*			primary	secondary			tertiary							

change or are induced by anthropogenic activity, and so are simply categorised as climate change for the intentions of this article.

Conservation measures. Participants identified conservation measures currently in place for each species, and recommended beneficial actions regardless of the conservation status of the species. In the case of amphibian species, a large number of species are protected through policy-based actions, and habitat and site-based actions (Figure 10). Research actions were identified for just one amphibian species. There are no known cases of species-based actions focussed on any Mongolian amphibian species, nor are there any communication and education projects in place at present. Participants strongly recommended further research actions as the conservation measure that would be of benefit to the largest number of amphibian species, this information could be used to plan habitat and site-based actions, along with species-based actions, which are all believed to be beneficial to several amphibian species.

Participants identified few conservation measures already in place for reptile species (Figure 11). Just six species were identified as being included in habitat and site-based actions (which were not established specifically for this species), and three species are believed to be included in policy-based actions. Of a total number of 18 species (of which seven are threatened or Near Threatened), this indicates conservation actions should be enhanced for this group of species.
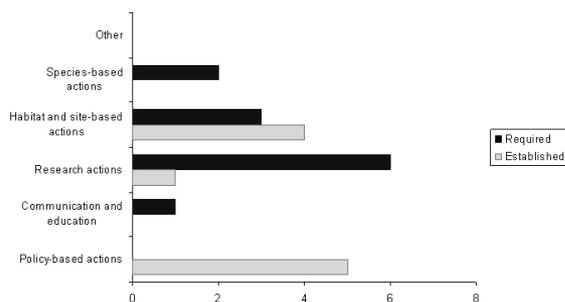
Figure 10. The number of amphibian species with different conservation measures currently established, or required.
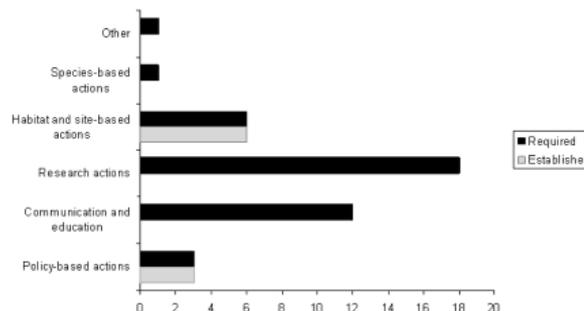

Figure 11. The number of reptile species with different conservation measures currently established, or required.

Research actions are recommended as beneficial for all reptiles assessed, and communication and education programmes were also strongly recommended for a large number of species. Participants also recommended habitat and site-based actions, policy-based actions, species-based actions, and other actions at lower levels. This indicates that generally reptiles are a poorly conserved group, requiring more beneficial actions, preferentially research, communication and education actions, and habitat and site-based actions.

A staggering 25% of Mongolia's amphibian and reptile species are facing serious risks of extinction if conservation measures are not implemented and the effects of threats reduced. As a further 21% of species are categorised as NT, this further enforces the need for action now, as conditions in Mongolia are undergoing rapid changes, its biodiversity should be carefully managed and monitored in order to reduce further declines.

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Хураангуй

Монголын биологийн олон янз байдлын мэдээллийн сангийн олон улсын хоёрдугаар хурал 2006 оны 9 сарын 11-15-нд Монгол Улсын Их Сургууль болон Хустайн Байгалийн Цогцолборт газарт болсон билээ. Уг хуралд оролцогчид Монгол орны хоёр нутагтан, мөлхөгчдийн нийт зүйлүүдийн хамгааллын статусыг Дэлхийн Байгаль Хамгаалах Холбооны Улаан дансны ангилал болон шалгуурыг баримтлан үнэлсэн юм. Монгол орны биологийн олон янз байдлын мэдээллийн сан 2005 онд байгуулагдан Монгол Улсын Их Сургууль дээр байрлаж байна. Энэхүү мэдээллийн сан нь сээр нуруутны дээр дурьдсан хоёр ангийн Монгол дахь зүйлийн жагсаалт, шинэчлэгдсэн тархацын зураг, ховор болон мэдээлэл дутмаг зүйлүүдийн хамгааллын төлөвлөгөө, түүнд холбогдох мэдээ баримт зэргээр баяжигдсан байна. Энэ өгүүллэгт Монгол орны хоёр нутагтан, мөлхөгчдийн зүйлийн жагсаалтыг хамгийн сүүлийн үеийн мэдээ баримтанд үндэслэн гаргаж, зүйл тус бүрийн хамгааллын статусыг нарийвчлан авч үзсэн юм. Хоёр нутагтны 6 зүйл, мөлхөгчдийн 21 зүйлийг Монгол оронд идээшин амьдарч буй, 7 зүйлийг Монгол улсын нутагт тохиолдох боломжит зүйлийн жагсаалтанд тус тус оруулав (үнэлгээ хийгээгүй). Хоёр нутагтан, мөлхөгчдийн 24 зүйлийг үнэлсэнээс 25% нь ховордлын ангилалд, 21 % нь ховордож болзошгүй ангилалд орсон байна.

Appendix 1. Agreed species list and possible species list for amphibians and reptiles of Mongolia.

a.) Amphibia

Scientific name	Common name	Regional assessment	Global assessment
Order Anura			
Family Bufonidae			
Bufo pewzowi Bedriaga, 1898	Pewzow's toad	Vulnerable, B1ab(iii)	Least Concern
Bufo raddei Strauch, 1876	Mongolian toad	Least Concern	Least Concern
Family Hylidae			
Hyla japonica Gunther, 1859	Japanese treefrog	Vulnerable, D2	Least Concern
Family Ranidae			
Rana amurensis Boulenger, 1886	Siberian wood frog	Least Concern	Least Concern
Rana chensinensis David, 1875	Asiatic grass frog	Vulnerable, B1ab(iii)	Least Concern
Order Caudata			
Family Hynobiidae			
Salamandrella keyserlingii Dybowski, 1870	Siberian salamander	Vulnerable, A3c	Least Concern

b). Reptilia

Scientific name	Common name	Regional assessment	Global assessment
Order Squamata			
Family Agamidae			
Laudakia stoliczkana (Blanford, 1875)	Mongolian agama	Near Threatened	Not Evaluated
Phrynocephalus helioscopus (Pallas, 1771)	Sunwatcher toadhead agama	Not Evaluated	Not Evaluated
Phrynocephalus versicolor Strauch, 1876	Toad-headed agama	Least Concern	Not Evaluated
Family Gekkonidae			
Alsophylax pipiens Pallas, 1814	Kaspischer even-fingered gecko	Least Concern	Not Evaluated
Cyrtopodion elongatus (Blanford,1875)	Yangihissar gecko	Vulnerable, D2	Not Evaluated
Teratoscincus przewalskii Strauch, 1887	Przewalski's wonder gecko	Near Threatened	Not Evaluated
Family Lacertidae			
Eremias argus Peters, 1869	Mongolian racerunner	Least Concern	Not Evaluated
Eremias arguta (Pallas, 1773)	Stepperunner	Data Deficient	Not Evaluated
Eremias multiocellata Gunther, 1872	Multi-ocellated racerunner	Least Concern	Not Evaluated
Eremias przewalskii (Strauch, 1878)	Gobi racerunner	Least Concern	Not Evaluated
Eremias vermiculata Blanford, 1875	Variegated racerunner	Least Concern	Not Evaluated
Lacerta agilis Linnaeus, 1758	Sand lizard	Not Evaluated	Not Evaluated
Zootoca vivipara Jacquin, 1758	Viviparous lizard	Least Concern	Lower Risk, least concern

Family Boidae

Eryx tataricus (Lichtenstein, 1823)	Tatar sand boa	Near Threatened	Not Evaluated

Family Colubridae

Coluber spinalis (Peters, 1866)	Slender racer	Near Threatened	Not Evaluated
Elaphe dione (Pallas, 1773)	Steppes ratsnake	Least Concern	Not Evaluated
Elaphe schrenckii (Strauch, 1813)	Amur ratsnake	Not Evaluated	Not Evaluated
Natrix natrix (Linnaeus, 1758)	European grass snake	Near Threatened	Lower Risk, least concern
Psammophis lineolatus (Brandt, 1838)	Steppe ribbon racer	Least Concern	Not Evaluated

Family Viperidae

Gloydius halys Hoge and Romano-Hoge, 1981	Halys pit viper	Least Concern	Not Evaluated
Vipera berus (Linnaeus, 1758)	Northern viper	Vulnerable, D2	Not Evaluated

c). Possible species occurring within Mongolia.

N.B. Species included in the Red List relate to species known to occur in the country in 2006, additional species whose presence is suspected or likely based on occurrence close to the borders/expanding ranges, but have not yet been confirmed are included in the possible species list.

Scientific name	Common name	Regional assessment	Global assessment
Class Amphibia			
Order Anura			
Family Bufonidae			
Bufo bufo Linnaeus, 1758	Common toad	Not Evaluated	Least Concern
Bufo gargarizans Cantor, 1842		Not Evaluated	Least Concern
Family Ranidae			
Rana arvalis Nilsson, 1842	Moor frog	Not Evaluated	Least Concern
Rana nigromaculata Hallowell, 1860	Dark-spotted frog	Not Evaluated	Near Threatened
Class Reptilia			
Order Squamata			
Family Agamidae			
Phrynocephalus axillaris Blanford 1875		Not Evaluated	Not Evaluated
Family Lacertidae			
Coluber ravergieri Menetries, 1832	Spotted wipe snake	Not Evaluated	Not Evaluated
Family Viperidae			
Vipera ursinii (Bonaparte, 1833)	Meadow viper	Not Evaluated	Endangered