

Summary Conservation Action Plans for Mongolian Reptiles and Amphibians

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The Mongolian Biodiversity Databank holds further details on all the species listed in this book. It is available to the public and can be accessed through:

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As only a limited number of hard copies will be produced, electronic versions of this report will be available through the ZSL library (<http://library.zsl.org>) and www.regionalredlist.com.

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INTRODUCTION TO THE SUMMARY CONSERVATION ACTION PLANS

The reptiles and amphibians of Mongolia were recently assessed using the ‘IUCN Red List Categories and Criteria’ (IUCN, 2001) in conjunction with the ‘Guidelines for Application of IUCN Red List Criteria at Regional Levels’ (IUCN, 2003). The assessments were carried out during the Second International Mongolian Biodiversity Databank Workshop from the 11th to 15th September 2006. This was the first time that regional guidelines had been applied to Mongolian reptiles and amphibians and the results of the assessment provided an overview of their conservation status. A full list of species occurring in Mongolia along with possible species is included in Annex I. During the assessment process, groups of participants formulated summary conservation action plans for both threatened and Data Deficient species, outlining recommended conservation measures that could be implemented to help arrest population declines or learn more about their conservation status. Following the workshop, these documents were extensively reviewed by participants and other experts who were unable to attend the workshop.

The assessments revealed a number of trends affecting the amphibians and reptiles of Mongolia. Six Mongolian reptile and amphibian species were identified as regionally threatened. Of these, four species are amphibians and two are reptiles. One species, the stepperunner (*Eremias arguta*) is categorised as Data Deficient. This does not necessarily imply that it is facing a lower risk of extinction than those identified as threatened, but highlights a requirement for more extensive research. Each species assessed as threatened is the subject of a summary conservation action plan in this document. It should be noted that the quantity and quality of available data varies between species.

These summary conservation action plans are intended to highlight species of particular concern, and to alert policy-makers, conservationists, and government and planning authorities of actions that will help to ensure that all reptiles and amphibians of Mongolia maintain viable populations into the future. Detailed action plans are already in place for some of the species in this document; the Summary Conservation Action Plans for Mongolian Reptiles and Amphibians are not intended to replace these documents, but to accompany them, and further details are provided for action plans already available. Each summary conservation action plan presents information about the status of the species, the current known distribution, threats faced, conservation measures presently established, and recommended conservation measures.

The future of Mongolia’s herpetological biodiversity depends on the response of the Mongolian and global community to the plight of the species discussed in these summary conservation action plans.

FORMAT OF THE SUMMARY CONSERVATION ACTION PLANS

The Summary Conservation Action Plans for Mongolian Reptiles and Amphibians are arranged according to the IUCN threat categories, with the most threatened listed first. Within each threat category, higher-level taxonomy follows that defined by the North Eurasian Reptile Specialist Group of the IUCN Species Survival Commission. Each summary conservation action plan follows the format outlined below:

Species name and taxonomic authority

Common names (English and Mongolian)

Subspecies in Mongolia (if applicable)

Synonyms (if applicable)

Description

Brief information on the physical characteristics of the species.

Conservation overview

Global status (global risk of extinction)

IUCN global population assessment for each species given in the ‘2007 IUCN Red List of Threatened Species’ (IUCN, 2007). Alteration of an existing global assessment during the Second International Mongolian Biodiversity Databank Workshop is denoted by a single black circle symbol (●). If this was the first assessment for the species using the ‘IUCN Red List Categories and Criteria’ (IUCN, 2001) and it is pending evaluation by IUCN Red List Authorities, this is denoted with two black circle symbols (●●).

Regional status (risk of extinction within Mongolia)

Regional assessments conducted for the first time for Mongolian reptiles and amphibians using the ‘IUCN Red List Categories and Criteria: Version 3.1’ (IUCN, 2001) and the ‘Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0’ (IUCN, 2003). For further details please refer to Terbish *et al.* (2006b), or the Mongolian Biodiversity Databank. Conservation assessments are identical to global status if endemic to Mongolia.

Legal status

Existing protective legislature for Mongolian reptiles and amphibians, including both Mongolian laws (e.g. the Law on Fauna) and international laws (e.g. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): see UNEP-WCMC (2006)). For each species, the percentage of the Mongolian range occurring within protected areas has been estimated using the UNEP-WCMC World Database on Protected Areas (<http://sea.unep-wcmc.org/wdpa/>). For further details please refer to Terbish *et al.* (2006b). Within protected areas, species are conserved under Mongolian Laws of Protected Areas.

Distribution

Global distribution

Listed from west to east and based largely on IUCN (2006) and the EMBL Database (Uetz *et al.*, 2006). Current distributions that include introductions into countries outside the native global range, or reintroductions following regional extinction, are indicated by [int] or [re-int] respectively.

Regional distribution

Place names and general regions of Mongolia are included, accompanied by a distribution map for Mongolia. These maps were updated during the Second International Mongolian Biodiversity Databank Workshop, based on Terbish *et al.* (2006a) and Borkin *et al.* (1990), and were enriched with new information from the scientific literature, museum records, government and conservation organisation documents, and expert observations (see Terbish *et al.* (2006b) for further details on the production of maps). Although these are as accurate and up to date as possible, it should be noted that many species are lacking in distribution data. As further research is conducted, changes to these maps are likely to occur. Distributions outside Mongolia were not updated.

Abundance

Historic population trends and recent population estimates within Mongolia.

Habitat and ecology

Habitat preferences within Mongolia and general comments on ecology.

Dominant threats

Brief outline of dominant threats and their causes, identified as being of immediate and primary concern by participants during the Second International Mongolian Biodiversity Databank Workshop. Threat processes can be complex and reflect multiple factors; for more detailed information please refer to the Mongolian Biodiversity Databank.

Conservation measures in place

Specific conservation actions currently established.

Conservation measures required

Actions suggested by experts at the Second International Mongolian Biodiversity Databank Workshop, and specialists in subsequent reviews, which are expected to reduce the negative impact of threats and ensure the future persistence of the species.

All summary conservation action plans have been compiled and reviewed by participants of the workshop and other specialists.

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SUMMARY CONSERVATION ACTION PLANS

VULNERABLE

Salamandrella keyserlingii

Dybowski, 1870

Order: Caudata

Family: Hynobiidae

Common names: Siberian salamander, Siberian newt or Dybowski's salamander (English) (Frank and Ramus, 1996); Shiver gulmer (Mongolian)

Subspecies in Mongolia: No subspecies are currently recognised (Kuzmin, 1999; Frost, 2007)

Synonyms: *Hynobius keyserlingii* Boulenger, 1910 (specific to Mongolia); *Hynobius michnoi* Nikolskii, 1925 (specific to Russia and northern Mongolia) (information from Gumilevskii, 1932); *Isodactylum schrenckii* Strauch, 1870

Taxonomic notes: Recently sibling species were described from Far Eastern Russia. Despite a lack of morphological differences, molecular evidence indicates they are distinct species (L. Borkin, pers. comm.). *Salamandrella* and *Hynobius* genera are from one line of the phylogenetic tree and are therefore closely related (Frost, 1985). This species has a wide distribution, however it is difficult to determine how many subspecies are present in Mongolia, due to a lack of geographical evolution studies. The first discovery of this species was very close to the Russian-Mongolian border, so this species may be represented by a nominative subspecies in Mongolia (Borkin *et al.*, 1988).

Description

During a study in Shaamar, along the Orkhon river, nine individuals were captured and their dimensions measured. It was found that females are similar to males in total length and body mass, with the average female measurements being 54.35-66.84mm (61.53±5.92) and 3.50-6.55g (5.14±1.27) compared to males which are 51.80-68.17mm (62.28±5.09) and 3.35-7.80g (5.99±1.37) (Khongorzul *et al.*, 2006). More detailed body measurements include: Snout-vent length 52.88mm±1.39mm (67.60mm±3.20mm in females); tail length 38.97mm±1.52mm (55.34mm±3.28mm in females); head width 7.83mm±0.25mm (10.18mm±0.47mm in females); body width 9.3mm±0.21mm (13.46mm±0.97mm in females); forelimbs 11.23mm±0.45mm (13mm±0.3mm in females) and hindlimbs 12.90mm±0.27mm (15.6mm±0.48mm in females) (Chashchukhin and Skopin, 2000). The post metamorphosis size is 25-26 mm (Borkin and Kuzmin, 1988). At maturity males reach 50-57 mm and females reach 44-68 mm (Hasumi *et al.*, 2004). The species has well developed limbs with four toes on each foot and no claws. The front legs are always smaller than the hind legs. Vomerine teeth are present in a V-shaped series (Terbish *et al.*, 2006). The tail is compressed laterally and may be slightly shorter than, equal to, or longer than the length of the head and body.



Photograph courtesy of Kh. Terbish

The lateral side of the head has three deep grooves. The first ('under-eye groove') forms a semi-circle under the eye. The next ('eye groove') forms a wave from the eyes to the neck. The third groove passes from the eye down to the hind corner of the chin.

This species has smooth skin, of brown, bronze-brown, olive or greyish colouration, with a light golden or silver longitudinal dorsal band, and dark spots (Terbish *et al.*, 2006). The under parts and neck are pale in colour and have no spots. The species' colour varies between water and land (dark in water, bright yellow on land). During the terrestrial breeding phase (April/May), the males' throats become bright yellow in colour, which may be a relevant factor in sexual selection (Hasumi, 2001). The under part of the throat is variable in colour. It is grey in June/August, white in September and dirty white in October. In females, ovisac development is a secondary sexual characteristic. During the breeding season (May), a pair of beige ovisacs become visible through the skin on the ventral side of the torso near the hindlimbs. At other times of the year this region of the body is a pale pinkish colour (Hasumi, 2001).

Conservation overview

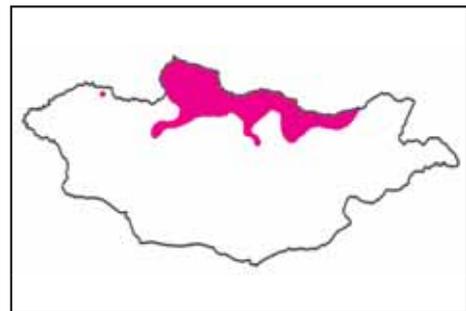
Global status: Least Concern

Regional status: Vulnerable, A3c

Legal status: Included as Rare in the 1987 and 1997 'Mongolian Red Book' (Munkhbayar, 1987; Munkhbayar and Terbish, 1997). Approximately 16% of the species' range in Mongolia occurs within protected areas.

Distribution

Global distribution: Russian Federation; Kazakhstan; China; Mongolia; Democratic People's Republic of Korea; Japan (IUCN, Conservation International, and NatureServe, 2006; IUCN, 2007). Possesses the widest geographical range of any recent amphibian species, spanning approximately 12 million km² globally (IUCN, Conservation International, and NatureServe, 2006).



Regional distribution: Coniferous forest and steppe habitats associated with freshwater sources in northern Mongolia. Distribution includes Hövsgöl Lake, Hentii Mountain Range along the Bogd and Tuul rivers, Northern Bayanzurkh, Huder, Shaamar and Zuunburen along Orkhon and Selenge rivers, Hongor Tolgoi along Eg River, Darkhad Depression along Shishhed River, and in Tes and Onon rivers (Munkhbayar and Terbish, 1997; Terbish, *et al.*, 2006). This species is distributed in Selenge, Orkhon, and Tuul and along associated rivers including Shishkhed, Ukhert, Arsay, Khug, Guna, and Tengis in Khoridol Saridag, Ulaan taiga mountain and the Arctic drainage basin (Munkhbayar, 1976b; Kuzimin *et al.*, 1986; Ulykpan and Munkhbayar, 1982; Litvinov *et al.*, 1986; Terbish *et al.*, 2006). It is also distributed along the Onon river in Hentii Mountain Range (Munkhbaatar, 2000), the upper part of Herlen River (Hotolkhuu, 1969), and Tes river which runs from Hangai Mountain Range to Uvs Lake of the Great Lake Depression (Dawaa *et al.*, 1990; Terbish *et al.*, 2006). It occurs at elevations of 600-2,250 metres above sea level in Mongolia (Borkin and Kuzmin, 1988), and has been recorded at elevations of 2,200 metres in alpine habitats on the southern slopes of Munkhsaridag Mountain along the Arig River (Litvinov, 1981; Litvinov and Skuratov, 1986). This species has an estimated extent of occurrence of around 202,083 km².

Abundance

Once relatively abundant (particularly in the vicinity of Bayanzurkh), this species is currently believed to be rare, existing in isolated populations and possibly undergoing population declines in Mongolia (Munkhbayar, 1987; Munkhbayar and Terbish, 1997). Although there is no data available to confirm this, numbers sighted on expeditions continue to decline. Abundance may be greatest along the Shished River of the Darkhad Depression in the Hövsgöl Mountain Range, and lowest in Bayanzurkh and other parts of the Mongolian range (Obst, 1962; Kuzymin *et al.*, 1986; Semenov and Munkhbayar, 1996). No population estimates for the Mongolian population are available, but studies in Shaamar recorded the larval density as 0.004-0.027 per litre and 18 individuals per 10m² in the morphogenesis stage (Borkin and Kuzymin, 1988; Munkhbayar and Terbish, 1997).

Habitat and ecology

Fragmented into several subpopulations, distribution in Mongolia is associated with swampy lowlands. There are several fragmented populations in coniferous forest (taiga) and forest steppe habitats (Borkin and Kuzymin, 1988; Semenov and Munkhbayar, 1996). One case of a high mountain population was recorded in the Hövsgöl Lake area, at elevations of 2,200 metres on the southern slopes of Munkhsardig Mountain, however this is an unusual case (Litvinov, 1981; Litvinov and Skuratov, 1986). Globally, suitable habitats include wet conifer, mixed, deciduous forests in the taiga zone and riparian groves in tundra and forest steppe (AmphibiaWeb, 2006). Specimens are often found under fallen rotten trees and branches, in the Darkhad Depression of the Hovsgol Mountain Range. Studies in the Orkhon River basin and Shaamar have found 70.4% (n=19) in burrows, 18.5 % (n=5) in fallen rotten trees and 11.1% (n=3) near the roots and shoots of plants. The distance between burrow and pool was 0.7-9.9m (n=27, 4.17±8.5), depth of burrow 7-39cm (n=19, 15.4±8.5), and size of fallen rotten tree surface was 160-1000cm² (n=5, 659±390) (Khongorzul *et al.*, 2006).

Salamandrella keyserlingii is a unique amphibian in its freeze-tolerance: adults are able to survive freezing to -35 - -40 °C and can move at +0.5- +1.0 °C. The spawn can survive short-term freezing in the ice and frozen adults have been observed to revive after being found in permafrost of 4-14 metres in depth (AmphibiaWeb, 2006).

Hibernation occurs between October and mid-April in Mongolia (Borkin *et al.*, 1988). The total duration of over-wintering increases northwards to about 75% of the year in the far north. Hibernation occurs in groups in rotten trees, under logs, or in holes (AmphibiaWeb, 2006). Eggs are laid at the end of April and the beginning of May. The egg sac is half moon shaped and surrounded by a thin colourless cover (Munkhbayar, 1976). During the breeding season the species is active during the day. A study by Munkhbayar (1976) found the average number of eggs in a female ovisac to be 60. A study by Kuzmin (Kuzmin *et al.*, 1986) observed two females and found one of them to contain 150 eggs (94 of which were fully developed), and another to contain 298 eggs. The average egg diameter was 2.5mm (n = 86). This study took place in Tuul river of Bayanzurkh on 19th May 1969. Litvinov and Skuratov (1986) observed many egg sacs in alpine pools on Munkhsaridag mountain, west of Hövsgöl Lake on 10th June 1981. Egg sac diameter was 1.5-2.0cm, and egg diameter was 5mm, containing a large, motile embryo. All egg sacs were near the edge of the pool, in water 20-30cm deep. Suitable places to breed were small pools with water up to 40cm deep (approximately 0.25m²) (Hasumi and Kanda, 1998).

Some studies of embryo development in this species have been conducted in Mongolia (Kuzmin *et al.*, 1986; Litvinov and Skuratov, 1986). The results of these studies have shown

that it takes approximately three months from the egg being laid to the young adult emerging from the water. This time includes the embryonic and larval stages of development. However, when situated in high mountain areas this process may take 2-3 weeks longer (Borkin *et al.*, 1988).

The freshwater larva are generally 8-10 mm in length, feeding on benthic and phytophilous invertebrates, and a small percentage of plankton. Terrestrial adults feed mainly on slugs and arthropods. Aquatic insects such as water beetles (*Dytiscidae* spp.) prey on the larvae of this species (Munkhbayar and Terbish, 1997), and larger vertebrates such as snakes and raptors prey on the adults (AmphibiaWeb, 2006). Migrations may be undertaken to search for food or better conditions but this species rarely travels further than 500 metres from a water source, and as Mongolia is an arid country, distances travelled will be shorter (L. Borkin, pers. comm.). This species has an average longevity of approximately nine years (Hasumi *et al.*, 2004).

Dominant threats

Habitat degradation and loss, primarily caused by marsh drainage and water pollution (Munkhbayar and Terbish, 1997). Water pollution is a particular problem around Ulaanbaatar and Shaamar, in Mongol Daguur Steppe. This situation occurred along Tuul river and Uu Bulan, caused by sewage release, and domestic, industrial and agricultural waste. Other causes of habitat degradation, fragmentation and loss include resource extraction (gold mining and logging), establishment of human settlements, and wildfires (particularly in coniferous forest habitats). Intrinsic factors such as limited dispersal, low densities and restricted range make this species vulnerable to stochastic events. Drying of water sources and droughts threaten this species, although it remains unclear if these represent natural environmental changes or are driven by anthropogenic activity. Parasites are also a problem. The lungs of a one-year-old Siberian salamander found in Shaamar were found to be infected with a nematode species (*Rhabdias* spp.) (Munkhbayar and Terbish, 1997).

Conservation measures in place

- Approximately 16% of this species' range in Mongolia is included within Hövsgöl National Park, Hordil saridag Strictly Protected Area and Han Hentii Strictly Protected Area, Ulaan taiga National Park, Onon balj National Park, Tujiin Nars National Park and Uvs Nuur Strictly Protected Area (Terbish *et al.*, 2006).
- Included as Rare in the 1987 and 1997 'Mongolian Red Book' (Munkhbayar, 1987; Munkhbayar and Terbish, 1997).

Conservation measures required

- Munkhbayar and Terbish (1997) recommend extending the current protected areas to cover more of its distribution, ecological studies, and annual monitoring at Shaamar. This would also benefit other species occurring in this area, including *Rana amurensis*, *Bufo raddei*, and *Salamandrella keyserlingii*, along with four reptile species; *Natrix natrix*; *Eremias argus*; *Elaphe dione* and *Gloydius halys*.
- This species has a similar distribution to that of the Far Eastern treefrog (*Hyla japonica*), therefore joint monitoring programmes and conservation efforts could be conducted. Measures should include: research on distributions in lowland habitats in Selenge River Basin, taxonomy, biology and ecology, life histories, effects of threats, and conservation measures required.
- Recommend that local authorities act to protect the areas where this species occurs, such as river valleys, pools and marsh areas.

- Research on all aspects of this species, including population numbers and range, biology and ecology, threats faced and conservation measures which will be of benefit.
- Establish a community based education programme on threats to this species and the effects of habitat degradation and loss on this species.
- Details of this species should be included in school textbooks, as a species which requires conservation.

Resources required for conservation

- Ecological studies and research in Shaamar.
- Establishment of a protected area at Shaamar or an extension to Tujiin Nars National Park (depending on the research results for distribution). Establishment of annual population monitoring.
- Maintenance of protected areas.
- Establishment of an education programme and community based initiatives.

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Bufo pewzowi Bedriaga, 1898

Order: Anura

Family: Bufonidae

Common names: Pewzow's toad, Central Asian green toad (English); nogoon bakh or tovaziin bakh (Mongolian)

Subspecies in Mongolia: No subspecies are currently recognised, further research is required (Kh. Terbish, pers. comm.).

Synonyms: *Bufo viridis* Laurenti, 1768; *Bufo danatensis* Pisanetz, 1978

Taxonomic notes: Research has shown that *Bufo viridis* is widely distributed in the Palearctic region, from Western Africa to Southern Siberia and Central Asia. During the 1970s, genetic studies determined that this species has tetraploid populations in Mongolia and other regions in Central Asia, differing from other populations globally (Masik *et al.*, 1976; Pisanets, 1978; Bassalayeva *et al.*, 1998; Borkin *et al.*, 2001). Researchers were firstly concerned with *Bufo viridis* in Mongolia (Peters, 1971; Munkhbayar, 1976b), although confusion with *Bufo oblongus* and *Bufo danatensis* still occurred (Stöeck *et al.*, 2001). The results of genetic studies indicated that this species has tetraploid chromosomes ($4n=44$, $NF=88$) so renamed it *Bufo pewzowi* (Borkin *et al.*, 1986). *Bufo pewzowi* was recognised as a distinct species three or four years ago, and was re-named the Central Asian green toad or Pewzow's toad (L. Borkin, pers. comm.). It is partly in sympatry with *Bufo viridis turanensis*, which is sometimes confused with this species (IUCN, 2007). The species has special scientific significance due to its polyploid speciation, a rare phenomenon in animals in general (Borkin *et al.*, 1986). Polyploid species occur in fewer than 5% of the world's amphibian species (Kh. Terbish, pers. comm.).



Photograph courtesy of Kh. Terbish

Description

The average body size of the toad is 7-9cm. A study at Uench, in the Bulgan river basin of western Mongolia found size to range from 65.44 ± 1.023 mm in females (n=22), to 69.68 ± 1.023 mm in males (n=16) (Terbish and Kuzmin, 1988). The head length is about one third of the body length (Terbish *et al.*, 2006). The ear drum is distinct, and is less than half the diameter of the eye. The eyes are bulging. The parotid gland is located in the postial bone of the head. It is kidney-like in shape, with a wider anterior region. The hind legs are always shorter than the front legs. The skin between the fingers is not well developed. It does not reach the third phalange of the fourth finger. The skin surface is blistered.

Body colour differs between males and females. The female is more sharply coloured. Many individuals have small dark spots arranged in longitudinal rows (Bassalayeva *et al.*, 1998), however, specimens from western Mongolia often display combinations of small irregular spots fused together to form reticulate patterns (Borkin and Kuzmin, 1988). Dorsal colouration changes throughout the year, with males appearing lighter during the breeding season (Bassalayeva *et al.*, 1998). Many specimens display wide dark stripes on the limbs, with large elongate or rounded separate spots surrounded by scattered specks on the dorsal sides. A study of adult female individuals found 52% to have a light wide stripe from the head to the end of the body. Dorsal colour is light greyish-green and the belly is white (Bassalayeva *et al.*, 1998; Terbish *et al.*, 2006). Males are not sharply coloured. Dorsal colour is light green, or green with a little brown. It has no dark spots, or specks on its back. The throat is white, without spots (Terbish, 1989; Borkin and Kuzmin, 1988).

Conservation overview

Global status: Least Concern

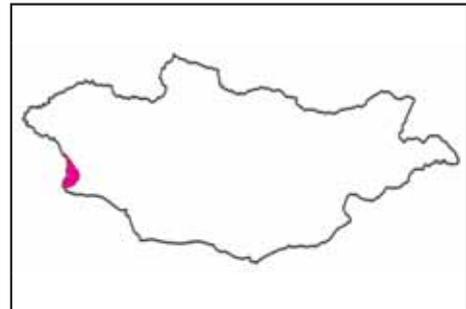
Regional status: Vulnerable, B1ab(iii)

Legal status: Included as Rare in the 1997 'Mongolian Red Book' (Munkhbayar and Terbish, 1997). Less than one percent of the species' range in Mongolia occurs within protected areas.

Distribution

Global distribution: Kazakhstan; Uzbekistan; China; Mongolia; Kyrgyzstan; possibly Afghanistan and Tajikistan (IUCN, 2007).

Regional distribution: Meadows, marshes, pond banks, streams and rivers in mountain-steppe, oases, and desert habitats (Munkhbayar and Terbish, 1997). Distributed in Bulgan and Uench rivers in the south western part of the Mongol Altai Mountain Range in western Mongolia and Uushig and Damjigiin Us in Dzungarian Gobi Desert (Munkhbayar, 1976; Orlova and Terbish, 1986; Borkin *et al.*, 1988; Semenov and Munkhbayar, 1996; Terbish *et al.*, 2006). Its distribution in Mongolia is sporadic and confined to water bodies, therefore it often exists in isolated populations. Details on occurrence in each water body are available in Borkin and Kuzmin (1988). It occurs at elevations of 1,150-2,000 metres above sea level in Mongolia (Borkin *et al.*, 1986; Borkin and Kuzmin, 1988). This species has an estimated extent of occurrence of around 11,870 km².



Abundance

This species has variable abundance depending on weather conditions. Although rare in some locations, it can become locally abundant in small areas (comments from workshop

participants). Estimates conducted in May 1981 (by Kh. Terbish and Kuzmin) in Huiten Bulag during night surveys recorded 65-150 toads along a 200 x 4 metre line transect (Terbish and Kuzmin, 1988; Borkin and Kuzmin, 1988). Later in 1984 in Ulaan Uzuuriin Bulag during night surveys, 149-194 toads were recorded along a 240 x 2 metre line transect (Terbish and Kuzmin, 1988; Borkin and Kuzmin, 1988). During 1-2 hour night transects along the Uliastai River, between five and 30 individuals were sighted (Munkhbayar and Terbish, 1997).

Habitat and ecology

Inhabits oases, springs or small rivers in true desert habitats (areas with annual precipitation levels of less than 100mm) and steppe habitats (Borkin and Kuzmin, 1988). The species is found in grass and shrubs on the banks of rivers (Terbish and Kuzmin, 1988). It also occurs under stones, in rodent burrows, and between plant roots during the day (Terbish and Kuzmin, 1988; Munkhbayar and Terbish, 1997). The species digs 20-30mm deep in soft sandy soil. This species reaches maturity at three years old. Eggs are laid in artificial small ponds, pools and ditches. Running water is avoided, perhaps due to the low temperatures affecting larval development (Terbish and Kuzmin, 1988; Bassalayeva *et al.*, 1998). In Huiten Bulag, three couples were found to lay eggs in temperatures of 6-13°C, on the 15th of May (Terbish and Kuzmin, 1988). A study of four females in Uench in September found that one clutch of 2.182-2.623 eggs is produced per year (average 2.391±112.6) (Terbish and Kuzmin, 1988). The larvae appear in early July. Young individuals are 1.3-1.35cm in size (Peters, 1971). In Mongolia, embryonic and larval stages take place over 1.5-2 months (Terbish, 1985; Borkin *et al.*, 1988). The larvae feed on algae (Zygnemalis, Hormogonales, Ulotrichales, Bacillariophyta and Phaeophyta) and water plants. During metamorphosis (stages 51 and 52), the individuals do not feed (Terbish and Kuzmin, 1987). After metamorphosis, the young toads feed on fly larvae, ants, and butterfly larvae. Adults feed on insects, arthropods and molluscs such as flies, mosquitos, crabs (Carabidae, Curculionidae, Scarabaeidae), butterflies, ants, locusts, bedbugs, saxual spiders, molluscs and shellfish (Munkhbayar, 1976; Terbish and Kuzmin, 1988; Borkin *et al.*, 1988; Peters, 1971).

The highest elevations of occurrence for this species are in mountain steppe habitats, with a minimum elevation of 1,150 metres above sea level and a maximum of 2,000 metres above sea level throughout its global range (Borkin and Semenov, 1986). Longevity is at least four years based on skeltochronology studies (Borkin and Kuzmin, 1988). Specifically to Mongolia, this species is described as crepuscular and nocturnal in May, June and September (Borkin and Kuzmin, 1988).

Dominant threats

Water pollution through releases of domestic sewage and agricultural, industrial, and commercial waste (L. Borkin and Kh. Terbish, pers. comm.). Resource extraction (mining) is a cause of habitat loss and pollution. Human settlements and livestock grazing near to oases are a likely source of habitat loss, as springs can be destroyed through trampling. Drying of water sources and droughts also threaten this species, although it remains unclear if these represent natural environmental changes or are driven by anthropogenic activity. Intrinsic factors such as limited dispersal, low densities, and a restricted range also affect this species.

Conservation measures in place

- The species occurs in GGSPA section B and Bulgan Gol Nature Reserve (Semenov and Munkhbayar, 1996; Terbish *et al.*, 2006).

Conservation measures required

- Establish an education programme informing local people of the effects of habitat loss on this species. This species congregates in areas of suitable habitat and hibernates, therefore disturbance or destruction of these areas can destroy an entire population. Leaflets (prepared by Kh. Terbish) should be circulated throughout its range and in adjacent areas.
- Sample water bodies in western Mongolia to identify accurate limits of distribution.
- Further research on all aspects of this species, including taxonomy, biology and ecology, population sizes, effective conservation measures, and the impact of threats, particularly mining and water pollution, needs to be conducted.
- Collect tissue samples to evaluate the genetic evolutionary diversity between isolated populations. If isolated localities are inhabited by evolutionarily distinct populations these must be conserved in order to retain maximum genetic diversity within the species' gene pool.
- Monitor population sizes and trends by training students and establishing a programme which can then be continued annually producing reliable data on population trends and dynamics.
- Maintain and expand existing protected areas to include a micro-protected area, leading to 100% of its Mongolian distribution to be within protected areas.

Resources required for conservation

- One expedition to cover the first four points listed above.
- Advise the Ministry of Nature and Environment on the results of this expedition.
- Train students and establish an annual monitoring programme.
- Create a genome bank, using samples collected during a field trip.
- Teaching in schools on the importance of habitat conservation and polyploid species.

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Hyla japonica Günther, 1859

Order: Anura

Family: Hylidae

Common names: Far Eastern tree frog or Japanese tree frog (English) (Frank and Ramus, 1996); modny melkhii (Mongolian)

Subspecies in Mongolia: *H. j. stepheni* Boulenger, 1887

Synonyms: *Hyla stepheni* Boulenger, 1887; *H. ussuriensis* Nikolsky, 1918

Taxonomic notes: Previously considered to be a subspecies of the *Hyla arborea* complex, however, biochemical and morphological studies have now shown this to be incorrect (Daito, 1968; Kawamura and Nishioka, 1977; Kuramoto, 1984; Nishioka *et al.*, 1990; Kuzmin, 1999; Frost, 2007; IUCN, Conservation International, and NatureServe, 2006). Here we consider *H. ussuriensis* to be a synonym of *H. japonica* pending further taxonomic work on this complex, although further research on the position of *H. japonica* in Central Asia and Mongolia is recommended.



Photograph courtesy of Kh. Terbish

Description

After metamorphosis this species can grow up to 20mm (Borkin and Kuzmin, 1988), and by maturity the average snout-vent length for males is 29mm, with a maximum recorded size of 42mm (Munkhbayar, 1976; Borkin and Kuzmin, 1988; Terbish *et al.*, 2006).

The head is wide and flat, a quarter of the body size. The ear drum is distinct, and is smaller than the eye. The eyes are oval and bulging. Front legs and fingers are well developed. Skin between the fingers is almost absent. Hind legs are long, and if stretched forwards they may reach the back of the eye. The tips of the fingers and toes have round adhesive disks. The forelimb webbing is poorly developed (AmphibiaWeb, 2006). The dorsal skin is smooth and the ventral skin is granular. This small pale green frog is very similar to the common tree frog (*Hyla arborea*), but has a dark spot on the upper lip below the eye, has no inguinal loop, and has slightly shorter hind legs. Its colour is changeable. It is light green when temperature and light levels are high, and becomes dark green at night. Colouration and sexual dimorphism are similar to those in the common tree frog (the main difference is the absence of the inguinal loop). The male frog has a single balloon-like resonator, made of skin (Borkin and Kuzmin, 1988). Karyotype: Diploid chromosomes (2n=24, NF=48) with six large pairs and six small pairs, making a total of 24 chromosomes (Kuramoto *et al.*, 1973; Kuramoto, 1980; Borkin and Kuzymin, 1988; AmphibiaWeb, 2006).

Conservation overview

Global status: Least Concern

Regional status: Vulnerable, D2

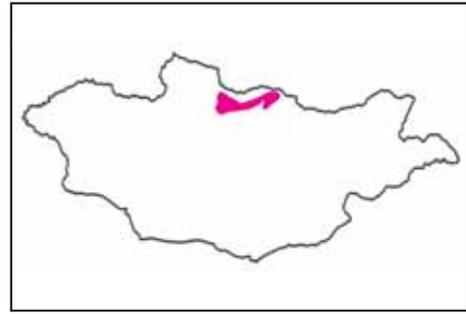
Legal status: Included as Rare in the 1997 'Mongolian Red Book' (Munkhbayar and Terbish, 1997). None of its range is included within protected areas (Terbish *et al.*, 2006; protected area data provided by UNEP-WCMC, 2006).

Distribution

Global distribution: Russian Federation; China; Mongolia; Democratic People's Republic of Korea; Republic of Korea; Japan (Semenov and Munkhbayar, 1996; IUCN, Conservation International, and NatureServe, 2006; IUCN, 2007).

Regional distribution: Meadows and swampy areas in steppe and forest steppe habitats associated with freshwater sources (Borkin and Kuzmin, 1988; Munkhbayar and Terbish, 1997). Distribution includes

lower Selenge and Orhon rivers, Ikh and Baga Buureg Tolgoi hills in Shaamar, and Eroo and Haraa rivers in Mongol Daguur Steppe. It also occurs in Tulgat Hill in Bulgan Province in the north-eastern Hangai Mountain Range (Munkhbayar, 1976; Borkin *et al.*, 1988; Munkhbayar and Terbish, 1997; Terbish *et al.*, 2006). It occurs at elevations of 600 metres above sea level in the lowlands of Mongolia (Borkin *et al.*, 1988). Its estimated extent of occurrence in Mongolia is 19,980 km².



Abundance

Globally, the Japanese tree frog is common throughout its range, but is considered rare and sporadically distributed in northern parts of its range, including the Lake Baikal area and Mongolia (Conservation International, and NatureServe, 2006). Within Mongolia, this species is rare with a limited range (Terbish *et al.*, 2006), although no population estimates or trend data for the total Mongolian population are available (L. Borkin and Kh. Terbish, pers. comm.). The species was most abundant in 1965 in Shaamar Ikh Bureg, where 30 individuals were recorded along a 1,000 x 3m transect survey, but later in 1968, only 23 individuals were recorded along the same transect (Munkhbayar, 1976, Borkin and Kuzmin, 1988). In 1984 in Shaamar, in different water bodies, 60-68 individuals were recorded in 1000m² (Borkin *et al.*, 1988).

Adults often occur in swampy areas between July and August and in some years as many as 100-500 can occur in a single area (Borkin and Kuzmin, 1988).

Habitat and ecology

This species occurs in forest steppe habitats in northern Mongolia with permanent stagnant water bodies such as marshes, bogs and swamps in which they can breed (Borkin and Kuzmin, 1988). Following rain it is frequently found on rocks. No information exists on seasonal activity. A study in the Baikal region found hibernation was likely to occur from the end of September to the end of April/beginning of May (Shevtsov, 1973; Shkatulova *et al.*, 1978). It is found in abandoned rodent burrows, in crevices between rocks, under stones, in holes in trees, and in leaf litter (Conservation International, and NatureServe, 2006).

Adults are nocturnal. In Shaamar, they are active from the evening to the morning, but are most active around 9-10pm (Borkin *et al.*, 1988). The larvae are active during the day and swim and feed at the water surface. In northern Mongolia it lays eggs from the middle of May to the beginning of June. Females lay around 760, 2mm eggs, once per year (Munkhbayar, 1976). Larvae appear in the water at the end of June. Metamorphosis takes place from the end of July to the end of August, after which young adults appear on land. Young adults are less than 20mm in size. Newly metamorphosed froglets feed on algae such as Hormogonals, Chlorococcales, Zygnemales and Mesotaeniales, whereas late froglets feed on invertebrates. Adults which are greater than one year old feed on earthworms, molluscs, spiders and insects

(dragonflies, butterflies, beetles, ants, flies). Seventy percent of the diet is made up of spiders, Coleoptera, and Diptera (Kuzmin, 1988; Borkin *et al.*, 1988).

Dominant threats

Water pollution through releases of domestic waste and sewage and small scale agricultural waste. This species may experience population fluctuations related to weather conditions, as populations decline during dry conditions, this constitutes a threat. Resource extraction (gold mining) also contributes to pollution and results in habitat loss. *Oswaldocruzia bialata* parasites were found on individuals examined in Shaamar and of these, 3% were infected with helminths (Munkhbayar and Terbish, 1997).

Conservation measures in place

- Despite being listed as Rare in the ‘Mongolian Red Book’ of 1997, the only other conservation measure currently established for this species is research at an international level into its taxonomic status (L. Borkin, pers. comm.).

Conservation measures required

- Shiirevdamba *et al.* (1997) recommend further habitat protection.
- This species has a similar distribution to that of the Siberian salamander (*Salamandrella keyserlingii*), therefore joint monitoring programmes and conservation efforts could be conducted. Measures should include: research on distributions in lowland habitats in the Selenge River Basin, taxonomy, biology and ecology, life histories, effects of threats, and conservation measures required.
- Maintenance of existing protected areas.

Resources required for conservation

- Ecological studies and research in Shaamar.
- Establishment of a protected area at Shaamar or an extension to Tujiiin Nars National Park (depending on the research results for distribution). Establishment of annual population monitoring.

Compilers and reviewers: B. Altantuya, J.E.M. Baillie, L. Borkin, A. Byambasuren, E.L. Clark, E. Hurelbaatar, J. Munkhbat, B. Munkhchuluun, B. Oyuntuya, Kh. Terbish and J. Uransakhan.

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Rana chensinensis

David, 1875

Order: Anura

Family: Ranidae

Common names: Asiatic grass frog, Chinese brown frog or inkiapo frog (English) (Frank and Ramus, 1996); dornodiin melkhii (Mongolian)

Subspecies in Mongolia: Further research into the designation of subspecies within Mongolia is required.

Synonyms: *Rana nigromaculata* Hallowell, 1860 (Munkhbayar and Eregdendagva, 1970).

Taxonomic notes: In the past (and sometimes at present), this species has been considered synonymous with *Rana temporaria* Linnaeus, 1758. Later studies revealed *R. chensinensis* to be part of a species complex, although it is now commonly accepted to consider this species (along with *R. ornativentris*, *R. dybowskii*, and *R. pirica*) as distinct, as it has 24 chromosomes (Borkin, 1975). However, the status of other species in this complex remains unresolved (AmphibiaWeb, 2006; IUCN, 2007). The taxonomic position of this species in Mongolia should be investigated, as there are two isolated populations in Dariganga and Ikh Hyangan Mountain Range, which may represent genetically different forms, subspecies or even species (L. Borkin, pers. comm.).



Photograph courtesy of Kh. Terbish

Description

The average body size is 64mm; females (n=13) 31.2-51.7mm (43.62± 6.02), males (n=13) 31.5-51.0mm (43.7±5.88) (Munkhbaatar, 2004). The ear drum is well developed, and is more than half the size of the eye. The body and lateral sides have many tubercles surrounded by brown patches which merge together (Terbish *et al.*, 2006). It has a brown, olive or greyish dorsal colouration, occasionally with dark spots. It has vomerine teeth and the posterior part of the tongue is free and forked. Its toes are webbed and its omosternum and sternum are ossified. The pupils of its eye are horizontal and the skin on its flanks and thighs is smooth or slightly granular. Along the upper lip there is a white stripe, and a dark stripe around the shoulder. It has a large temporal spot and a light coloured ventral side. The lower surface of the hind part of the belly and hind legs is orange-pink in females (Borkin *et al.*, 1988; Munkhbaatar, 2004).

Conservation overview

Global status: Least Concern

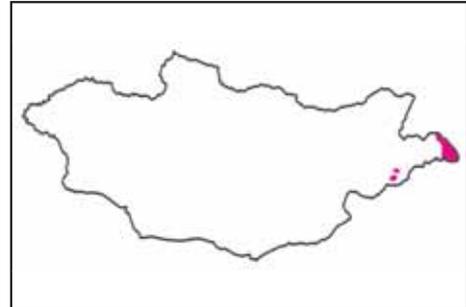
Regional status: Vulnerable, B1ab(iii)

Legal status: Included as Rare in the 1987 and 1997 'Mongolian Red Books' (Munkhbayar, 1987; Munkhbayar and Terbish, 1997). Approximately 15% of the species' range in Mongolia occurs within protected areas (Terbish *et al.*, 2006; protected area data provided by UNEP-WCMC, 2006).

Distribution

Global distribution: China; Mongolia; possibly Democratic People's Republic of Korea and Russian Federation (IUCN, Conservation International, and NatureServe, 2006; IUCN, 2007).

Regional distribution: Steppe and forest steppe habitats associated with freshwater sources such as marshes, springs, oases and lakes (Borkin and Kuzmin, 1988; Semenov and Munkhbayar, 1996). Isolated populations are located in Galt Mountain in Sukhbaatar



Aimag, and around Buir Lake and Halkh River in Ikh Hyangan Mountain Range and Eastern Mongolia (Borkin and Kuzmin, 1988; Munkhbaatar, 2004; IUCN, Conservation International, and NatureServe, 2006; IUCN, 2007). Its distribution is restricted to Eastern Mongolia and includes Ganga Lake in Sukhbaatar Province, Dagsh River, Duut Lake, and Hukh Lake. It also occurs in Hongor, Ar Nömrög, Hus, Bichigt, Azarga, Degee, and Halkh rivers and tributaries (Munkhbayar and Terbish, 1997; Terbish *et al.*, 2006). The species occurs at elevations of 583-1,500 metres above sea level in Mongolia (Borkin and Kuzmin, 1988). Its estimated extent of occurrence in Mongolia is 19,995 km².

Abundance

The population in Mongolia is believed to be small and is considered rare with a limited range (Terbish *et al.*, 2006), although no population data for the total Mongolian population exists. Studies recorded approximately 60 individuals along a 1km transect along the Dagsh River (Munkhbayar, 1987; Munkhbayar, Terbish, 1997), 34 individuals along a 100m transect in Dariganga (during the breeding season when activity is at its highest), 20 individuals in the Hingan Mountain Range (later in the year but also during breeding time) over two days of sampling (Munkhbayar, 1976; N, Batsaikhan, pers. comm.), 10 individuals along a 1km transect of the Nariin river of Nömrög river basin in June 1999 and 35 individuals along a 500m transect of the Khanyn river on 28th May 2000 (Munkhbaatar, 2004).

Habitat and ecology

Occurs in eastern steppe and forest steppe habitats, in permanent rivers and streams, bogs, marshes and swamps, and permanent freshwater lakes, springs and oases. The species also occurs in permanent brackish, saline or alkaline lakes.

This species is active in the evening in Dariganga (E.V. Rotshild, pers. comm.), however, in the Nömrög river and Nariin river in June 1999, the species was found to be active between three and four o'clock in the afternoon (Munkhbaatar, 2004). There is no information about seasonal activity in Mongolia. In Dariganga the species was found on the 17th of October (Munkhbaatar, 2004). This species hibernates underwater in streams and rivers (Conservation International, and NatureServe, 2006). Reproduction takes place from February to June, depending on latitude and altitude. Females laid eggs in shallow water in Dariganga on 2nd May 2002. Each clutch contained around 1800 eggs. The fact that eggs remained in

the oviducts of two females studied (73 and 26 eggs), suggests that this species deliberately stops laying around this date. Breeding occurs in pools around Beijing in May, and in June in Sychuan and eastern Tibet (Lui and Hu, 1961; Lui, 1950). In the Far East it lays eggs after it comes out of hibernation in April. Each clutch contains 2100-3500 eggs (Korotkon, 1974). Many larvae were found in the Nömrög river of the Ikh Khyngan mountain range in the second half of July (Munkhbaatar, 2004). There is a lack of information on development and longevity in Mongolia. In Dariganga, the average body length of females is 64mm, males 51mm. Males are therefore smaller than females. Tadpoles feed on algae, detritus and higher plants, and parts of plant tissue such as leaves, whereas adults feed on invertebrates. Adults greater than one year old in Dariganga and Nömrög river feed on crayfish (Gammaridae), spiders, mites, Myriapods, Collembola, Aphidinea, Cicadodea, Lepidoptera, Coleoptera, Hymenoptera and Diptera (Borkin *et al.*, 1988; AmphibiaWeb, 2006). Land cover generally includes shrub or herbaceous cover. This species is found at elevations between 583 and 1,500 metres above sea level throughout its global range (Borkin and Kuzmin, 1988).

Dominant threats

As this species has a restricted range and exists in isolated populations it is vulnerable to stochastic events such as extreme weather conditions. Habitat degradation constitutes a threat through wildfires (particularly in Ikh Hyangan Mountain Range). Establishment of human settlements near water sources, grazing by increasing numbers of livestock, and infrastructure development (to some extent) pose further threats. In some areas, particularly Dariganga, pollution through release of domestic waste is also a threat (Munkhbayar and Terbish, 1997).

Conservation measures in place

- Parts of the species' range occur within the Dariganga National Reserve and Nömrög Strictly Protected Area in Eastern Steppe and the Ikh Hyangan Mountain Range (Terbish *et al.*, 2006).

Conservation measures required

- Establish an education programme to raise awareness on the effect of waste release and the improper use of water resources. This programme should also identify key areas for hibernation, to prevent disturbance or destruction of these habitats. This species congregates when hibernating, so entire populations can easily be destroyed. Information would be primarily distributed via leaflets.
- Agree on land management techniques or protected areas with local authorities to prevent habitat degradation.
- Conduct further research on population trends and sizes, taxonomy, habitat and ecology, disease and pathogen management, and threats.

Resources required for conservation

- Education programme.
- Land management or protected areas.
- Further research on all aspects of this species.
- Population monitoring programme.
- Development of existing legislation regarding this species.

Compilers and reviewers: B. Altantuya, J.E.M. Baillie, L. Borkin, A. Byambasuren, E.L. Clark, E. Hurelbaatar, J. Munkhbat, B. Munkhchuluun, B. Oyuntuya, Kh. Terbish and J. Uransakhan.

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Cyrtopodion elongatus (Blanford, 1875)

Order: Squamata

Family: Gekkonidae

Common names: Gobi naked-toed gecko or yangihissar gecko (English); Gobi Goviin makhir huruut or Goviin nutsgen huruut (Mongolian)

Subspecies in Mongolia: Further research into the designation of subspecies within Mongolia is required.

Synonyms: *Gymnodactylus elongatus* Boulenger, 1885 (Uetz *et al.*, 2006)

Taxonomic notes: Often considered to be a different species in Mongolia. Taxonomic research is required to resolve this issue, and other issues relating to this genus at subgenus level (Ananjeva *et al.*, 1997).



Photograph courtesy of Kh. Terbish

Description

The average length of the head and body is 5.8cm (Terbish *et al.*, 2006), with a tail of maximum length 7.5cm (Ananjeva *et al.*, 1997). The ratio of body length to tail length is 0.7-0.8. The nostrils are located among the rostral, one of the upper labials and two of the nasal shields (Terbish *et al.*, 2006). The upper side of the head is covered with small granular scales, and the dorsal scales are triangular in shape, no larger than the diameter of the ear canal, and do not form regular transverse or longitudinal rows (Terbish *et al.*, 2006). The tail is covered with trapezoid scales that form rings on the upper surface, and one row of larger scales cover the lower tail surface (Terbish *et al.*, 2006). The species has long legs. The front leg reaches forward to the snout and the hind leg reaches as far forward as the shoulder. The dorsal colouration is a greyish brown with transverse dark brown or black stripes on the back and upper sides of the tail and limbs (Terbish *et al.*, 2006). Young adults display more sharply coloured stripes. The ventral side and under tail are both white (Terbish, 1989; Terbish *et al.*, 2006).

Conservation overview

Global status: Not Evaluated

Regional status: Vulnerable, D2

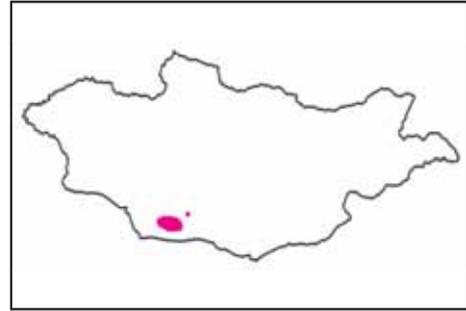
Legal status: Included as Rare in the 'Mongolian Red Book' of 1987 and 1997 (Munkhbayar, 1987; Munkhbayar and Terbish, 1997). Approximately 55% of the species' range in Mongolia occurs within protected areas (Terbish *et al.*, 2006; protected area data provided by UNEP-WCMC, 2006).

Distribution

Global distribution: Turkmenistan; China (Gansu and Yanggissar); Mongolia (Zhoa and Adler, 1993; Uetz *et al.*, 2006).

Regional distribution: Inhabits gravel desert habitats and rocky foothills, ravines and dry river beds in mountainous regions (Semenov and Munkhbayar, 1996; Munkhbayar and Terbish, 1997). The species is distributed in Shar Huls Oasis, Nogoos Tsav, Ingen Hoovoriin Hooloi, and Tsuglabar Mountain Range

in Trans Altai Govi Desert. It also occurs around Tsuvaraa Har, Hermiin Tsav, Naran Bulag and Haich mountains in Trans Altai Govi Desert (Munkhbayar, 1976; 1977; Gorelov, 1977; Munkhbayar, 1981; Munkhbayar and Terbish, 1997; Terbish *et al.*, 2006). In addition, it is found in the Zulganain oasis, Bugiin tsav in Trans Altai Govi Desert (Kh. Terbish and N. Batsaikhan, pers. comm.). It occurs at elevations of 700-1,300 metres above sea level in Mongolia (Borkin *et al.*, 1990). This species inhabits extreme environments, limited by food availability (Borkin *et al.*, 1990; Anenjeva *et al.*, 1997). Its estimated extent of occurrence in Mongolia is 28,549 km².



Abundance

There is little information concerning the density and population size of this species in Mongolia. It was first recorded in Mongolia during the 1960s (Munkhbayar, 1981). One individual was observed for an hour one night, along a 1km route near Shar Hulstain Oasis in Trans Altai Govi. Another six to eight individuals were observed for an hour, again at night time, along a 1km route in rocky foothills in Nogoos Tsaviin Hooloi (Munkhbayar and Terbish, 1988; Anenjeva *et al.*, 1997). Additionally, five individuals were observed by five people for half an hour during a day survey at the Shar Hulstain Oasis. A single individual was observed for one hour by two people in Tsugalbaryn us. Five individuals were observed for two hours by three people in Tsuvraa Khar around Ekhiin Gol Oasis (Munkhbayar and Terbish, 1988). The species is generally considered to be rare in Mongolia, occurring in isolated populations, however, no total population estimates are available at present.

Habitat and ecology

This species inhabits rock crevices and caves, abandoned rodent holes, and the underside of stones and the roots of bushy plants (Munkhbayar and Terbish, 1988; Terbish, 1989). A study of this species found high activity from the evening to one o'clock in the morning, but not after 4am in Nogoos Tsaviin Khooloi of the Trans Altai Govi Desert. They may also become active during the day, when seasonal and daily temperature is unusually cool (Munkhbayar and Terbish, 1988). They were found to be active in the daytime on dark, cloudy days in Khutsiin Khar Mountain and Shar Khulstai mountain range in Trans Altai Govi Desert (Terbish, 1989). The expedition group, led by P.K. Kozlov, collected this species on the 10th-12th December 1926 from Ezniin gol and Khar Khot in China (Russian Academy Science, Collection of Zoological Institute, Shevtsov and Golubev, 1986). There is a distinct lack of information on breeding and development of this species in Mongolia. The minimum recorded elevation for this species is 700 metres above sea level and the maximum is 1,300 metres above sea level throughout its global range (Borkin *et al.*, 1990; Ananjeva *et al.*, 1997).

A study of the diet of 26 individuals collected from Trans Altai Govi Desert, found that 40% of the diet consisted of beetles (Scarabaeidae, Buprestidae and Tenebrionidae) and that

33.3% consisted of Dipterian insects (Munkhbayar and Terbish, 1988). Long eared hedgehogs (*Hemiechinus auritus*) and steppe ribbon snakes (*Psammophis lineolatus*) are key predators of this species (Munkhbayar, Terbish, 1997).

Dominant threats

As this is a nocturnal species, many of the insects which comprise the majority of its diet are not active during its foraging time, so prey is scarce. Changes in native species dynamics (a decline in its prey base) therefore poses a threat to this species. As the population is not contiguous, any change in the environment or natural disasters (particularly mining or temperature extremes) could have severe stochastic impacts.

Conservation measures in place

- Parts of its range are included within the borders of the Great Gobi (Section A) Strictly Protected Area and Govi Gurvan Saikhan National Park (Zulganain Oasis) (Munkhbayar and Terbish, 1981; Terbish and Munkhbayar, 2001; Terbish, 2004).

Conservation measures required

- Conservation measures recommended in the 'Mongolian Red Book, 1997' include further ecological research and inclusion in the list of rare species.
- Habitat protection is very important as the species is specialised to a specific habitat type.
- An education programme is recommended for both locals and foreigners in the area to inform them of the threats to this species, particularly habitat alteration.
- Research and monitoring of all aspects of this species.
- Investigate the effectiveness of captive breeding programmes for re-introductions.
- Establish a new micro-protected area, and develop the existing protected area.

Resources required for conservation

- Further research on taxonomy, population numbers and range, and biology and ecology.
- Establish a micro-protected area or extend the Great Gobi (Section A) Strictly Protected Area to include the entire species' range.
- Education and awareness programme, in the form of information leaflets and talks in the area.
- Investigate the effectiveness of captive breeding for the re-introduction of this species.

Compilers and reviewers: J.E.M. Baillie, N. Batsaikhan, V. Eremchenko, S. King, Kh. Munkhbayar and D. Semenov.

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Vipera berus (Linnaeus, 1758)

Order: Squamata
Family: Viperidae

Common names: Adder, northern viper or sand viper (English) (Frank and Ramus, 1996); egel zagalmait mogoi (Mongolian)

Subspecies in Mongolia: *V. b. berus* (Linnaeus, 1758) (Uetz *et al.*, 2006)

Synonyms: *Coluber berus* Linnaeus, 1758 (Uetz *et al.*, 2006)

Taxonomic notes: Originally described as *Coluber berus* from a specimen in Sweden, it was later placed in the genus *Vipera* as *Vipera berus* in 1803 by Daudin (Mallow *et al.*, 2003).



Photograph courtesy of Kh. Terbish

Description

This snake may reach 740mm in length (Semenov and Munkhbayar, 1996; Terbish *et al.*, 2006). The tail length is 80-120mm in males, 65-98mm in females. The ventral tail has 32-48 pairs of scales in the male and 24-38 pairs in the female. Only one anal sac is present. There are 19-23 scales around the middle of the body (Ananjeva *et al.*, 1997). The nostril is located between two nasal scales. The head is large and the neck is narrow. The head is covered with granular scales, including three large scales (two interparietals and one parietal). The eyes are isolated by one or two rows of subocular scales.

This species varies in colouration from light brown, brown, orange, grey, dark grey, to black on the back (Ananjeva *et al.*, 1997; Coote, 2000; Milto and Zinenko, 2005). Adults are dark grey or black and juveniles range from orange to dark brown, with a thick dark brown zigzag extending from the head down the back. The head also displays zigzag colouration. The underside is dark grey with many dark spots. The tip of the tail is light yellow and orange (Terbish *et al.*, 2006).

Conservation overview

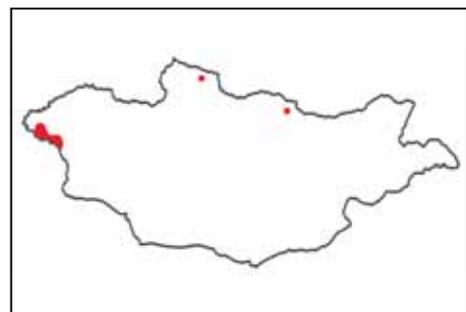
Global status: Not Evaluated

Regional status: Vulnerable, D2

Legal status: Approximately 9% of the species' range in Mongolia occurs within protected areas, in Altai Tavan Bogd National Park (Terbish *et al.*, 2006).

Distribution

Global distribution: France; England; Belgium; Netherlands; Germany; Norway; Switzerland; northern Italy; Denmark; Austria; Slovenia; Czech Republic (formerly Czechoslovakia); Croatia; Sweden; Poland; Bosnia and Herzegovina; Serbia and Montenegro; Hungary; Finland; Albania; Romania; Bulgaria; the former Yugoslav Republic of Macedonia; Latvia; Lithuania; Estonia; Russian Federation; north-western



China (northern Xinjiang, Jilin); Mongolia; Democratic People's Republic of Korea (Uetz *et al.*, 2006).

Regional distribution: Coniferous forest habitats in rocky mountain areas including the Eroo river in Hentii, Hövsgöl and Mongol Altai mountain ranges (Terbish and Munkhbayar, 1989; Semenov and Munkhbayar, 1996; Terbish *et al.*, 2006). However, all point locality data for northern Mongolia dates from 100 years ago, so is likely to have changed significantly during this time. This should be considered if utilising the distribution data, and further research is strongly recommended as this species is threatened. It occurs at elevations of 1,000-2,750 metres above sea level in Mongolia, with 1,800 metres being optimal (Ananieva *et al.*, 1997).

Abundance

This species is believed to be very rare in Mongolia, although no population estimates exist. Four individuals of various ages were observed along a 10km transect during the day, in the second half of July in the Songintiin gol river basin. Here the dominant habitat is forest steppe and mountain steppe (Terbish, 1989).

Habitat and ecology

Habitat preferences are not clearly established, but it is known to inhabit coniferous forests, mountainous forests with rocky outcrops, and herb meadows. In Mongolia it is mostly found in forest steppe and mountain steppe habitats (Terbish, 1989; Semenov, Munkhbayar, 1996; Ananjeva *et al.*, 1997). No information exists on daily and seasonal activity, development, breeding, habitat selection or diet, in Mongolia. The European population is active during the day. Sexual maturity is reached at two years in females and between three and four years in males (Mallow *et al.*, 2003). The species breeds two to four weeks following hibernation, and gastrulation occurs after three months. Between July and September, females give birth to 6-12 live young, which are 160mm long. Breeding females do not feed until they have given birth (Mallow *et al.*, 2003). Young adders feed themselves once they have shed their first skin. This species is known to prey mainly upon small mammals such as voles, shrews, and mice, but also upon lizards, newts, salamanders, frogs (but not toads), nestling birds, and eggs (Semenov, Munkhbayar, 1996; Mallow *et al.*, 2003; Coote, 2000). It hibernates inside dead wood, in rock cavities, rodent burrows and burrows that have been dug under the permafrost. Suitable hibernation sites must not be less than 2-4^o C (Bannikov *et al.*, 1977; Bojanskii, 1986; Ananjeva *et al.*, 1997; Mallow *et al.*, 2003).

Prey are stalked slowly and attacked from an 'S' posture. Once struck, the prey is released and tracked using the scent of its venom. This reduces the possibility of the predator being injured by its prey and may also lead it back to a litter of young (Mallow *et al.*, 2003; Coote, 2000). Adders are eaten by hedgehogs, polecats, wild pigs, foxes, badgers and birds (Mallow *et al.*, 2003). The species is found at elevations ranging from 1,000 to 2,750 metres above sea level, throughout its global range, but in Mongolia it is generally most suited to elevations of 1,800 metres.

Dominant threats

Little is known about threats to this species, although in the western Hentii Mountain Range, resource extraction (mining) is a threat, causing habitat loss and pollution. As this activity increases this may become a threat in other parts of its range too.

Conservation measures in place

- Part of its range is included in the Altai Tavan Bogd National Park (Terbish *et al.*, 2006).

Conservation measures required

- Conduct further research on distribution, population sizes, biology, ecology and threats impacting on this species.
- Establish a monitoring programme to evaluate population sizes and trends.
- Establish a new micro-protected area and develop the existing protected area.

Resources required for conservation

- Further research on all aspects of this species.
- Establish a population monitoring programme.

Compilers and reviewers: J.E.M. Baillie, V. Bobrov, J. Jargal, M. Munkhbayar and Ts. Odbayar.

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DATA DEFICIENT

Eremias arguta (Pallas, 1773)

Order: Squamata

Family: Lacertidae

Common names: Stepperunner, racerunner or arguta (English); tolbot gurvel (Mongolian)

Subspecies in Mongolia: *E. a. potanini* Bedriaga 1912

Synonyms: *Lacerta arguta* Pallas, 1773;
Podarcis variabilis Wagler, 1830



Photograph courtesy of Kh. Terbish

Description

A study measuring this species took place in the western Gobi of Mongolia. Body length was found to be 35-37mm (36.04 ± 1.17) ($n=49$) and tail length 40-78mm (59.95 ± 1.64). The ratio of body length to tail length is 0.8-1.32 (0.98 ± 0.01). There are 47-58 underside scales (53.04 ± 0.36). On one side of the hind legs are 6-14 femoral pores (8.68 ± 0.14). This is a wide lizard, with a short thick tail which narrows at the very tip (Terbish, 1989; Terbish *et al.*, 2006). The body is light or dark brown with large dark brown spots running along both dorsal sides in two rows; the ventral side is white (Terbish *et al.*, 2006).

Conservation overview

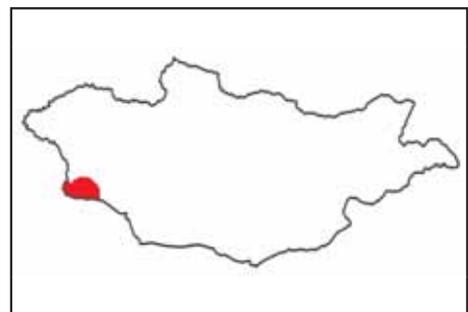
Global status: Not Evaluated

Regional status: Data Deficient

Legal status: Included as Rare in the 'Mongolian Red Books' of 1987 and 1997 (Munkhbayar, 1987; Munkhbayar and Terbish, 1997). Approximately 18% of the species' range in Mongolia occurs within protected areas (Terbish *et al.*, 2006; protected area data provided by UNEP-WCMC, 2006).

Distribution

Global distribution: North-eastern Romania; southern Ukraine; Turkey (Szczerbak, 1974); south-western Russian Federation (in the south to the northern Caucasus, east up to Ural River); eastern Georgia; southern Moldova; Armenia (Sevan River Basin); northern Islamic Republic of Iran; northern Azerbaijan; western and eastern Kazakhstan; Uzbekistan; Tajikistan; Kyrgyzstan; north-western China (Xinjiang and Inner Mongolia); south-western Mongolia (Uetz *et al.*, 2006).



Regional distribution: The species occurs in gravel desert or low sandy hills in Baruun Khuurai, Davsan Khuurai, Yolkhon, Khonin Us and Takhiin Us Gobies and along river banks in Bulgan and Uyench in Dzungarian Gobi Desert (Terbish and Munkhbayar, 1982; Terbish,

1985; Orlova and Terbish, 1986; Borkin *et al.*, 1990). The range of this species in Mongolia constitutes the north-eastern boundary of its global range. It occurs at elevations of 1,200-2,000 metres above sea level in Mongolia (Orlova and Terbish, 1986; Ananieva *et al.*, 1997). Its estimated extent of occurrence in Mongolia is 20,811 km².

Abundance

This species is considered rare in Mongolia, but occurs in relatively high abundance in small areas, however, no population data exists at present. In 1982 in Dzungarian Gobi, a density of 29 individuals per hectare was recorded (Ananjeva *et al.*, 1997), although details of the study are not provided.

Habitat and ecology

This species occurs in gravel desert with saxual (*Haloxylon ammodendron*), *Ephedra przewalskii*, and *Anabasis brevifolia*, *Zygophyllum xanthoxylom* and *Eurotia ceratoidei*, such as is found in the Dzungarian Gobi Desert. It also occurs on low sandy hills along the banks of the Uench and Bodonch rivers, among *Nitraria sphaerocarpa*, *Reaumuria songorica* and *Achnotherum spp.*, on the southern slope of mountains with *Stipa spp.*, *Caragana spp.*, *Artemisia spp.*, and *Oxytropis spp.* (Terbish, 1989; Munkhbayar and Terbish, 1997; Terbish, 2003). It digs 15-32cm (24.52±3.03) deep burrows near the roots of bushes and shrubs. It also lives under rocks and in rodent burrows.

The species appears in the middle of April and hibernates at the end of September and the beginning of October. Both sexes reach maturity after two years. Males and females breed in May (Terbish, 1989; Terbish, 2003). Up to 12 eggs are laid twice a year (2-6 each time) (Semenov and Munkhbayar, 1996). The body size of the young reaches 3.4cm by the middle of September.

This species usually feeds on insects. A study on diet in the Dzungarian Gobi Desert recorded beetles (47.7%), butterflies and larvae (15.4%) and ants (13.4%) (Terbish, 1991). This species is preyed upon by long-eared hedgehogs (*Erinaceus auritus*), red foxes (*Vulpes vulpes*), corsac foxes (*Vulpes corsac*), Eurasian badgers (*Meles meles*), steppe eagles (*Aquila rapax*), falcons, northern goshawks (*Accipiter gentilis*), black kites (*Milvus migrans*), great bustards (*Otis tarda*), crows, bitterns, steppe ribbon snakes (*Psammophis lineolatus*), and Central Asian vipers (*Gloydis halys*) (Terbish, 1989; Munkhbayar, Terbish, 1997).

Dominant threats

The drying of water sources, and droughts threaten this species. The impact of carnivorous animals and raptors is less important in reducing populations of this species. Also habitat degradation and loss, due to bushes and shrubs being used for fuel, and land being used for agriculture, has an impact on this species' future survival (Terbish, 1989; Semenov and Munkhbayar, 1996; Munkhbayar and Terbish, 1997).

Conservation measures in place

- Most of this species' range is included within the Great Gobi (Section B) Strictly Protected Area (Munkhbayar and Terbish, 1997).

Conservation measures required

- Conduct further research on population dynamics and sizes, distributions, biology and ecology.
- Establish monitoring programmes to record population sizes and trends.

Resources required for conservation

- Further research on all aspects of this species.
- Establish a population monitoring programme.

Compilers and reviewers: J.E.M. Baillie, N. Batsaikhan, V. Eremchenko, S. King, Kh. Munkhbayar and D. Semenov.

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ANNEXES

Annex I. List 1: Species identified as occurring within Mongolia and assessed at the Second International Mongolian Biodiversity Databank Workshop.

N.B. The Red List of Mongolian Reptiles and Amphibians and its associated documents contain taxa that were on the agreed list for the Second International Mongolian Biodiversity Databank Workshop, i.e. those that were known to occur in Mongolia in 2006. Subsequent to the workshop, several additional species have been suggested to occur in Mongolia, based on recent range expansions or their occurrence close to the Mongolian border. Those which are likely to occur in Mongolia have been added to List 1, but are marked with a plus sign (+) to indicate that they were not assessed during the workshop.

a.) Amphibia

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

b). Reptilia

<i>Scientific name</i>	<i>Common name</i>	<i>Regional assessment</i>	<i>Global assessment</i>
Order Squamata			
Family Gekkonidae			
<i>Alsophylax pipiens</i> (Pallas, 1814)	Kaspischer even-fingered gecko	Least Concern	Not Evaluated
<i>Cyrtopodion elongatus</i> (Blanford, 1875)	Gobi naked-toed gecko	Vulnerable, D2	Not Evaluated
<i>Teratoscincus przewalskii</i> Strauch, 1887	Przewalski's wonder gecko	Near Threatened	Not Evaluated

<i>Scientific name</i>	<i>Common name</i>	<i>Regional assessment</i>	<i>Global assessment</i>
Family Agamidae			
<i>Laudakia stoliczkana</i> (Blanford, 1875)	Mongolian agama	Near Threatened	Not Evaluated
<i>Phrynocephalus helioscopus</i> (Pallas, 1771)	Sunwatcher toadhead agama	Not Applicable	Not Evaluated
<i>Phrynocephalus versicolor</i> Strauch, 1876	Toad-headed agama	Least Concern	Not Evaluated
Family Lacertidae			
<i>Eremias argus</i> Peters, 1869	Mongolian racerunner	Least Concern	Not Evaluated
<i>Eremias arguta</i> (Pallas, 1773)	Stepperunner	Data Deficient	Not Evaluated
<i>Eremias multiocellata</i> Günther, 1872	Multi-ocellated racerunner	Least Concern	Not Evaluated
<i>Eremias przewalskii</i> (Strauch, 1876)	Gobi racerunner	Least Concern	Not Evaluated
<i>Eremias vermiculata</i> Blanford, 1875	Variiegated racerunner	Least Concern	Not Evaluated
<i>Lacerta agilis</i> Linnaeus, 1758	Sand lizard	Not Applicable	Not Evaluated
<i>Zootoca vivipara</i> Jacquin, 1787	Viviparous lizard	Least Concern	Least Concern
Family Boidae			
<i>Eryx tataricus</i> (Lichtenstein, 1823)	Tatar sand boa	Near Threatened	Not Evaluated
Family Colubridae			
<i>Coluber spinalis</i> (Peters, 1866)	Slender racer	Near Threatened	Not Evaluated
<i>Elaphe dione</i> (Pallas, 1773)	Steppes ratsnake	Least Concern	Not Evaluated
<i>Elaphe schrenckii</i> (Strauch, 1813)	Amur ratsnake	Not Applicable	Not Evaluated
<i>Natrix natrix</i> (Linnaeus, 1758)	European grass snake	Near Threatened	Least Concern
<i>Psammophis lineolatus</i> (Brandt, 1838)	Steppe ribbon racer	Least Concern	Not Evaluated
Family Viperidae			
<i>Gloydius halys</i> (Pallas, 1776)	Halys pit viper	Least Concern	Not Evaluated
<i>Vipera berus</i> (Linnaeus, 1758)	Northern viper	Vulnerable, D2	Not Evaluated

List 2: Possible species occurring within Mongolia.

N.B. Species included in the Red List relate to species known to occur in the country in 2005; 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.

<i>Scientific name</i>	<i>Common name</i>	<i>Regional assessment</i>	<i>Global assessment</i>
Class Amphibia			
Order Anura			
Family Bufonidae			
<i>Bufo bufo</i> Linnaeus, 1758	Common toad	Not Evaluated	Least Concern
<i>Bufo gargarizans</i> Cantor, 1842	Asiatic toad	Not Evaluated	Least Concern
Family Ranidae			
<i>Rana arvalis</i> Nilsson, 1842	Moor frog	Not Evaluated	Least Concern
<i>Rana nigromaculata</i> Hallowell, 1860	Dark-spotted frog	Not Evaluated	Near Threatened
Class Reptilia			
Order Squamata			
Family Agamidae			
<i>Phrynocephalus axillaris</i> Blanford 1875		Not Evaluated	Not Evaluated
Family Colubridae			
<i>Coluber ravergieri</i> Ménétriés, 1832	Spotted wiper snake	Not Evaluated	Not Evaluated
Family Viperidae			
<i>Vipera ursinii</i> (Bonaparte, 1833)	Meadow viper	Not Evaluated	Endangered, A1c+2c

