CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Twenty-fourth meeting of the Animals Committee
Geneva, (Switzerland), 20-24 April 2009

Periodic review of animal species included in the CITES Appendices

PERIODIC REVIEW OF SPECIES SELECTED BETWEEN COP13 AND COP15

1. This document has been submitted by Carlos Ibero Solana, Chair of the working group on the periodic review of animal species included in the CITES Appendices*.

2. Resolution Conf. 11.1 (Rev. CoP14) on *Establishment of committees* mandates the Animals and Plants Committees to undertake a periodic review of animal or plant species included in the CITES Appendices by *inter alia* establishing a schedule for reviewing the biological and trade status of these species.

3. In Resolution Conf. 14.8, on *Periodic Review of the Appendices*, the Conference of the Parties agrees that:

   > *The Animals and Plants Committees shall establish a schedule for the Periodic Review of the Appendices and identify a list of taxa they propose to review during the next two intersessional periods between meetings of the Conference of the Parties (CoP). The list should be established at their first meeting after the meeting of the Conference of the Parties that initiates the review period.*

4. The first meeting of the Animals Committee that took place after CoP14 was AC23, held in April 2008, at which a list of species to be reviewed was agreed (having been in progress since AC22, in July 2006), and it was agreed that the Secretariat would issue a Notification to the Parties requesting volunteers or contributions of any kind to help with the review.

5. The Secretariat issued Notification to the Parties No. 2008/049 on 30 July 2008, addressing the Parties as described above. Annex 1 contains the portion of Notification No. 2008/49 that covers the description of the task and list of species involved.

6. As of the time of writing, 17 February 2009, the Secretariat and the Chair of the working group have yet to receive any offers of assistance with the pending reviews from any of the Parties.

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* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat or the United Nations Environment Programme concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

7. Nonetheless, in response to Notification No. 2008/049, the Secretariat received information from Madagascar and Thailand. Madagascar sent information on various species of amphibians, two of which were among those selected for this Periodic Review following CoP13: *Dyscophus antongilii* and *Hoplobatrachus tigerinus* (see Annex 1). However, the information received did not qualify as a review from the standpoint of the Periodic Review. Rather, they were the results of a seminar on amphibians in Madagascar, information that is more useful for the purposes of the Review of Significant Trade.

8. Thailand sent information on four feline and three galliform species appearing on the list referred to above. Thailand's document includes information on the three species of Galliformes in that country, but does not qualify as a review from the standpoint of the Periodic Review (for example, it refers exclusively to Thailand, whereas a formal Periodic Review must include the entire range of a species). Therefore, this information is included as an annex to this document as a record of Thailand's contribution and for information purposes, but with the recommendation that it not be considered by the Committee as reviews of the species in question.

9. For its part, the IUCN is still interested in assisting in the review of the 15 species of Galliformes that are yet to be reviewed, which will require the financial support of a Party.

10. Lastly, there are some further species on the AC22 (Lima, July 2006) list that are being reviewed by certain Parties, including some reviews that have already been completed, as follows:

    BIRDS (Galliformes)

    a) Colinus virginianus ridgwayi: review under way by the United States of America.

    b) Gallus sonneratii: review under way by Hungary.

    c) Tympanuchus cupido attwateri: review under way by the United States of America.

    AMPHIBIANS

    d) Ambystoma dumerilii: review completed by Mexico and included in Annex 3 to this document.

    e) Andrias davidianus: review under way by China.

    f) Andrias japonicus: review completed by Japan and included in Annex 2 to this document.

11. Consequently, the working group recommends that the Committee:

    a) Discuss the reviews of Ambystoma dumerilii and Andrias japonicus submitted by Mexico and Japan, respectively.

    b) Urge the Parties that are undertaking reviews to complete them as soon as possible, and encourage the CITES Parties to offer to complete the pending reviews or to hire consulting services to do so.

Notification to the Parties No. 2008/049, Geneva, 30 July 2008

CONCERNING: Periodic review of species included in the CITES Appendices

1. Resolution Conf. 11.1 (Rev. CoP14) on *Establishment of committees* mandates the Animals and Plants Committees to undertake a periodic review of animal or plant species included in the CITES Appendices by *inter alia* establishing a schedule for reviewing the biological and trade status of these species.

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   The Animals and Plants Committees shall establish a schedule for the Periodic Review of the Appendices and identify a list of taxa they propose to review during the next two intersessional periods between meetings of the Conference of the Parties (CoP). The list should be established at their first meeting after the meeting of the CoP that initiates the review period.

Fauna

3. At its 22nd meeting (Lima, July 2006), the Animals Committee agreed on the list of species to be reviewed between the 13th and 15th meetings of the Conference of the Parties.

4. At its 23rd meeting (Geneva, April 2008), the Animals Committee requested the Secretariat to raise awareness of the following selected taxa for which no reviewer had been identified. It also invited Parties to conduct reviews for remaining species of Felidae which the Committee had been instructed to review in Decision 13.93 (Rev. CoP14).

Taxon	Range States and territories
AVES	
Argusianus argus	Brunei Darussalam (br.), Indonesia (br.), Malaysia (br.), Myanmar (br.), Singapore (ex.), Thailand (br.)
Catreus wallichii	India (br.), Nepal (br.), Pakistan (br.)
Crossoptilon crossoptilon harmani	China (br.)
Ithaginis cruentus	Bhutan (br.), China (br.), India (br.), Myanmar (br.), Nepal (br.)
Lophophorus impejanus	Afghanistan (br.), Bhutan (br.), China (br.), India (br.), Myanmar (br.), Nepal (br.), Pakistan (br.)
Lophophorus lhuysii	China (br.)
Lophophorus sclateri	China (br.), India (br.), Myanmar (br.)
Lophura imperialis	Viet Nam (br.)
Mitu mitu	Brazil (br.)
Polyplectron bicalcaratum	Bangladesh (br.), Bhutan (br.), Cambodia, China (br.), India (br.), Lao People's Democratic Republic (br.), Myanmar (br.), Thailand (br.), Viet Nam (br.)
Polyplectron germaini	Viet Nam (br.)
Syrmaticus humiae	Viet Nam (br.)

Taxon	Range States and territories
Tetraogallus caspius	China (br.), India (br.), Myanmar (br.), Thailand (br.)
Tetraogallus tibetanus	Armenia (br.), Azerbaijan (br.), Georgia (br.), Iran (Islamic Republic of) (br.), Iraq (br.), Turkey (br.), Turkmenistan (br.)
Tragopan melanocephalus	Bhutan (br.), China (br.), India (br.), Nepal (br.), Tajikistan (br.)
AMPHIBIA	
Bufo periglenes	Costa Rica
Bufo superciliaris	Cameroon, ? Central African Republic, ? Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Ghana, Guinea, Liberia, Nigeria
Dyscophus antongilii	Madagascar
Euphlyctis hexadactylus	Bangladesh, India, Nepal, Sri Lanka
Hoplobatrachus tigerinus	Bangladesh, India, Madagascar (int.), Myanmar, Nepal, Pakistan, Sri Lanka
Nectophrynoides tornieri	United Republic of Tanzania
Nectophrynoides viviparus	United Republic of Tanzania
Rheobatrachus silus	Australia
Rheobatrachus vitellinus	Australia
Spinophrynoides osgoodi	Ethiopia

Distribution Key:

? – outstanding query over status

ex. – extinct

int. – introduced

br. - breeding

Parties are invited to notify the Secretariat of:

a) voluntary contributions for contracting experts for the review of taxa for which no voluntary experts has been identified by the Animals Committee.

b) experts who have been identified or contracted for the review of species.

c) offers to undertake the review of these species.

5. Reviews should be sent to the chairmen of the Animals Committees' intersessional working groups on periodic review of animal species so that they may be considered at the 24th meeting of the Animals Committee, scheduled for April 2009.

Review of the status of Japanese Giant Salamander (*Andrias japonicus*)

2008 December

Ministry of the Environment, Japan

Introduction

At the 22nd meeting of the Animals Committee (July 2006), *Andrias japonicus* (Japanese Giant Salamander) was selected for the periodic review of animal and plant species included in the CITES Appendices, according to Resolution Conf. 11.1 (Rev. CoP14). In response, the Government of Japan has reviewed their status by examining existing data and interviewing experts in order to provide information on the species for review by the Animals Committee.

A. Proposal

The Japanese Giant Salamander meets the biological criteria B iii), iv) and C ii) of Annex 1 to Resolution Conf. 9.24 (Rev. CoP13). In addition, it is considered that their potential international demand as a food product and for other purposes including aquarium trade is high. Japan, therefore, proposes to retain the inclusion of the Japanese Giant Salamander in Appendix I.

B. Proponent

Japan

C. Supporting statement

1. Taxonomy

1.1 Class: Amphibia

1.2 Order: Urodela

1.3 Family: Cryptobranchidae

1.4 Species: *Andrias japonicus* Temminck, 1836

1.5 Scientific synonyms:

Cryptobranchus japonicus, Cryptobranchus maximus, Hydrosalamandra japonica, Megalobatrachus japonicus, Megalobatrachus maximus, Megalobatrachus sieboldi, Salamandra maxima, Sieboldia maxima, Tritomegas sieboldi, Triton japonicus.

1.6 Common names:

Japanese:	Oosansyouo, Hanzaki, Hanzake,
German:	Japanse Reuzensalamander
English:	Japanese Giant Salamander
French:	Salamandre géante du Japon
Spanish:	Salamandra gigante de Japón
Swedish :	japansk jättesalamander

1.7 Code number: A-402.003.001.002

2. Overview

The Japanese Giant Salamander is endemic to Japan, and is found in western Honshu, Shikoku and Kyushu. It inhabits mountain streams as well as limpid streams in the hills. It is classified as "Near Threatened (NT)" in the IUCN Red List (2004) and as "Vulnerable (VU)" in the Japanese Red List by the Ministry of the Environment of Japan (2006). Currently the main factor threatening this species is the deterioration of its habitat caused by river improvement works, dam construction, water pollution and the like. It is thought that there are many cases where Japanese Giant Salamanders are unable to breed, in particular because the riverside environment, where they use holes to breed, has been damaged. It is unlikely that the habitat condition will improve in the near future. While some areas have a high population density, it has been reported that some populations consist of only aged animals and are likely to decline in the future because they cannot breed successfully. In addition, this species may be affected by competition and hybridization with a congeneric alien species, *Andrias davidianus* (Chinese Giant Salamander), recently found in the wild. Thus, the Japanese Giant Salamander meets the biological criteria B iii) and iv), and C ii) in Annex 1 of Resolution Conf. 9.24 (Rev. CoP13).

There has been international demand for this species as food, as an aquarium animal, and as a subject for medical research, and it is believed that potential international demand is high. It is the world's largest amphibian and both its maturation period and its lifespan are much longer than those of other amphibians. Reflecting these biological characteristics, it is considered that the exploitation of adults for commercial purposes will decrease the population. In Japan, this species is designated as a "Special Natural Monument" under the Law for the Protection of Cultural Properties and also as an "International Endangered Species of Wild Fauna and Flora" under the Law for Conservation of Endangered Species of Wild Fauna and Flora. Therefore, they cannot be legally traded either domestically or internationally for commercial purposes. It is believed that there is little illegal use or trade at present, although they may be used illegally as food in some localities.

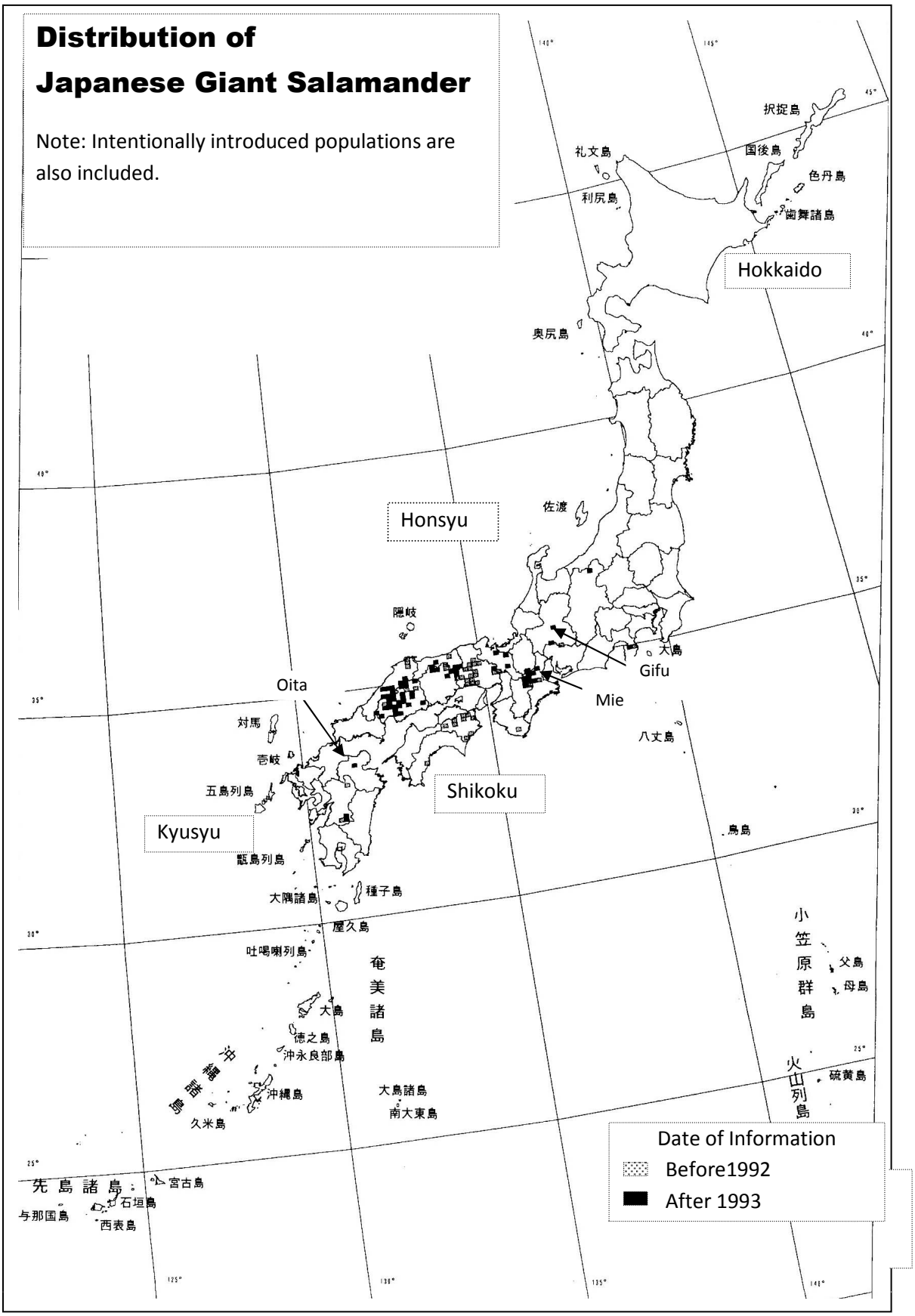
Further, in recent years the Chinese Giant Salamander has been cultivated and used as food in China (Tochimoto, private correspondence). If the giant salamanders, the entire genus including Japanese species, are transferred from Appendix I to II and the commercial trade is allowed, there is a possibility that in the future Chinese Giant Salamanders will be imported as food and for other purposes, as has occurred in the past. It is quite difficult to distinguish between the Japanese and Chinese species, and there might be illegal capture and trading of Japanese Giant Salamanders due to the difficulty of labeling of their origins.

It is, therefore, speculated that the international trade of this species for commercial purposes will negatively affect the survival of wild population, at least in Japan. Accordingly, it is considered that *Andrias japonicus* should be retained in Appendix I, under Article II, paragraph 1 of the Convention.

3. Species characteristics

3.1 Distribution

The species is endemic to Japan, found in western Honshu, Shikoku, and parts of Kyushu. Although their main habitat is in the Chugoku Mountains (westernmost part of Honshu), there are also many populations in Gifu, Mie and Oita Prefectures (Tochimoto, 1996). Even in the same water system, however, the population density varies from area to area (Kuwabara, private correspondence). (Figure: Distribution of Japanese Giant Salamander)



Source: Ministry of the Environment, Nature Conservation Bureau, Biodiversity Center

2001. Biodiversity Research/ Animal Distribution Survey (Amphibians and Reptiles)

3.2 Habitat

Although Japanese Giant Salamanders generally live in the upper portion of mountain streams at an elevation of 200-600 meters (Mie Prefecture Board of Education, 2002), they are sometimes found in irrigation canals and creeks near towns around the middle section of the river basin.

3.3 Biological characteristics

Japanese Giant Salamanders are amphibians, but are rarely found on land. They spend most of their life in water. Adult giant salamanders do not live in clusters; instead they hide in holes or under large rocks at the waterfront during the daytime and move around in search of small fish and aquatic insects during the night (Tochimoto, 2005).

The species becomes active in the spring when the water temperature rises. Around July, male and female adults start moving toward breeding sites. Breeding takes place from late August to early September. A dominant male will occupy the breeding cavity to block other males from entering. However, when a female enters the cavity to lay eggs, fertilization may take place with multiple males, with males other than the dominant one also participating in the breeding process (Kuwabara et al., 1980; Kobara, 1985). A female lays 300-700 eggs (500 on average), which are 5-8 mm in diameter, forming beadlike chains enveloped in a jelly-like substance that is 2-3 cm thick in diameter. After fertilization, a dominant male alone remains in the breeding cavity to protect the eggs. The male stays in the breeding cavity even after the eggs have hatched for about 4 months to protect the larvae (Kuwabara et al., 2005). The eggs hatch after about two months at water temperatures of 13-20°C (Thorn, 1969). When they are properly protected by a male, the hatching rate is approximately 90% (Kuwabara, private correspondence).

3.4 Morphological characteristics

The entire length of an adult Japanese Giant Salamander ranges from 300 mm to 1,500 mm; the head and body length is between 200 mm and 900 mm, and the weight ranges between 1.5 kg and 35 kg. The color of the body is usually brownish-yellow with black mottles; however, there is considerable individual variation ranging from being completely black to almost yellow.

3.5 Role of the species in its ecosystem

The hatched larvae are at the bottom of the river ecosystem's food chain and are preyed on as a food source for species in higher trophic levels, such as fish, other aquatic fauna and birds. When they become adults, they are placed at the top of the river ecosystem's food chain and feed on various species, such as water insects, fish, frogs, and sometimes snakes and rats, etc (Kuwabara et al., 2005). Therefore, an environment provided with these diet conditions is necessary for the Japanese Giant Salamander to survive, and it is an important species as a symbol of river ecosystem conservation.

4. Status and trends

4.1 Habitat

Riverbank reinforcement works and forest road construction may threaten the survival of this species, as these activities completely cover with concrete blocks the deep horizontal holes along the riverside that are ideal for laying eggs. Recently, eco-friendly works for the habitat conservation have begun in some parts of Japan (Tochimoto, 1996). (Figure "Distribution of Japanese Giant Salamander")

4.2 Population size and structure

Neither the total population nor the population in each river system in Japan is well known. According to a report on the species' status in Okagawa, the headwaters of the Yakkan River in Innai Town, Oita Prefecture, ten small animals of 30-50 cm in length have been found within 100 m of the river (Tochimoto, private correspondence). Also, in the Takinoya River in the Maruyamagawa water system, Hyogo Prefecture, about 300 animals have been confirmed within a 12 km wide area (Tochimoto, 1996). As this

shows, the population density is quite high in some areas (Tochimoto, private correspondence), although they are concentrated in certain parts of the river basin.

Because this species has a long life (over than 50 years), it is difficult to study their lifespan, age of sexual maturation, and the differences between the sexes; therefore there is little basic data available.

4.3 Population trends

Although there is no data available to show a quantitative trend in population both at present and in the past, in some local populations, extinction has been reported (Iwata, 2002; The Agency for Cultural Affairs, 1980).

There are also some areas where aged animals live without being able to move and/or breed, as they are blocked by dams and other obstructions, and the structure of such groups of animals is not considered as being a viable population (Aichi Pref., 2002; Shimane Pref., 2004). Those populations are likely to decline in the future because they cannot breed successfully.

4.4 Geographic trends

According to the Animal Distribution Survey conducted in 1993, there were 43 grids (about 10 km x 10 km) where the species is found (The Environment Agency, 1993); however, the number increased to 108 in the next survey conducted in 2001 (Ministry of the Environment, 2001). This larger number is considered to be more reflective of the scale and inputs of the survey, rather than of an actual increase in the population.

On the other hand, some cases of intentional introduction are confirmed in some areas (Matsui, private correspondence), and there might be further expansion of distribution due to human intervention.

5. Threats

- Habitat destruction by man-made structures
  Riverbank reinforcement, associated with river improvement works and forest road construction that use concrete, is considered to be the biggest factor to threat the survival of populations, as it deprives them of their breeding grounds and reduces both the number of areas for rest during the daytime and the number of places for refuge when the river water rises (Tochimoto, 2005). Additionally, dam construction work blocks their movement, limits their breeding and feeding behaviors (Taguchi, 2005) and isolates groups of animals. Consequently, it may have an adverse effect on population and genetic diversity.

- Hybridization
  Through a recent DNA analysis it was found that there were two Chinese Giant Salamanders among the giant salamanders captured in the Kamo River in Kyoto Prefecture. As Japanese and Chinese Giant Salamanders are close cousins, it is highly likely that hybrids would be born between them. Consequently, there is concern as to the resulting genetic contamination caused by interspecies hybridization where these two species coexist (Matsui, 2007). While it is not clear how these Chinese Giant Salamanders were introduced into the Kamo River, there are records showing that in the early 1970's many Chinese Giant Salamanders were imported from China (Asahi Shimbun article, 1972 a. b., 1973).

- Competition with alien species
  The Japanese Giant Salamander is a top predator in the river ecosystem in Japan. However, the establishment of Chinese Giant Salamanders, as found in the Kamo River in Kyoto, may result in interspecies competition as the two species occupy the same niches.

- Illegal capture
  While it is true that capture of the Japanese Giant Salamander for food has declined after the species was designated as a "Special Natural Monument" in 1952, eating practices possibly remain in some areas. It can be also assumed that they are secretly captured and illegally reared, as some animals have been found in areas outside of the original habitat (Kuwabara, private correspondence). The larval period (from hatching to metamorphosis) is about 4-5 years, and it takes another 10 years to reach adulthood. Because they grow so slowly, the number of animals will decrease sharply if there is an excessive capture pressure imposed on the population.

6. Utilization and trade

6.1 National utilization

It is basically prohibited to capture and trade in the species as it is designated as a "Special Natural Monument" (1952) under the Law for the Protection of Cultural Properties. It is also prohibited from being displayed for the purpose of sale, or to transfer rights of ownership and possession, as it is designated as an International Endangered Species of Wild Fauna and Flora (1980) under the Law for Conservation of Endangered Species of Wild Fauna and Flora. No obvious signs of illegal use as food or other purposes have been confirmed, probably because of the public awareness promotion so far.

6.2 Legal trade

Table 1 shows the number of the species exported from Japan (CITES Trade Database, 2006). The purpose of trade is mainly as exhibits in zoos, with 153 traded in total. Additionally, and only in the year 1992, 100 samples were exported for the purpose of medical research. All are traded for non-commercial purposes with permission. Since 2000, there has been no legal export from Japan.

Year	1979		1980		1984		1985	
Term	quantity	purpose	quantity	purpose	quantity	purpose	quantity	purpose
bodies	0		0		0		0	
live	2	S	4	Z	72	Z	2	Z
specimens	0		0		0		0	

Year	1986		1992		1998		1999	
Term	quantity	purpose	quantity	purpose	quantity	purpose	quantity	purpose
bodies	0		0		0		1	S
live	50	Z	0		8	Z	17	Z
specimens	0		100	M	0		0	

purpose: S/Scientific, Z/Zoos, M/Bio-medical research

Table 1. The number of *Andrias japonicus* exported from Japan

6.3 Parts and derivatives in trade

There have been no cases of trade in parts and derivatives of this species.

6.4 Illegal trade

It is basically prohibited to capture and trade the species under the related laws (The Law for Conservation of Endangered Species of Wild Fauna and Flora; the Law for the Protection of Cultural Properties), and no illegal trade cases have been reported nor confirmed.

6.5 Actual or potential trade impacts

The species has a peculiar life history: they take a long time to mature, and few animals survive to adulthood. Therefore, it is thought that capturing wild animals, especially adults, for commercial purposes will greatly affect the survival of populations.

If the genus of *Andrias* that includes the Japanese Giant Salamander is transferred from Appendix I to II, Chinese Giant Salamanders may be legally imported into Japan. There is a possibility for the Japanese species to be captured, reared and claimed as the Chinese species, since it is very difficult to distinguish between the two. Furthermore, if Chinese Giant Salamanders imported were released into the wild, it is also possible that they would hybridize with the Japanese species.

7. Legal instruments

7.1 National

- Law for the Protection of Cultural Properties
  The species is designated as a "Special Natural Monument" under the Law for the Protection of Cultural Properties (1952), and permission from the chief of the Agency for Cultural Affairs is required to change its current status with regards to capture and transfer.

- The Law for Conservation of Endangered Species of Wild Fauna and Flora (1993)
  This species is designated as an International Endangered Species of Wild Fauna and Flora, and is prohibited from being displayed for the purpose of sale or to transfer ownership and possession rights.

7.2 International

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (Japan ratified the convention in 1980)
  The species is listed in Appendix I, whose trade for commercial purposes has been prohibited since 1975 when the Convention came into effect.

8. Species management

8.1 Conservation measures

- Field survey
  Ecological studies have been conducted in many parts of Japan. Based on the results, the captive breeding techniques are developed, and also new construction methods of river works in several areas are also being devised for the survival of the species.

- Captive breeding
  Species Survival Commission of the Japanese Association of Zoos and Aquariums has established a Giant Salamander Working Group to devise and execute a plan for the purpose of the stable breeding of the species. The species' re-introduction into the wild is not being implemented, because the species is a top predator in the river ecosystem and may greatly affect local ecosystems and fisheries.

- Domestic pedigree registry
  A pedigree registry has been made for each breeding animal to help the breeding plan by the Species Survival Commission of the Japanese Association of Zoos and Aquariums. In the registry, age, body length, breeding place, and other detailed data on each animal are recorded. As of the end of 2005, there have been more than 300 animals registered.

8.2 Population monitoring

Ecological surveys are being conducted by research institutions such as universities and zoos, as well as organizations such as local governments and NGOs, regarding population, habitat and breeding in various areas.

8.3 Control measures

8.3.1 International

The import and export of species on the CITES Appendices is regulated and controlled by "the Foreign Exchange and Foreign Trade Control Law" and "Customs Act".

In Hiroshima City Asa Zoological Park, the only institution to succeed in captive breeding of the species in Japan, a microchip is implanted in an animal to be transferred so that it can be easily identified. When animals are transferred overseas, the importing institution concerned must pass a screening process conducted by the Agency for Cultural Affairs.

8.3.2 Domestic

It is prohibited to capture, transfer and trade without permission under the related laws. When capture is undertaken for such special purposes such as surveys, the permission of the chief of the Agency for Cultural Affairs is required.

8.4 Captive breeding and artificial propagation

- Captive Breeding
  The captive breeding program developed by the Japanese Association of Zoos and Aquariums is conducted in four facilities and the breeding has been successful only in Asa Zoological Park (Kuwabara, 1989; Kobara et al, 1980).

- Intraregional Breeding Program
  In Asa Zoological Park, they set up man-made holes in branches of the Shijihara River (Matsuzai River and Ohguchi River) in Hiroshima Prefecture (Wakabayashi, 1986), and produce many larvae every year. Nihon Hanzaki Institution set up manhole-type artificial holes at the bank of the Ichikawa River in 1994, and egg-laying has been observed from a few years ago.

8.5 Conservation of habitat

If the species' habitats are within protected areas, such as National and Quasi-National Parks or Nature Conservation Areas, development works are regulated under the relevant laws and ordinances. Some important habitats have been protected as "Giant Salamander Habitats" under the Law for the Protection of Cultural Properties.

9. Information on similar species

Today, there are two genera and three species recognized in the family Cryptobranchidae (Japanese: *Andrias japonicus*, Chinese: *Andrias davidianus* and American: *Cryptobranchus alleganiensis*).

The largest *Cryptobranchus alleganiensis* is 74 cm in length, about half in size of the other species. It is distinguishable because it keeps its gill openings for life. Although it is reported that *Andrias davidianus* have symmetrical pairs of tubercles on their body, this does not serve as a distinguishing characteristic between the Japanese and Chinese species (Tochimoto, 1996).

10. Conclusion

All species threatened with extinction which are or may be afeected by trade shall be included in Appendix I, in accordance with paragraph 1 of Article II of the Convention. A species is considered to be threatened with extinction if it meets, or is likely to meet, at least one of the criteria listed in Annex 1 of Resolution Conf.9.24 (Rev.CoP13).

The Japanese Giant Salamander meets the above biological criteria for the following reasons:

1) The wild population has a restricted area of distribution; they need specialized niche requirements for habitat and it is expected that deterioration in the quality of their habitats causes a decline in the population. Therefore, the species meets criteria B iii) and iv).
2) Habitat deterioration and the decrease in the number of recruitment are suspected to lead decline in the population size in the wild.This fact meets C ii) of the criteria.

As shown above, the species meets criteria B and C in the Annex 1 of Resolution Conf. 9.24 (Rev. CoP13) and it is considered to satisfy the biological criteria to be listed in Appendix I. In addition, there are some local populations whose distribution areas have been declining. Therefore, the species is also considered to satisfy criterion A. However, due to inadequate quantitative data such as population size, whether the species meets the criterion A is not clear.

The species is designated as a "Special Natural Monument" and strictly protected in Japan, and international or domestic legal trade for commercial purposes is not being conducted. It is also believed that there is little illegal use or trade at present. On the other hand, in China, Chinese Giant Salamanders of the same genus are cultured and used as food; therefore it is believed that the potential international demand for giant salamanders as food, etc., is high.

In conclusion, it is considered that *Andrias japonicus* should be retained in Appendix I, under Article II, paragraph 1 of the Convention.

Furthermore, if Chinese Giant Salamanders are downlisted to Appendix II and are imported into Japan, since these two species are difficult to distinguish, the Japanese species may be illegally captured and traded in Japan as the Chinese species. Further, there would be an increasing threat of hybridization with the Chinese species released or escaped into the wild. Accordingly, it is considered that to downlist not only the Japanese species but also the Chinese species will negatively affect the survival of wild populations of Japanese species. It is desirable, therefore, to remain both the Japanese and Chinese species in Appendix I.

11. Interviewees and references

11.1 List of the experts interviewed

- Ishii Nobuo: Professor, College of Arts and Sciences, Tokyo Woman's Christian University.
- Kuwabara Kazushi: Administrative Director, Hiroshima City Asa Zoological Park.
- Matsui Masahumi: Professor, Graduate School of Human and Environmental Studies, Kyoto University.
- Okada Sumio: Graduate School of Regional Sciences, Tottori University.
- Tochimoto Takeyoshi: Head, Nihon Hanzaki Institution.

11.2 References

(Titles of articles in Japanese papers are tentative translation)

Agency for Cultural Affairs. 1980. "List of Historic Sites, Places of Scenic Beauty and/or Natural Monuments" [In Japanese]. Dai-Ichi Houki, Tokyo.

Aichi Prefecture. 2002. Red Data Book Aichi - Animals - , Threatened Wildlife of Aichi Prefecture.

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Environment Agency, Nature Conservation Bureau. 1993. Report on the fourth National Surveys of the Natural Environment. Animal Distribution Survey Report (Amphibians and Reptiles) [In Japanese].

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No.0902.3/ 1296

CITES Management Authority
National Park, Wildlife and Plant
Conservation Department
61 Phaholyothin Road
Chatuchak, Bangkok 10900

10 October B.E. 2551 (2008)

Dear Sir,

Subject: Periodic review of specimens in CITES Appendices

With reference to your letter dated 30 July 2008 regarding periodic review of species in CITES Appendices and requesting the reviews that should be sent to the Chairman of the Animals Committees intersessional working groups on periodic review of animal species.

In response, we are pleased to enclose herewith the information for above-mentioned subject, including copies of relevant documents.

Should more detailed information be required, please do not hesitate to contact us.

Yours sincerely,

W. Vetayaprasit

(Mr.Watana Vetayaprasit)
Director, CITES Management Authority of Thailand
National Park, Wildlife and Plant Conservation Department

Mr. Althaus Thomas
Chairman of the Animals Committee
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Attached 1

Felis chaus แมวป่า

1. **Status of species in the wild:** Critically Endangered.
2. **Legal controls of harvest:** *Felis chaus* is a protected animal under the Wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Exemption can be made in some cases where hunting, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific research, protection, captive breeding, or public zoo.
3. **Basis for setting of export level:** any exports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
4. **Basis for the issuance of export permit:** according to paragraph 3
5. **Levels of trade reported in CITES Annual Reports are on basis of export permit issued or actual numbers of specimens exported:** there have been no export permit issued for *Felis chaus*.
6. **Problem with enforcement of harvest export regulations:** no problem
7. **Relevant document/reports:** attached

Attached 2

Prionailurus bengalensis แมวดาว

1. **Status of species in the wild:** Least Concern
2. **Legal controls of harvest:** *Prionailurus bengalensis* is a protected animal under the Wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Exemption can be made in some cases where hunting, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific research, protection, captive breeding, or public zoo.
3. **Basis for setting of export level:** any exports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
4. **Basis for the issuance of export permit:** according to paragraph 3
5. **Levels of trade reported in CITES Annual Reports are on basis of export permit issued or actual numbers of specimens exported:** there have been no export permit issued for *Prionailurus bengalensis*.
6. **Problem with enforcement of harvest export regulations:** no problem
7. **Relevant document/reports:** attached

Attached 3

Prionailurus planiceps แมวป่าหัวแบน

1. **Status of species in the wild:** Critically Endangered.
2. **Legal controls of harvest:** *Prionailurus planiceps* is a protected animal under the Wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Exemption can be made in some cases where hunting, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific research, protection, captive breeding, or public zoo.
3. **Basis for setting of export level:** any exports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
4. **Basis for the issuance of export permit:** according to paragraph 3
5. **Levels of trade reported in CITES Annual Reports are on basis of export permit issued or actual numbers of specimens exported:** there have been no export permit issued for *Prionailurus planiceps*.
6. **Problem with enforcement of harvest export regulations:** no problem
6. **Relevant document/reports:** attached

Attached 4

Prionailurus viverrinus เสือปลา

1. Status of species in the wild: Vulnerable
2. Legal controls of harvest: *Prionailurus viverrinus* is a protected animal under the Wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Exemption can be made in some cases where hunting, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific research, protection, captive breeding, or public zoo.
3. Basis for setting of export level: any exports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
4. Basis for the issuance of export permit: according to paragraph 3
5. Levels of trade reported in CITES Annual Reports are on basis of export permit issued or actual numbers of specimens exported: there have been no export permit issued for *Prionailurus viverrinus*.
6. Problem with enforcement of harvest export regulations: no problem
7. Relevant document/reports: attached

Attached 5

Argusianus argus นกหว้า

6. Status of species in the wild: Vulnerable.
7. Legal controls of harvest: *Argusianus argus* is a protected animal under the Wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Exemption can be made in some cases where hunting, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific research, protection, captive breeding, or public zoo.
8. Basis for setting of export level: any exports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
9. Basis for the issuance of export permit: according to paragraph 3
10. Levels of trade reported in CITES Annual Reports are on basis of export permit issued or actual numbers of specimens exported: there have been no export permit issued for *Argusianus argus*.
6. Problem with enforcement of harvest export regulations: no problem
11. Relevant document/reports: attached

Attached 6

Polyplectron bicalcaratum นกแว่นสีเทา

1. Status of species in the wild: –
2. Legal controls of harvest: *Polyplectron bicalcaratum* is a protected animals according to the wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Some exemptions relating to hunt, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific, protection, captive breeding, or zoo.
3. Basis for setting of export level: any ex ports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
4. Basis for the issuance of export permit: according to paragraph 3
5. Levels of trade reported in CTES Annual Reports are on basis of export permit issued or actual numbers of specimens exported: there is no export permit issuance for *Polyplectron bicalcaratum*.
12. Problem with enforcement of harvest export regulations: no problem
13. Relevant document/reports: attached

Syrmaticus humiae ไก่ฟ้าหางลายขวาง

1. **Status of species in the wild:** Critically Endangered.
2. **Legal controls of harvest:** *Syrmaticus humiae* is a protected animals according to the wild Animal Reservation and Protection Act B.E. 2535 (1992). Specimens of protected animals are completely prohibited from any exploitation both for domestic use and export. Some exemptions relating to hunt, breeding, possession, import, or export are undertaken by a government authority for purposes of education and scientific, protection, captive breeding, or zoo.
3. **Basis for setting of export level:** any exports levels have no setting due to specimens of animal bred in captivity are allowed for export. Other cases shall be in accordance with the provisions of the exemption in paragraph 2.
4. **Basis for the issuance of export permit:** according to paragraph 3.
5. **Levels of trade reported in CTES Annual Reports are on basis of export permit issued or actual numbers of specimens exported:** there is no export permit issuance for *Syrmaticus humiae*.
6. **Problem with enforcement of harvest export regulations:** no problem
7. **Relevant document/reports:** attached

Review of the Status of the Lake Patzcuaro Salamander (*Ambystoma dumerilii*)

1. This document is submitted by the *Comisión Nacional para el Conocimiento y Uso de la Biodiversidad* (CONABIO), the CITES Scientific Authority of Mexico.

2. At its 22nd meeting (Lima, July 2006), the CITES Animals Committee selected amphibian and galliform species for inclusion in the Periodic Review to take place between the 13th and 15th meetings of the Conference of the Parties (Bangkok, 2004, and Doha, 2010, respectively). The Lake Patzcuaro salamander (*Ambystoma dumerilii*) was included in the list, and Mexico volunteered to undertake the review.

3. The CITES Scientific Authority of Mexico contacted Dr Dolores del Carmen Huacuz Elías of the Universidad Michoacana de San Nicolás de Hidalgo, Michoacán, a Lake Patzcuaro salamander specialist in Mexico, to perform the 'Evaluation of the Status of the Lake Patzcuaro Salamander (*Ambystoma dumerilii*) in the CITES Appendices', financed by CONABIO.

4. Based on an exhaustive review of available sources of information, existing data were compiled on taxonomy, distribution, habitat, biology, morphology, importance, population and habitat status and trends, threats, management, use and trade (both legal and illegal), and conservation. This information was complemented on the basis of experience and unpublished reports and research studies carried out by the specialist.

5. A fact sheet was created based on the paragraphs of Annex 6 to Resolution Conf. 9.24 (Rev. CoP14). The most relevant information from the fact sheet is listed in **Annex 1** to this document.

6. Lastly, the status of the species in the CITES Appendices was evaluated based on the criteria for amending CITES Appendices I and II in the aforementioned Resolution. That evaluation is submitted as **Annex 2** to this document.

7. Based on the results of the project and an analysis of the criteria for amendment of the Appendices, the following conclusions were drawn:

    - From the biological standpoint, the species meets the criteria for inclusion in Appendix I.
    - The primary threat to the species involves loss of and changes to its habitat, in addition to other factors, such as capture for local or national consumption (primarily) and the introduction of exotic species.
    - International trade is not a risk factor for wild specimens.
    - The species presents problems of similarity with *Ambystoma mexicanum*, a species listed in CITES Appendix II.

8. For the reasons above, although there is no significant international trade in the species, we recommend that it remain in Appendix II, due to its similarity to *Ambystoma mexicanum*, pursuant to Article II, paragraph 2 (b), of the Convention.

ANNEX 1 – Summary of the Fact Sheet on *Ambystoma dumerilii*

Area of distribution.- *Ambystoma dumerilii* is a species endemic to Lake Patzcuaro in Michoacán, Mexico (**Figures 1** and **2** at the end of this Annex). Its historical and current area of distribution is approximately 100 square kilometres (97.57 km^2) which is the total area of the Lake (Huacuz, 2008).

Threats to populations and habitat.- The Lake Patzcuaro basin has lost nearly 10,000 ha of forest, 85 % of the soil has been affected to some degree and erosion has caused a significant accumulation of terrigenous sediments in the lake, resulting in a 40 km^2 reduction in area and 2.6 m reduction in depth (García, 2004). The harvesting of *A. dumerilii* for consumption as food or traditional medicine has been practised from prehistoric times in Michoacán by the Purépecha ethnic group (Huacuz, 2002). It currently continues to be used for the manufacture of 'salamander syrup', purported to possess various medicinal properties. The introduction of alien species (*Cyprinus carpio*, *Oreochromis aureus*, *Micropterus salmoides*) into Lake Patzcuaro is another threat, as such species have disrupted the balance of the ecosystem, causing repercussions on the predator-prey relationship and trophic competition, and introducing parasites and diseases previously not found in the system.

Wild population status.- Data on commercial harvesting provided by fishermen's organizations between 1987 and 2000 indicate a reduced offtake in the latter years of that period. *A. dumerilii* is differentially distributed in Lake Patzcuaro and the areas where most of the harvesting takes place are the central and northern portions of the lake. Fishermen currently report offtakes of individuals which they throw back when small or keep for their own consumption.

The population density of the species was calculated using the Catch per Unit of Effort method (CPUE = W/UE, where W is the weight of the catch in kilogramme and UE is the unit of effort or total cumulative length in metres of the nets used per organization per year, divided by 100), resulting in an average density of 0.915 CPUE, or an approximate density of 0.002 indiv./m^2 for the species. This density of *A. dumerilii* is comparable to that estimated for *A. mexicanum* (0.006 indiv./m^2; Graue, 1998).

Domestic trade.- *A. dumerilii* is considered a species associated with fishing activities (*Carta Nacional Pesquera* D.O.F. 2006); and given the nature of the nets used (gill nets), only adult Lake Patzcuaro salamanders are caught. There is only one Wildlife Conservation Management (UMA), registered for the species in 2003 ('Biological Station for the Integral Study and Sustainable Use of *Ambystoma dumerilii*'). This UMA has a Management Plan approved by the Mexican CITES Management Authority *(Dirección General de Vida Silvestre* – SEMARNAT), which has granted three use permits for *A. dumerilii* for a total of 392 individuals between 2005 and 2007 for commercial purposes, and 82 individuals between 2005 and 2006 for research. Empirical data show that the salamander continues to be marketed and consumed domestically, among the Purépecha communities and the mestizos in the region, although the sale of salamanders does not provide significant income for them (Huacuz, 2002).

International trade.- The CITES Trade Database (UNEP-WCMC, 2008) reports only three trade events between 1975 and 2007: 18 and eight specimens for scientific purposes were exported from Mexico and imported into the United States (1979 and 1995, respectively; the latter were of wild origin), and 100 live specimens bred in captivity, exported from Germany and imported into the former Czechoslovakia for commercial purposes in 1992.

Illegal trade.- Data provided by the Mexican CITES Enforcement Authority (*Procuraduría Federal de Protección al Ambiente*, PROFEPA) indicate that, between 2001 and 2008, eight seizures of *Ambystoma* spp. and/or *Ambystoma dumerilii* were carried out, for a total of 97 specimens, in various non-border cities in the country. Likewise, between 2002 and 2008, a total of 61 specimens of the genus *Ambystoma* were seized in inspection and security actions. No data are available regarding any cross-border seizures.

Breeding in captivity.- Apparently, only the UMA 'Biological Station for the Integral Study and Sustainable Use of *Ambystoma dumerilii*' breeds the species in captivity at the moment. Data from the most recent report submitted by the *Dirección General de Vida Silvestre* (August 2007 to July 2008) indicate a captive population of 80.78.82 individuals.

Conservation and Protection.- *Ambystoma dumerilii* is on the list of threatened species in Mexico, categorized as *Subject to Special Protection* (NOM-059-SEMARNAT-2001), as a species that could become threatened by factors negatively impacting its viability, for which the need has been determined to support its recovery and conservation, or the recovery and conservation of associated species. The International Union for Conservation of Nature (IUCN) categorizes the Lake Patzcuaro salamander as Critically Endangered (CR – *Critically Endangered*; IUCN, 2008).

In 2002, the "Programme for the Management and Conservation of *Ambystoma dumerilii*, the Lake Patzcuaro salamander" was established as a strategic planning tool to ensure its long-term survival and also provide for the management and conservation of the species. Among other achievements, it has succeeded in discontinuing the sale of de *A. dumerilii* at local markets; brought about the creation of the National Advisory Technical Subcommittee for the Conservation, Management and Use of Salamanders (*Ambystoma*) and raised awareness among the 'Dominican Mothers', who have established an UMA based on the programme's proposals. Among the more significant plans for conserving the habitat of *Ambystoma dumerilii* is the 'Plan Patzcuaro 2000', whose primary purpose was an integral analysis on which to base recommendations and determine what actions should be taken (development, research and awareness), to counteract the ecological and social deterioration of the basin. As a result of this programme, the Patzcuaro Technical Committee was established in 1997. To date, it remains the technical authority that coordinates, arranges and promotes government and civilian efforts to rescue the basin. In 2003, an agreement was signed to implement the 'Lake Patzcuaro Basin Environmental Restoration Programme', which takes over from the 'Plan Patzcuaro 2000' and which to date has completed its first two phases (http://www.recuperapatzcuaro.info).

Similarity to other species.- There are 30 valid species in the genus *Ambystoma* (Flores and Canseco, 2004; SIIT, 2006), of which 16 are found in Mexico, and 15 of these are endemic. Of all the species found in Mexico, the one that is visually most similar to *A. dumerilii* and is also sold on the domestic and international markets is *A. mexicanum*, which is also listed in CITES Appendix II. Its colouration differs from that of the Lake Patzcuaro salamander (Huacuz, 2008), with a dark-coloured back, brownish-black sides and tail, and with the mid-portion of the lower sides, belly and gular region being yellowish-brown with dark spots and, occasionally, light patches. By contrast, *A. dumerilii* is normally light green, mixed with shades of purple and brown, lighter in colour on the belly and the extremities, with whitish spots on the sides, head and back. However, a person who is not an expert might have difficulty differentiating between the two species.

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Zambrano, L., E. Vega, L.G. Herrera, E. Prado & Reynoso V.H. 2007. A population matrix model and population viability analysis to predict the fate of endangered species in highly managed water systems. Animal Conservation 10 (2007) 297-303

Figure 1.- Location of Lake Patzcuaro in the State of Michoacán, and location of the State of Michoacán in Mexico.

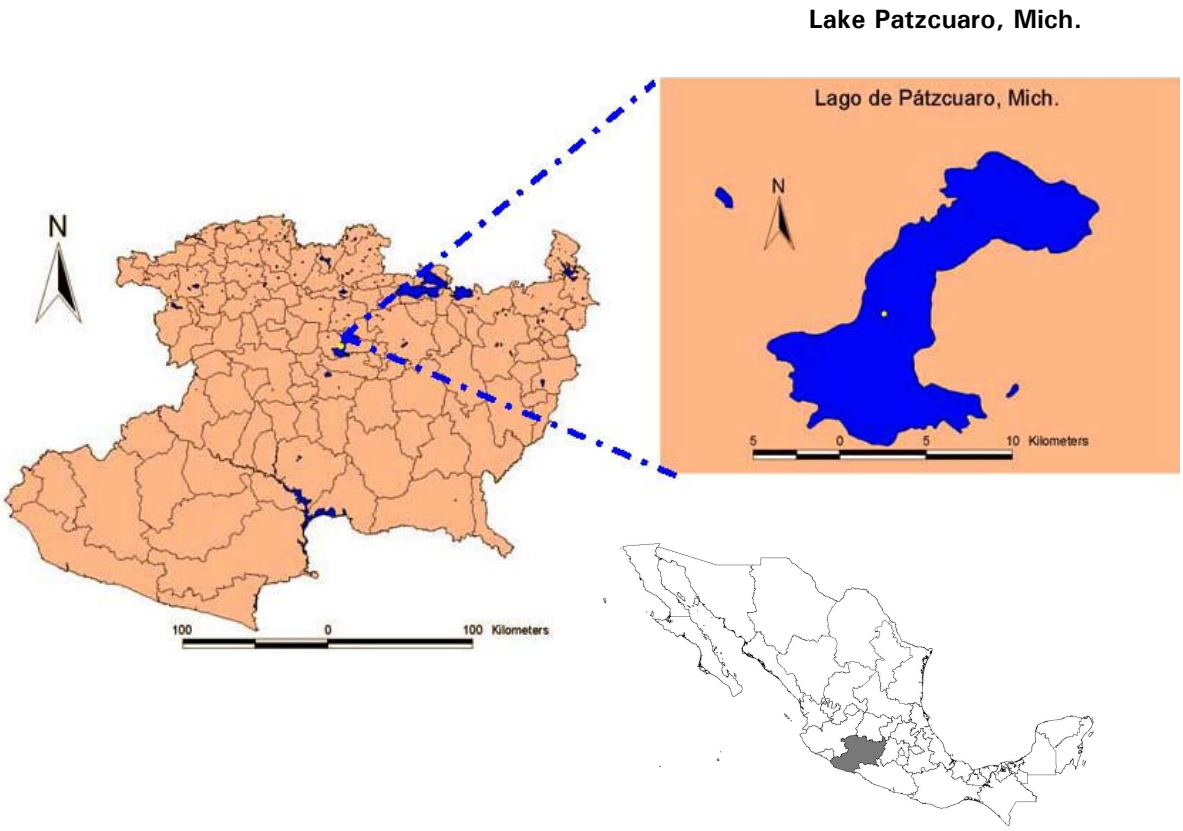
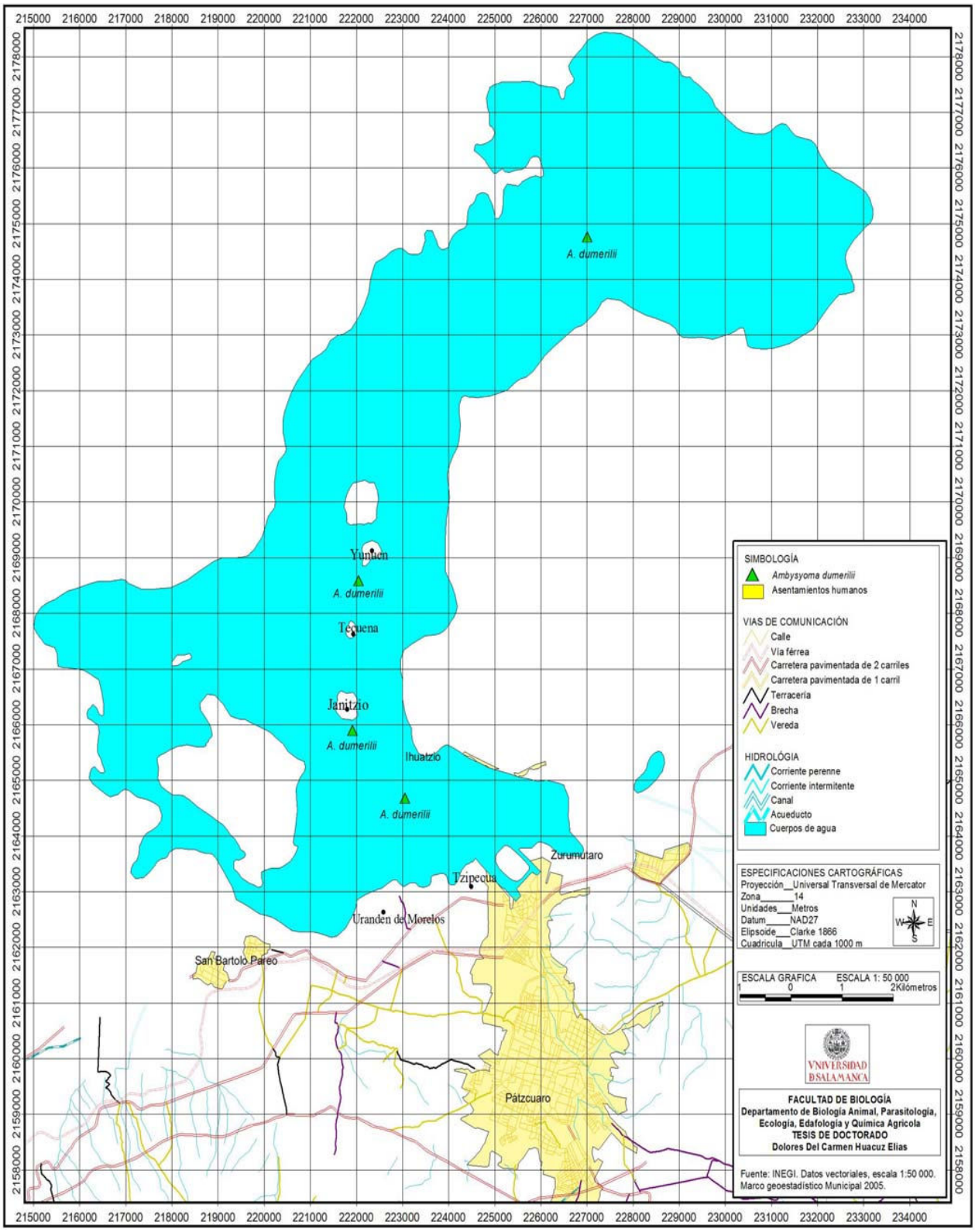


Figure 2.- *Ambystoma dumerilii* catch sites in Lake Patzcuaro, Michoacán (Huacuz, 2008)



[Map key]
SYMBOLS
Ambystoma dumerilii
Human settlements

ACCESS ROUTES
Street

Railway
2-lane tarred road
1-lane tarred road
Earth track
Trail
Path

WATERWAYS
Perennial stream
Intermittent stream
Canal
Aqueduct
Body of water

CARTOGRAPHIC SPECIFICATIONS
Projection — Universal Transverse Mercator
Zone — 14
Units — metres
Datum — NAD 27
Ellipsoid — Clarke 1866
Grid — UTM every 1000 m

GRAPHIC SCALE SCALE 1:50,000

2 kilometres

University of Salamanca
School of Biology
Department of Animal Biology, Parasitology, Ecology, Edaphology and Agricultural Chemistry
DOCTORAL THESIS
Dolores del Carmen Huacuz Elias

Source: INEGI
Vectorial Data Scale 1:50,000
Municipal Geostatistical Map 2005

ANNEX 2: Analysis of *Ambystoma dumerilii* in the CITES Appendices in accordance with the criteria of Resolution Conf. 9.24 (Rev. CoP14).

Criteria for the inclusion of species in the CITES Appendices

(adapted from document AC16 Doc. 16.8, Annex 2 "Guidelines for the review of animal species listed in CITES Appendices")

Appendix I

Biological Criteria[1]											**Trade Criteria[2]**				**Implementation problems if transferred to Appendix I**
A					**B**				**C**						
The wild population is small, and is characterized by **at least one** of the following (i-v):					The wild population has a restricted area of distribution and is characterized by **at least one** of the following (i-iv):				A marked decline in the population size in the wild, which has been either (i-ii):		At least one of the following (i-iv):				
i	**Ii**	**iii**	**iv**	**v**	**i**	**ii**	**iii**	**iv**	**i**	**ii**	**i**	**ii**	**iii**	**iv**	
✓		✓		✓	✓		✓	✓		✓					If there is no significant international trade in the species, the transfer to Appendix I will not contribute to its conservation.

Appendix II*

Criteria for the inclusion of species in Appendix II [Resolution 9.24 (Rev. CoP14]				**Trade criteria[2]**				**Implementation problems if deleted from Appendix II**
Annex 2 a		**Annex 2 b**						
A	**B**	**A**	**B**	At least one of the following (i-iv)				
It is known, or can be inferred or projected, that the regulation of trade in the species is necessary to avoid it becoming eligible for inclusion in Appendix I in the near future; or	It is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences.	The specimens of the species in the form in which they are traded resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2 (a), or in Appendix I, such that enforcement officers who encounter specimens of CITES-listed species, are unlikely to be able to distinguish between them; or	There are compelling reasons other than those given in criterion A above to ensure that effective control of trade in currently listed species is achieved.	**i**	**ii**	**iii**	**iv**	
		✓						Similarity with *A. mexicanum*

* A species must be included in Appendix II when it meets either criteria **A or B and at least one** of the trade criteria.

[1] **Biological criteria for Appendix I** [Resolution Conf. 9.24 (Rev. CoP14), Annex 1]

A species is considered to be threatened with extinction if it meets, or is likely to meet, **at least one** of the following criteria.

A. The wild population is small, and is characterized by **at least one** of the following:
   i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or

   ii) each subpopulation being very small; or

   iii) a majority of individuals being concentrated geographically during one or more life-history phases; or

   iv) large short-term fluctuations in population size; or

   v) a high vulnerability to either intrinsic or extrinsic factors.

B. The wild population has a restricted area of distribution and is characterized by **at least one** of the following:
   i) fragmentation or occurrence at very few locations; or

   ii) large fluctuations in the area of distribution or the number of subpopulations; or

   iii) a high vulnerability to either intrinsic or extrinsic factors; or

   iv) an observed, inferred or projected decrease in any one of the following:

   - the area of distribution; or
   - the area of habitat; or
   - the number of subpopulations; or
   - the number of individuals; or
   - the quality of habitat; or
   - the recruitment.

C. A marked decline in the population size in the wild, which has been **either**:
   i) observed as ongoing or as having occurred in the past (but with a potential to resume); or

   ii) inferred or projected on the basis of any one of the following:

   - a decrease in area of habitat; or
   - a decrease in quality of habitat; or
   - levels or patterns of exploitation; or

- a high vulnerability to either intrinsic or extrinsic factors; or
- a decreasing recruitment.

[2] **Trade criteria** [Resolution Conf. 9.24 (adopted at CoP9), second RESOLVES, paragraph b)]

A species "is or may be affected by trade" if:

i) it is known to be in trade; or

ii) it is probably in trade, but conclusive evidence is lacking; or

iii) there is potential international demand for specimens; or

iv) it would probably enter trade were it not subject to Appendix-I controls.