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

Sixteenth meeting of the Conference of the Parties
Bangkok (Thailand), 3-14 March 2013

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion of *Epipedobates machalilla* (Coloma, 1995) in Appendix II in accordance with Article II, paragraph 2 (b) of the text of the Convention; Resolution Conf. 9.24 (Rev. CoP14), Annex 2 (b), criteria A and B; Resolution Conf. 12.11 (Rev. CoP15), paragraph f); and document AC25 WG8 Doc. 1, Recommendation a (vii).

B. Proponent

Republic of Ecuador[1]

C. Supporting statement

1. Taxonomy

See synonyms and taxonomic comments in Frost (2009) and Grant *et al.* (2006). Its hypothetical species is *Epipedobates anthonyi* (Graham *et al.*, 2004) or *Epipedobates anthonyi* and *Epipedobates tricolor* (Santos et al, 2003; Grant, 2006).

Genus/Species	1987	1987	1995	2006
Epipedobates machalilla	The species had not been discovered	The species had not been discovered	*E. machalilla* was discovered and is included in the *Colostethus* genus as *Colostethus machalilla*	In 2006, the species was transferred to the *Epipedobates* genus, [Based on the standard reference for amphibians contained in Resolution Conf. 12.11 (Rev.CoP15). (Taxonomic Checklist of CITES-listed Amphibians, information extracted from Frost, D. R. (ed.) (2004), *Amphibian Species of the World: a taxonomic and geographic reference*, online reference,

[1] *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 autor.*

Genus/Species	1987	1987	1995	2006
				Version 3.0 of 7 April 2006)]
Dendrobates (Epipedobates)	The *Dendrobates* genus was included in Appendix II at CoP6 (originally included *Epipedobates* spp.)	*Epipedobates spp*. is separated from *Dendrobates* spp. by taxonomists	*Colostethus spp*. was not on the CITES list at this time and continued without being listed in the Appendices.	Given that the species was classified in a genus that was not listed in CITES, when *Epipedobates* spp. was listed separately, it was not possible to include it automatically in Appendix II with the rest of the *Epipedobates* species as this would extend the intention of the original proposal.

1.1 Class: Amphibia

1.2 Order: Anura

1.3 Family: Dendrobatidae

1.4 Genus, species or subspecies: *Epipedobates machalilla* (Coloma, 1995)

1.5 Scientific synonyms: *Colostethus machalilla (*Coloma et.al, 1995)

1.6 Common names: Spanish: Rana venenosa de Machalilla (Coloma y Guayasamín, 2011-2012)

1.7 Type: Holotype QCAZ 1414

1.8 Identification

Unlike other species in the genus, *Epipedobates machalilla* is a dark coffee-coloured, non-venomous, Dendrobatidae. The species is found in the dry and low area of the forests in the west of Ecuador (Coloma, 1995). The males have a snout-vent length of between14.4 and 16.0 mm (n = 22) (Coloma, 1995) while the snout-vent length for females is 15.8 mm (n = 28) (Coloma, 1995).

1.9 Etymology

The subspecies name refers to the Machalilla National Park, where this species is found. This park includes relict forests and significant archaeological sites which were inhabited by cultures such as the Valdivia, the Machalilla, the Chorrera, the Bahía, the Guangala and the Manteña around 5,000 years ago (Coloma, 1995).

2. Overview

When *Epipedobates machalilla* was discovered in 1995, it was included in the *Colostethus* genus and, as a result, was not considered for inclusion in the CITES Appendices. However, the Standard Reference for amphibians adopted at the 15th Conference of the Parties (CoP15) included the *machalilla* species in the *Epipedobates* genus, making it the only species within that genus not to be listed in Appendix II. Therefore, based on Resolution Conf. 12.11 (Rev. CoP15), paragraph f), the Animals Committee recommended at its 25th meeting that the Taxonomic Working Group should prepare a proposal to include *E. machalilla* in Appendix II for consideration by the Conference of the Parties at its 16th meeting in 2013.

The International Union for Conservation of Nature (IUCN) Red List classifies *E. machalilla* as Near Threatened (NT) because the population has probably suffered from a reduction of > 30 % over 10 years through a significant loss of habitat across its range, thus making the species close to qualifying as Vulnerable (Colomo *et al.,* 2004).

E. machalilla is used for scientific ends, specifically for embryonic development studies and trade in the species is unknown. Therefore, it is a candidate to be listed in Appendix II in accordance with the terms of Article II, paragraph 2 (b).

Moreover, *E. machalilla* is already subject to conservation measures at the national level in Ecuador, The inclusion of *E. machalilla* in Appendix II would not only be for the conservation and survival of the species in the wild but also to fulfil the decision taken by the Animals Committee during its 25th meeting:

> *vii) A single special problem had been identified with regard to the frog species Epipedobates machalilla, which had been transferred recently from the genus Colostethus to Epipedobates. The Committee therefore recommended to solve this problem by preparing a proposal for CoP16 to include E. machalilla in Appendix II.*
>
> *http://www.cites.org/eng/com/ac/25/sum/E25-SumRec.pdf*

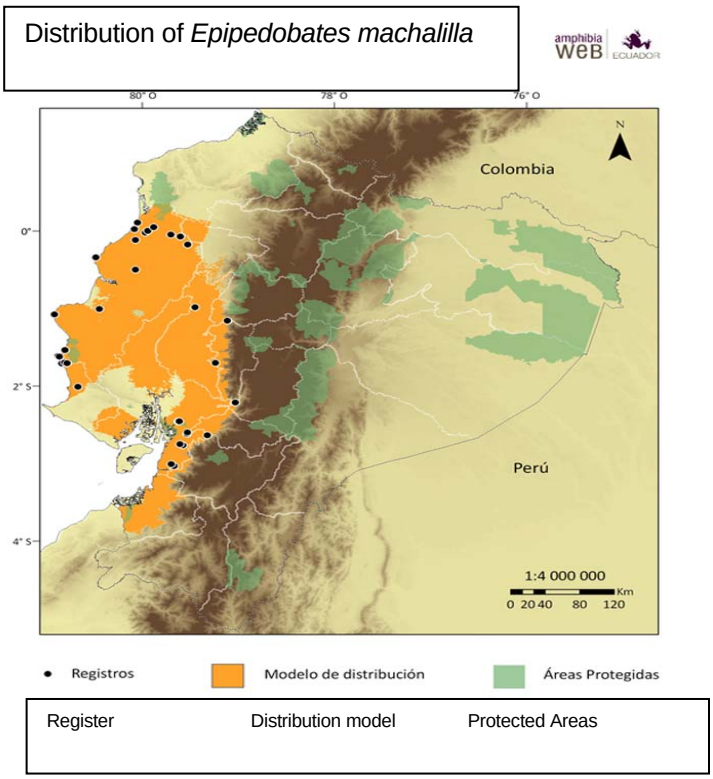
3. Characteristics of the species

3.1. Distribution

The species is endemic to Ecuador and is known to inhabit approximately thirty locations in the Pacific Lowlands area of Ecuador, in the provinces of El Oro, Los Ríos, Bolívar, Cotopaxi, Guayas, Cañar and Manabí (Parker and Carr, 1992; Coloma, 1995). Although it can be locally abundant, it is not a common species and in some areas it is restricted to the rivers and streams (IUCN Red List).

Parker and Carr (1992) reported the presence of the species (under the name *Colostethus* sp. 1) in Machalilla National Park.

Also found in the dry scrublands and deciduous forests in the coastal region, the Chocó tropical rainforest, and the forests in the western foothills. (Coloma, 1995).



Source: AmphibiaWeb

3.2. Habitat

Biodiversity in Ecuador is under significant survival pressure as a result of deforestation, invasive alien species, fires, contamination and overexploitation of natural resources and the growth in the human population and its requirements (US Aid, 2011).

Can live in disturbed habitats such as banana and cocoa plantations (Coloma, 1995; Del Pino *et al*., 2004).

3.3. Biological characteristics

Mating is elaborate and includes cephalic amplexus. On average, 15 eggs (measuring 1.6 mm) are laid (under fallen leaves or on plants in terrariums) (8-21 eggs, n = 72). Parental care is given by the male, who also carries the larvae. Development from fertilization to the hatching of the tadpoles to be able to be carried takes 19-20 days. They are taken by the males to small pools on river banks (Coloma, 1995; Del Pino *et al*., 2004).

Amplexus takes place on land and the eggs are deposited on the ground or under dry leaves. After amplexus, the female leaves the nest and the father protects the development of the embryos from intruders by showing aggressive behaviour. At the time of incubation, the male carries the tadpoles into the water where growth and metamorphosis takes place (Quiguango-Ubillús, 2000). Despite its sole and unusual reproduction method, not much is known about its primary development, except the expression of the Brachyury protein (Benítez and del Pino, 2002).

Benitez and del Pino (2002) provide data on the Brachyury expression during development. Del Pino *et al*. (2002) provide data on the differential expression in the LAP-2 somatic and germ cells (a lamina-associated polypeptide), which is implicated in gastrulation during early development. Santos *et al*. (2003) and Grant *et al*. (2006) provide molecular and phylogenetic information and discuss evolution aspects. Graham *et al*. (2004) provide data on the distribution, geographic environment and environmental niches of the species, which are used to explore speciation mechanisms. Pérez *et al*. (2006) provide data on the ortholog of the VegT transcription factor, which is the meso-endodermal determinant in *Xenopus laevis*. This ortholog shares with other anura species a conserved domain of

57 amino acids in the C-terminus. Moya *et al*. (2007) provide data on, and comparisons with other frog species of, blastopore formation, the embryonic disc, elongation of the archenteron and notochord, and Brachyury expression. The differences reported indicate that gastrulation of amphibians is modular. Lötters *et al*. (2007) provide an overview of the species, with data on its distribution, natural habitat, morphology and biology.

The species live in sympatry with *Hyloxalus awa* in the Mache Chindul mountains in the Cordillera de la Costa range and with *Hyloxalus infraguttatus* at 600 m in the Chimbo River basin and the Chongón Colonche range. They have been found in great density on the banks of the Ayampe River (Coloma, 1995; Del Pino *et al*. 2004).

3.4 Morphological characteristics

Epipedobates machalilla differs from other species because of its light olive/coffee colour with dark coffee-coloured patches, solid, oblique lateral stripes. The inguinal and anterior regions of the legs are yellow or yellow-orange and the tarsal bone is large and very curved (Cisneros-Heredia & Yanez-Muñoz 2010).

Del Pino *et al*. (2004) provide embryonic data and analyse the morphology of the species. Although *E. machalilla* does not form an embryonic disc, its thick blastopore lips are similar to the embryonic disc of the marsupial frog *Gastrotheca riobambae*.

The eggs of *E. machalilla* were the smallest and least pigmented in the *Dendrobates* genus. These were analysed in comparison with other frogs in that genus, such as *Colostethus kingsburyi* and *Epipedobates tricolor* (Syn: *Phyllobates tricolor*), which reach 2 mm in diameter and were darker. Although the development model of six other species was fairly similar to the development of *E. machalilla,* there were differences in the development time. For example, *E. tricolor* develops faster than *C. machalilla* (Del Pino *et al*., 2004).

3.5 Role of the species in its ecosystem

4. Status and trends

4.1 Habitat trends

The coastal forests in Ecuador are strongly threatened by human pressures, with only 2 % of the original forest remaining. This destruction of the forests is the main result of population growth, which has doubled agricultural production and led to significant increase in logging and large-scale planting of forests with African palm trees for the extraction of oil *(Elaeis guineensis)* and eucalyptus *(Eucalyptus* spp) (US Aid citing CI, 2010). To counteract the deforestation, the Provincial Council of Manabí implemented a large-scale reforestation project in 2008 using native species and bamboo (US Aid, 2011).

4.2 Population size

E. machalilla is not an uncommon species in its range area. It is listed on the IUCN Red List as Near Threatened because the population is possibly decreasing significantly as a result of a loss of habitat in the majority of the range area, thus making it a candidate to be listed as Vulnerable (Coloma et. al, 2004).

An analysis was performed between February 2005 and January 2010 of the amphibians in four locations in the Chongón region and the Colonche mountains. Four hundred and forty three specimens were found in total across the four locations. Loma Alta had 58.01 % of absolute abundance, with Dos Mangas having 15.58 %, Cantalapiedra, 14.67 %, and Cerro Blanco, 11.74 %.

Overall across the four sites, there was a marked dominance of *Epipedobates machalilla* (Pi= 0,139). (Amador & Martinez, 2011).

4.3 Population structure

No information was found on the population structure of this species.

4.4 Population trends

The population of *E. machalilla* is considered to be falling according to the IUCN Global Amphibian Assessment prepared in 2004. (Coloma 2004, *op. cit*.). The IUCN Red List classifies *E. machalilla* as Near Threatened because the population has probably suffered from a reduction of > 30 % over 10 years through a significant loss of habitat across its range, thus making the species close qualifying as Vulnerable (Colomo et al., 2004).

4.5 Geographic trends

The species is endemic to Ecuador and is known to be in at least 10 locations in the Pacific Lowlands area of Ecuador, in the provinces of El Oro, Los Ríos, Bolívar, Cotopaxi, Guayas, Cañar and Manabí (Parker and Carr, 1992; Coloma, 1995).

5. Threats

The main threats to *E. machalilla* are agriculture (crops, livestock) and logging (Coloma 2004, *op. cit.*).

The American organization, US Aid, notes a number of direct and indirect threats to biodiversity in Ecuador.

Direct threats to the biodiversity and habitat of *E. machalilla*:

The main cause of deforestation in Ecuador is the expansion of agriculture and, depending on the region, livestock farming, the felling of trees in primary forests, the impacts of exploration and exploitation of non-renewable resources, and the construction of new roads, hydroelectric plants and dams. It is estimated that 95 % of the coastal forests have been transformed into spaces for agriculture and livestock farming and habitats such as dry forests, mangroves and others have been lost or have deteriorated (US Aid, 2011).

Despite special efforts and projects within the communities to reduce and eliminate the use of burning, this practice is common among small-scale farmers (US Aid, 2011).

Indirect threats:

The human population is growing and therefore so is the demand for more goods and services using the country's natural resources, such as water, land, wood-based products (US Aid, 2011).

In Ecuador the trend of temperature change is also a threat to biodiversity and the forests in the country (US Aid, 2011).

Additional information:

Study of the environmental impact of the project to dredge sediment in the Severion Pumping Station, Bolívar canton, Manabí Province:

The study found that there were negative impacts on amphibians in Bolívar canton, Manabí Province, where *E. machalilla* lives (National Water Secretariat, 2011).

6. Utilization and trade

6.1 National utilization

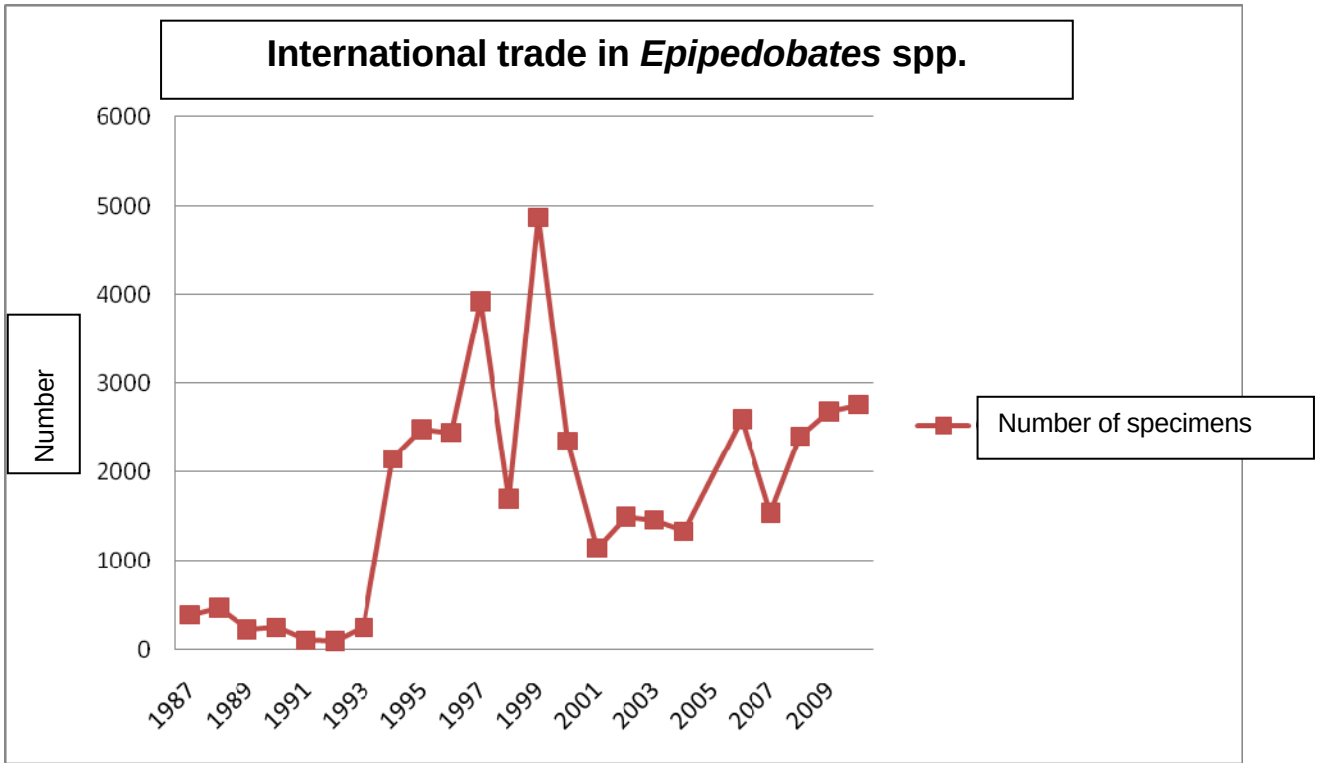
To date, there is no information available on the national use of this species.

6.2 Legal trade

To date, there is no information available on legal trade in *E. machalilla*.

There is an abundant trade in other species within the *Epipedobates* spp. and they are very popular in international trade, e.g. *E. tricolor* and *E. anthonyi*.

The graph below shows the rates of international trade of *Epipedobates* spp. since it was listed in Appendix II of CITES.



Source: CITES-WCMC trade database.

6.3 Parts and derivatives in trade

There is no information on trade in *E. machalilla*.

6.4 Illegal trade

There is no information on illegal trade in *E. machalilla*.

6.5 Actual or potential trade impacts

Although no trade in *E. machalilla* has been detected (possibly because it is part of the *Colostethus* genus which does not have much international demand), there is commercial demand for other species in the *Epipedobates* genus at the international level. It was found that there is international trade in *E. boulengeri,* which could affect the species as they are similar and it is difficult for lay persons and non-experts to differentiate between the two species.

7. Legal instruments

7.1 National

The Constitution of Ecuador guarantees a sustainable conservation model for biodiversity. The environmental management policies are applied in a cross-cutting manner and are linked at all levels and for all individuals and companies in the country. If there are doubts about the scope and reach of environmental law, the protection that most favours nature prevails. (Constitution of Ecuador, Art 395).

Ecuador has two environmental laws for the protection of biodiversity: the Environmental Management Act and the Forestry and Natural Areas and Wildlife Conservation Act. (Environmental Management Act, 2004 and the Forestry and Natural Areas and Wildlife Conservation Act, 2004).

The main legal instrument is the Unified Text of Secondary Environmental Legislation (TULAS) by the Ministry of Environment, in which are laid out the management, conservation, protection and trade requirements for wild species that are native to Ecuador.

7.2 International

All *Epipedobates* species are listed in Appendix II of CITES.

8. Species management

8.1 Management measures

Epipedobates machalilla is included in the Strategic Plan for the Conservation of Amphibians in Ecuador (Coloma, 2011).

Presence in protected areas: *E. machalilla* is present in the public protected area of Machalilla National Park. In private protected areas, it is found in Cerro Blanco Protected Forest (IUCN Red List, 2004).

8.2 Population monitoring

There is no specific information on the monitoring of the population of *E. machalilla*.

8.3. Control measures

8.3.1 International

There are no control measures at the international level for this species.

8.3.2 Domestic

There are no control measures at the domestic level for this species.

8.4 Captive breeding

Experiments in captive breeding of this species showed that the development of *E. machalilla* takes 19-20 days to complete fertilization and the tadpoles hatched when the embryos were the responsibility of the father in the nest and when they were planted in a damp area (Del Pino, 2004).

There is no information available on captive breeding for trade.

8.5 Habitat conservation

Presence in public protected areas: Machalilla National Park; private protected areas: Cerro Blanco Protected Forest.

9. Information on similar species

E. machalilla can be compared with *Hyloxalus breviquartus*, *Colostethus fugax* and *H. cevallosi*, which have solid, oblique lateral stripes and an unmarked belly, together with rudimentary or absent membranes between the digits on the feet. It differs from *H. breviquartus* and *H. cevallosi* as the males have a swollen third digit on the foot. *Epipedobates machalilla* differs from *C. fugax* as it is slightly larger and usually has an x-shaped mark on the scapular region. *Epipedobates machalilla* resembles *Hyloxalus toachi* as it has coffee-coloured testicles and the females have an unmarked belly. Male *H. toachi* do not have a swollen third digit and have a dark patch in the gular region. The females can be distinguished by the dorsal pattern (an x-shaped mark in the case of *E. machalilla*) (Coloma, 1995).

10. Consultations

The species is endemic to Ecuador but has also been found very close to the border with Peru and is probably also found in this area (Cisneros-Heredia *et al.*, 2004).

11. Additional remarks

Dendrobatidae was included in Appendix II of CITES in 1987. At this time, the *Colostethus* genus was excluded from the list. When *Epipedobates machalilla* was described in 1995, it was considered to be a member of the *Colostethus* genus and therefore was not considered for inclusion in the CITES Appendices.

However, the CITES Appendices. However, the Standard Reference for amphibians adopted at the 15th Conference of the Parties included the *machalilla* species in the *Epipedobates* genus, complying with the taxonomic revision of 2006 [AC25 Doc. 22 (Rev. 1), Annex 3]. *Epipedobates* was originally listed as Dendrobatidae, part of the *Dendrobates* genus, which was included in Appendix II at that time, However, as *E. machalilla* was considered to be a member of a genus not listed in CITES at the time the proposal was approves, it could not be automatically included in Appendix II with the other *Epipedobates* species without extending the scope of the original listing.

The only way to include *E. machalilla* in Appendix II with the other members of the genus is to prepare a proposal for listing the species in Appendix II in order to avoid the requirement to include a note indicating that the species is excluded despite its inclusion in a genus listed in the Standard Reference for amphibians.

This option was considered by the Working Group on Nomenclature of the Animals Committee at its 25th meeting. The Working Group recommended that a proposal for listing *E. machalilla* in Appendix II should be prepared for consideration at the 16th meeting of the Conference of the Parties [AC25 WG8 Doc. 1, Recommendation a (vii)]. The Animals Committee agreed that the representative of Central and South America and the Caribbean should contact Ecuador, the only range country, and request them to prepare a proposal and present it at the 16th meeting of the Conference of the Parties in 2013 (AC25 Summary record, p. 38).

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