Original language: English CoP19 Inf. 51
(*English only / en inglés únicamente / Seulement en anglais*)

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

Nineteenth meeting of the Conference of the Parties
Panama City (Panama), 14 – 25 November 2022

LACK OF SCIENTIFIC RIGOR AND MISLEADING DATA IN PROPOSAL 1 *"TRANSFER OF COMMON HIPPOPOTAMUS FROM APPENDIX II TO APPENDIX I"*

1. This document has been submitted by Botswana, United Republic of Tanzania, Zambia and Zimbabwe[1] in relation to Proposal 1.

[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 author(s).*

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Introduction

The proposal has been presented to CITES CoP 19 purporting that it is in accordance with:

- Article II, paragraph 1, of the Convention: "*Appendix I shall include all species threatened with extinction which are or may be affected by trade;*" and

- Resolution Conf. 9.24 (Rev. CoP17), Annex 1, paragraph 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; a decrease in quality of habitat; levels or patterns of exploitation; a high vulnerability to either intrinsic or extrinsic factors; or a decreasing recruitment."*

However, the proposal does not indicate whether or not the proponents believe the species meets the criteria in paragraph C**(i),** C**(ii),** or both, and they do not connect the information and data provided in the proposal with the criteria laid out in paragraph C**(i)**, C**(ii)**, or both.

Proponents

Benin, Burkina Faso, Central African Republic, Gabon, Guinea, Liberia, Mali, Niger, Senegal, Togo

Analysis under CITES Resolution Conf.9.24 - Biological criteria C) and Trade criteria.)

The Common Hippopotamus (*Hippopotamus amphibius*) does not have a restricted range, nor does it have a small population. Estimates of population trends vary across African range States, with some *H. amphibius* populations stable or increasing, and others allegedly decreasing. At the species-level, the global hippo population was reported by the 2017 IUCN Red List Assessment (Lewison, R. & Pluháček, J. 2017) to have declined by at least 30% (but less than 50%) over three generations (30 years, 1986–2016), although the estimates on which that calculations are based are surrounded by a high level of uncertainty.

The criteria for inclusion of the species in Appendix I set forth in Resolution Conf 9.24(Rev. CoP17) **are not met** because **a)** there is no marked decline nor observed or ongoing nor inferred or projected and **b)** trade is substantially decreasing and is not a cause of the decline of the species.

a) No marked decline

The 2008 IUCN Red List Assessment (Lewison & Oliver 2008) described the Common Hippopotamus (*Hippopotamus amphibius*) populations as Vulnerable, reporting alleged population declines in the mid 1990s and early 2000, and estimated Hippo populations to be approximately 125,000 and 148,000, with half of the 29 countries in which Common Hippos were found reporting alleged declines.

The 2017 Red List Assessment (Lewison, R. & Pluháček, J. 2017) yielded a lower population estimate, on the order of 115,000-130,000 Hippos, and suggested that the observed downward shift in total population size was likely reflecting overestimated population sizes from some countries in the 2008 Red List Assessment and that a change in the Risk Category classification of Common Hippos was not warranted.

In reality, a substantial increase in hippo populations compared to the estimates reported in the IUCN Red List Assessment (Lewison, R. & Pluháček, J. 2017) occurred in many Range States, as well as better and sometime species-specific surveys as illustrated in the table overleaf which compares data from some countries as reported in Table 1 of the Proposal (basically data from Lewison, R. & Pluháček, J. 2017, Supplementary Information) and data available from literature or survey reports. The best current estimate deriving from these recent surveys could be in the range of 162,000-192,000 hippos in Africa, and still could represent an underestimate due to lack of surveys and unsuitable methodologies used as explained further on.

Mistakenly, the proponents have confused the intrinsic decline needed for a Vulnerable status under the IUCN Red List Criteria (IUCN 2012) with the definition of "marked decline" contained in Resolution Conf.9.24 (Rev.CoP17).

This is a gross misinterpretation of both the IUCN Red List Criteria and the CITES Resolution as not only there is no automatism for which a species categorized as Vulnerable (or whatever category for what it counts for) by the IUCN Red List has automatically a marked decline in accordance with CITES Resolution Conf.9.24 (Rev.CoP17). Moreover, the proposal also wrongly states that the species in question has a low reproductive rate being, on the contrary, capable of very high growth rates in irregular cycles of decline and increase as suggested by a variety of scientific studies (see especially Chansa et al. 2011, in the reference section).

Furthermore, the accuracy of historical population estimates makes it difficult to accurately track long-term population trends or determine if there has been a true marked decline in the wild population, which is the basis of criterion C of Resolution Conf. 9.24 (Rev.CoP17).

Importantly, all the data reported here are publicly available (contrary to what has been asserted in the proposal that no new survey were available for a series of countries), with the exception of the TAWIRI (Tanzania) survey reports of 2015 which however can be easily requested from TAWIRI.

Table 1: Updated population estimates of Common Hippopotamus (*Hippopotamus amphibius*) in selected countries

Country	Estimated Population Size in Lewison, R. & Pluháček, J. 2017	Updated population estimates, source and comments
Cameroon	***1,500-2,000***	**3,827-4,424** *Management Plan of Hippo in Cameroon (in French)* AC28 Doc 9.3 https://cites.org/sites/default/files/eng/com/ac/28/E-AC28-09-03-A1.pdf.
Democratic Republic of Congo	***5,000***	**Garamba NP 3000** (Kujirakwinja et al 2016) **Virunga NP 2500 (**Hillman-Smith 2018) These two National Parks covers about 13,000km^2 out of a total country area of 2,344,275km^2 (www.protectedplanet.net/en) Likely **more than 5,000** hippos are present in the whole country. Recently Hippo presence has been documented in the capital Kinshasa. https://photocontest.smithsonianmag.com/photocontest/detail/hippo-near-our-home-along-the-congo-river/
Kenya	***5,000-7,000***	In Masai Mara **4,200** in 2009. (Kanga et al 2011) In Lake Naivasha minimum **700-1000** in 2021 Source: National Geographic: Human-hippo conflicts are exploding in this pristine patch of Kenya Likely more than 7,000 hippos are present in the country.
Rwanda	***1,000***	**1751 counted in Akagera NP in 2021** https://twitter.com/AkageraPark/status/1493465095858499585. The status in the rest of the country is unknown.
Tanzania	***20,000***	**41,000-45,000(? Or more?)** Selous 31,086 (CL 26,152-36,020) (TAWIRI 2019) Katavi 4,500 ground count 2010 (Timbuka 2012) 2000-3000 aerial 2014 (TAWIRI 2015) Ruaha-Rungwa 2000 (TAWIRI 2015) Malagarasi-Muyowosi 3,500 (TAWIRI 2015) The above surveys are limited to major protected areas and excluding major such as Victoria, Tanganyika, Burigi, Rukwa, Manyara and Babati and major rivers. The countrywide population can possibly be greater than 50,000 individuals.
Botswana	***2,000-4,000***	**13,232 (CL 11,231-15,233)** (Chase et al. 2018), covering only northern Botswana. The countrywide population can possibly be greater than 20,000 individuals.
Malawi	***3,000***	**2,500** Liwonde National Park (African Parks Annual Report 2020) Likely more than 3,000 in the country.

Mozambique	***3,000***	**>8,000** (ANAC 2017). Data in the NDF presented at the 69th CITES Standing Committee Annex 4 of Doc 30. https://cites.org/sites/default/files/eng/com/sc/69/E-SC69-30.pdf
South Africa	***7,000***	**11,061** (Eksteen et al 2016)
Eswatini (Swaziland)	***150***	Included in the estimates for South Africa.
Zambia	***40,000-45,000***	Unpublished reports from hippo surveys along the Luangwa River found that drones estimate 24% more hippos than the numbers regularly counted with ground counts. (DNPW ZM Maimbo, H and Simpamba, T. 2019).
Zimbabwe	***5,000***	Likely more than 5,000 countrywide. Matusadona National Park **>2,100** (African Parks Annual Report 2021) Sebungwe **665** (2014 National Aerial Survey) Zambezi Valley **2921**(2014 National Aerial Survey) Southeast Lowveld **529** (2014 National Aerial Survey) Zambia and Zimbabwe did a hippopotamus ground and aerial survey between September and October 2022 along a stretch of the Zambezi River. The data is currently being analyzed and a report will be shared after completion of the survey analysis. Preliminary results show a high observation frequency of hippopotamus in the Rukomechi-Sapi zone followed by Chewore-Luangwa, Chirundu-Rukomechi and Sapi-Chewore.
CL= Confidence Limit **47,000 - 52,000 more than estimated by RL assessment. Populations are much greater due to large un-surveyed areas and underestimates from commonly used survey methodologies. Best estimate 162,000-192,000 (most likely still an underestimate)**		

In the selected countries shown in the table above, there has been an increase of more than 30% in hippo populations compared with the estimates of the IUCN (2017) Red List assessment.

Therefore, the decline has been incorrectly reported in the proposal.

Importantly, the most updated surveys can be plagued by underestimates with the exceptions perhaps of the Zambian and Mozambican estimates. Indeed, much of the hippo population data in Africa originates from fixed-wing, Systematic Recognition Flight (SRF) aerial surveys, which can be inaccurate (See for example, Kujirakwinja 2010, ANAC 2017, Inman 2019) and produces underestimates.

ANAC 2017 stated "*Aerial surveys carried out with the Systematic Reconnaissance Flight (SRF) methodology are not suitable for counting Hippos and crocodiles and other species associated with aquatic habitats such as the sitatunga (Tragephalus spekei) and they are likely to produce unreliable data due to the meandering nature of the rivers and lakes and the numerous turns and manoeuvres the pilot would be required to make. Helicopter surveys with photographs and ground counts are the preferred methodologies for hippo counts (Jachmann 2001). Because population estimates from aerial surveys for large wildlife tends to underestimate the true numbers (Stalmans et. al 2014) and vary due to study-specific factors such as observers and habitat, caution should be taken when interpreting the results of surveys and analyzing trends (Schlossberg et al. 2016).*

Kujirakwinja 2010, and Inman et al 2019 and 2021 mentioned the same constraints as above.

Hippos are inherently difficult to count because of their aquatic lifestyle and behavior, and ground counts (although dangerous) have been one of the methods that produced the most reliable estimates. Zambia for example have used regular annual ground counts of hippo, using the total river bank foot count method, along the Luangwa River since 1976, (and irregularly since the 1950s) making them of the longest wildlife monitoring exercise existing in Africa (Chomba *et al.* 2012). Insert a line re what this method has produced vs other methods that may be more widely cited when referencing the Zambia population.

In recent years drones are more and more used in local hippo surveys opening new possibilities for regular hippo populations monitoring. They usually have low impact, are relatively low cost, have consistent flight paths, allow remote operation away from wildlife, and enable monitoring of areas inaccessible by land or boat. Hippos were counted using drones, in the Democratic Republic of Congo (Lhoest 2015, Lhoest et al 2015, Linchant 2018) in South Africa (Fritsch & Downs 2020), in Botswana (Inman et al. 2019) and in Zambia, where

it has been tested since 2019 in the annual hippo counts along the Luangwa River producing estimates of about 24% higher than ground counts (Maimbo, H and Simpamba, T. 2019).

The above is a clear indication of the unreliable, conservative estimates contained in the IUCN (2017) Red List assessment.

It therefore appears that the hippo Red List Assessment is in need of review, based on the improved knowledge on the population status in many countries. Not only the estimates in the IUCN assessment are incorrect but clearly the trends are not reliable as already pointed by Mozambique in its NDF (ANAC 2017) presented to the 69th meeting of the CITES Standing Committee, where it requested the IUCN Hippo Specialist Group to review the estimates and the status of the species in the country following the results of its 2016 specialized hippo survey.

The listing proposal relies only on these estimates and is not well researched. Most likely if reassessed now the species would qualify for a Near-threatened or even Least Concern status in most of its range rather than the current Vulnerable classification status.

It would be advisable if IUCN would re-assess the hippo status after assisting Range States in conducting surveys of hippo populations with proper and reliable methodologies in representative ecosystems in each Range State. However, as per the summary presented here, the IUCN Red List estimates (Lewison & Pluháček, 2017) clearly under-estimate the current population, and thus the argument for a reduction in population based on these incorrect estimates is grossly misleading.

Based on the information reported here, the species do not meet the criteria for Appendix I of Resolution Conf. 9.24 (Rev. CoP17).

b) Trade is substantially decreasing and is not a cause of decline of the species.

Indications from the recent TRAFFIC report (Moneron, S. & Drinkwater, E. 2021) on the trade in hippo ivory suggests that the quantity traded has decreased between 2009 and 2018, contrary to concerns raised by Benin that the trade in hippo ivory may increase as a substitute for elephant ivory as countries/territories globally implement stricter legislation around the trading in elephant ivory, see Moneron, S. & Drinkwater, E. (2021). *The Often-Overlooked Ivory Trade: A Rapid assessment of the international trade in hippo ivory between 2009 and 2018. TRAFFIC, Cambridge, UK.* Retrieved from https://www.traffic.org/site/assets/files/14405/the_often_overlooked_ivory_trade.pdf. This report appears more accurate and unbiased than the proposal in analyzing trade data.

ANAC 2017 reports that: *"the intrinsic rate of increase of populations ranges between 8% and 11% (Marshall & Sayer, 1976) and higher rates are recorded with a decrease in the rate of increase as the population approaches carrying capacity (K) (Chomba et al. 2012 and 2014). However, populations sizes can increase and decrease irregularly. In a long-term study in the Luangwa valley (Zambia) the population size and density fluctuated between 5000 (density 29/km) and 7000 individuals (density 42/km) respectively, in 9 irregular cycles of 5 times below K, with each cycle lasting roughly 4 years, and 4 times above K with each cycle lasting roughly 7 years (Chomba et al. 2012 and 2014). Rainfall is assumed to be an important factor in determining the common hippopotamus populations by influencing primary production (grass) and its availability (Lewison 2007, Chansa et al., 2011 and 2012).*

Smuts & Whyte (1981) describe the reproductive strategy of the hippo as one well adapted to the semi-arid environments of Africa. When resources become limiting, populations remain stable by delayed sexual maturity and fecundity and so adjust to the carrying capacity of the environment. Equally, populations are capable of rapid increase when resources become abundant."

Therefore, the 1% offtake modelled by Lewison (2007) quoted in Moneron, S. & Drinkwater, E. (2021) is misplaced and erroneously used for two reasons; a) the model of Lewison (2007) does not take into account comprehensively researched population growth rates reported above and b) to use trade data to calculate offtake (harvest) in a given population is not appropriate given the many variables associated with trade data, such as, for hunting trophies, time taken to prepare a trophy for shipment and trophies that come from hunts conducted towards the end of the year are not likely to be exported in that year and reported only at the year of export leading to a misjudgment of harvest levels and the fact that the CITES Trade Database is at least outdated by two years.

Hippos can withstand maximum sustainable offtakes at a level close to their normal population growth rate (10% Martin & Thomas, 1991 quoted in ANAC 2017).

A substantial portion of the trade in the period 2009-2018 is represented by an auction of 3,5 tonnes (12,467 teeth) of stockpiled hippo teeth made by the Tanzania Government in 2018 and not reported in the proposal although it is reported by Moneron, S. & Drinkwater, E. (2021). Other source here: https://www.thecitizen.co.tz/tanzania/news/national/auction-of-3-5-tonnes-of-hippo-teeth-jan-29-2620912. This stockpile was obtained from natural death and problem animal control for many years. Also document AC31 Doc.13.4 Annex 2 in which hippo was selected because of a sharp increase in the exports from Tanzania, suffers from a lack of knowledge by its authors (UNEP-WCMC) about the 2018 Tanzania auction.

Probably also teeth from Malawi that entered into international trade in the 2009-2018 period were part of a stockpile.

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