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

Sixty-ninth meeting of the Standing Committee
Geneva (Switzerland), 27 November – 1 December 2017

Interpretation and implementation matters

General compliance and enforcement

REVIEW OF SIGNIFICANT TRADE IN SPECIMENS OF APPENDIX-II SPECIES

1. This document has been prepared by the Secretariat.

Background

2. The role and responsibilities of the Standing Committee in conducting the Review of Significant Trade in specimens of Appendix-II species are described in paragraph 1 k) to p) and paragraph 2 of Resolution Conf. 12.8 (Rev. CoP17) on *Review of Significant Trade in specimens of Appendix-II species*.

3. They can be summarized as follows: Following consultation with the members of the Animals or Plants Committee through the Chairs, the Secretariat informs the Standing Committee about whether the recommendations formulated by the Scientific Committees to ensure compliance with Article IV for trade in selected Appendix-II species have been implemented or not by the range State concerned. On the basis of the report of the Secretariat, the Standing Committee decides on appropriate actions in instances where implementation was not satisfactory, and makes recommendations to the State concerned, or to all Parties. The Standing Committee is also to review recommendations to suspend trade that have been in place for longer than two years, and to address problems identified in the course of the review process that are not related to the implementation of Article IV, paragraph 2 (a), 3 or 6 (a).

4. The cases for review contained in the present document all concern fauna, and were selected for review after the 14th or 15th meetings of the Conference of the Parties (CoP14, The Hague, 2007; CoP15, Doha, 2010). As per Resolution Conf. 12.8 (Rev. CoP17), the members of the Animals Committee have been consulted on all of the following cases.

5. **Following CoP14**, the Animals Committee selected cases concerning fauna at its 23rd and 24th meetings (AC23, Geneva, April 2008; AC24, Geneva, April 2009), which were reviewed by the Standing Committee, at its 62nd, 63rd, 65th and 66th meetings (SC62, Geneva, March 2013; SC63, Bangkok, March 2013; SC65, Geneva, July 2014, SC66, Geneva, January 2016).

   a) SC62 determined that Mozambique had not implemented the Animals Committee recommendations for *Hippopotamus amphibius* and trade was suspended on 7 September 2012 (Notification to the Parties No. 2012/057).

   b) SC63 recommended that trade in *Pandinus imperator* from Togo be suspended until that country demonstrated compliance with Article IV, paragraphs 2 (a) and 3 for this species, and provided full information to the Secretariat regarding compliance with the recommendations of the Animals Committee (Notification No. 2013/13).

   c) Both trade suspensions were reviewed and retained at SC66. Based on the submission of recent information, and in consultation with the members of the Animals Committee through the Chair, the status of implementation of the Animals Committee's recommendations in relation to these two

species/range States combinations are reviewed and discussed in paragraphs 7 and 8 below, and in Annex 1. Additional comments and recommendations from the Animals Committee on the two reviews are included in Annex 2 to this document.

6. **Following CoP15**, the Animals Committee selected cases at its 25th meeting (AC25, Geneva, July 2011), which were reviewed by the Standing Committee at its 66th and 67th meetings (SC66, Geneva, January 2016; SC67, Johannesburg, September 2016).

   a) At SC66, the Standing Committee congratulated Malaysia for the progress achieved in implementing recommendations a) and b) for *Python reticulatus*, and encouraged the range State to finalize the implementation of recommendations c) and d) by 2 June 2016.

   b) At SC66, the Standing Committee congratulated Thailand for the progress achieved in implementing the recommendations a), b) and c) of the Animals Committee for *Hippocampus trimaculatus*, noting however that recommendations d) and e) have not been implemented within the agreed timeframe. Thailand was requested to finalize the implementation of recommendations d), e), f) and g) by 2 June 2016.

   c) At SC67, the Standing Committee urged Togo to establish export quotas for *Chamaeleo gracilis* and *Kinixys homeana*, and to implement all outstanding recommendations by 2 June 2017. The Standing Committee's recommendations can be found in document SC67 Summary record.

   d) The species/range states combinations indicated above, and the status of implementation of the recommendations, are discussed in paragraphs 9 to 12 below, and in Annex 1 to this document. Additional comments and recommendations from the Animals Committee in relation to *Python reticulatus* and the two species from Togo are included in Annex 2 to this document.

Cases selected for review following CoP14

7. **Mozambique*: Hippopotamus amphibius***

   Background to the case

   a) The Animals Committee selected *Hippopotamus amphibius* for the Review of Significant Trade at AC23. Mozambique did not provide a response to the consultation by the Secretariat, and at AC24, the Animal Committee retained the species/range State combination in the Review of Significant Trade based on concerns of declining populations and increasing trade. At AC25, the Animals Committee determined that trade in *H. amphibius* from Mozambique was of "possible concern" and formulated recommendations.

   b) In the absence of a reply from Mozambique, the Secretariat, following consultations with the Chairs of the Animals and Standing Committees, determined that Mozambique had not complied with the recommendations. At SC62, the Standing Committee took the decision to suspend trade in *H. amphibius* from Mozambique. The suspension entered into force on 7 September 2012 (Notification to the Parties No. 2012/057).

   c) The case was reviewed at SC66 (see document SC66 Doc. 31.2), and the suspension was maintained. At that meeting, Mozambique informed that it was undertaking research on the status and management of *H. amphibius* in response to the Review of Significant Trade recommendations, and that it would share the results with the Secretariat and the Standing Committee when concluded.

   Response from range State

   d) In May 2017, Mozambique provided two documents to the Secretariat in order to initiate the procedure outlined in paragraph o) of Resolution Conf. 12.8 (Rev. CoP17), and for the Standing Committee to consider withdrawing the trade suspension for *H. amphibius*. The submission consisted of the study "Status, management and Non-Detriment Finding for *Hippopotamus amphibius* (Common Hippopotamus) in Mozambique", which is presented in Annex 4 to this document in the language and format as received; and of a report entitled "Study of the distribution, abundance and conservation status of common hippopotamus (*Hippopotamus amphibius*)" (BassAir 2017). The latter contains the results of a hippo-focused national aerial survey that was conducted in 2016. Mozambique has

requested that this report be treated as confidential, although the results of the survey are presented in the document contained in Annex 4.

Determination of implementation

e) The original recommendations by the Animals Committee and any previous decisions by the Standing Committee, a summary analysis of the information submitted by Mozambique in response to these recommendations, and the evaluation thereof by the Secretariat, following consultation with members of the Animals Committee through the Chair, are presented in Annex 1. The Animals Committee has made further detailed comments and recommendations that can be found in Annex 2.

f) Based on the above, the Secretariat, has determined that Mozambique has implemented recommendations a), b) and c) of the Animals Committee.

8. **Togo: *Pandinus imperator***

Background to the case

a) The Animals Committee selected *Pandinus imperator* for the Review of Significant Trade at AC24. It determined that the trade in *P. imperator* from Togo was of "possible concern" and formulated recommendations at AC26.

b) In June 2012, the Management Authority of Togo acknowledged receipt of the recommendations, but no further communication was received, so at SC63, the Standing Committee agreed with the determination of the Secretariat and the Chair of the Animals Committee that recommendations a) and b) had not been complied with. Trade in *P. imperator* from Togo was subsequently suspended until that country demonstrated compliance with Article IV, paragraphs 2 (a) and 3 for this species, and provided full information to the Secretariat regarding compliance with the recommendations of the Animals Committee (see Notification No. 2013/13).

c) The suspension was reviewed at SC66, and maintained on the basis that further information was required to demonstrate that intended exports would not be detrimental to the survival of the species in compliance with Article IV of the Convention (see Notification 2014/039). Concerns were also raised about the status of the species in Togo, high quotas, and levels of trade in ranched and wild-sourced specimens from the country prior to the trade suspension, with quotas apparently exceeded.

d) At SC67, document SC67 Doc. 15 Annex 3 was discussed in relation to the Review of Significant Trade concerning *Chamaeleo gracilis* and *Kinixys homeana* from Togo, but it also provided some information on *P. imperator*. This document is now re-examined in light of the current trade suspension of *P. imperator* from Togo.

Response from range State

e) Togo presented at SC67 a study that determined that the current collection quota of 16,500 ranched specimens and 1,000 wild specimens was not detrimental. The study further recommended that an increase in the annual export quota of *P. imperator* of live ranched specimens from 16,500 to 20,000 would not be detrimental.

Determination of implementation

f) The original recommendations by the Animals Committee and any previous decisions by the Standing Committee, a summary analysis of the information submitted by Togo in response to these recommendations, and the evaluation thereof by the Secretariat, following consultation with members of the Animals Committee through the Chair, are presented in Annex 1. While acknowledging that Togo has made efforts to address some of the recommendations, the Animals Committee has made some additional comments and recommendations that may be of assistance to Togo in addressing more precisely the concerns of the Animals Committee (see Annex 2).

g) Based on the above, the Secretariat has determined that Togo has not implemented the Animals Committee's recommendations. However, recommendations b) and c) have been partially implemented.

Cases selected for review following CoP15

9. **Malaysia: *Python reticulatus***

Background to the case

a) The Animals Committee selected *Python reticulatus* for the Review of Significant Trade at AC25. Malaysia provided a response to the consultation for AC26, but was retained in the review process. The Animals Committee determined that trade in *P. reticulatus* from Malaysia was of "possible concern", and formulated recommendations at AC27.

b) Malaysia submitted full information addressing the short-term recommendations of the Animals Committee, which were to be implemented by 31 August 2014. At SC66, the Standing Committee congratulated Malaysia for the progress achieved in implementing recommendations a) and b), and encouraged it to finalize implementation of recommendations c) and d) by 2 June 2016.

Response from range State

c) On 2 June 2016, Malaysia submitted a study entitled "Information in Peninsular Malaysia's Non-Detriment Findings approach for trade in reticulated python (*Python reticulatus*) skins" as a response to recommendations c) and d) of the Animals Committee. This study is presented in Annex 5 to this document. Other available information was taken into consideration during this review, including the following:

i) AC29 Doc. 31.1 *"Non-Detriment Findings for snakes: guidance for CITES Scientific Authorities";*

ii) AC29 Inf. 16 *"Sustainable management of the trade in reticulated python skins in Indonesia and Malaysia"; and*

iii) AC29 Inf. 17 *"Trade in python skins: Impact on livelihoods in Peninsular Malaysia."*

Provisional assessment by the Secretariat

d) The original recommendations by the Animals Committee and any previous decisions by the Standing Committee, a summary analysis of the information submitted by Malaysia in response to these recommendations, and the evaluation thereof by the Secretariat, following consultation with members of the Animals Committee through the Chair, are presented in Annex 1. The Animals Committee has made further detailed comments and recommendations that can be found in Annex 2.

e) Based on the above, the Secretariat has determined that Malaysia has implemented the outstanding recommendations c) and d) of the Animals Committee.

10. **Thailand: *Hippocampus trimaculatus***

Background to the case

a) The Animals Committee selected *Hippocampus trimaculatus* for the Review of Significant Trade at AC25. It determined that trade in *H. trimaculatus* from Thailand was of "urgent concern" and formulated recommendations at AC27.

b) At SC66, the Standing Committee congratulated Thailand for the progress achieved in implementing recommendations a), b) and c) of the Animals Committee, noting however that recommendations d) and e) had not been implemented within the agreed timeframe. Thailand was requested to finalize the implementation of recommendations d), e), f) and g) by 2 June 2016.

c) At SC67, Document SC67 Doc. 15 Annex 2 was discussed in relation to three other species of *Hippocampus* from Thailand (*H. kelloggi, H. kuda and H. spinosissimus*). The outcome of SC67 was that the Standing Committee recommended that Thailand be removed from the Review of Significant Trade process concerning *H. kelloggi, H. kuda* and *H. spinosissimus*, recognizing that Thailand suspended the exportation of specimens of *Hippocampus* spp. from 1 January 2016 until further notice; and that Thailand inform the Secretariat and the Chair of the Animals Committee about any change in the trade suspension for *H. kellogi, H. kuda and H. spinosissimus*, together with a justification, for their

agreement (SC67 Summary record). As this suspension covers all *Hippocampus* species, it would also apply to *Hippocampus trimaculatus.*

Response from range State

d) Document SC67 Doc. 15, Annex 2, included information on *Hippocampus*-related research activities that took place in the country in 2013 and the first half of 2014 in the context of an international research project entitled "Implementing CITES for Seahorses in Thailand", a collaboration between Project Seahorse (University of British Columbia) and the Thai Department of Fisheries. Some of these activities are also relevant to the recommendations made by the Animals Committee concerning *H. trimaculatus*. The document also provided some specific information on *H. trimaculatus*, including a letter from Thailand dated 27 May 2016, with details relevant to recommendations d) to g). This information is now re-examined in light of the on-going review of this species from Thailand.

Provisional assessment by the Secretariat

e) The original recommendations by the Animals Committee and any previous decisions by the Standing Committee, a summary analysis of the information submitted by Thailand in response to these recommendations (contained in SC67 Doc. 15 Annex 2), and the evaluation thereof by the Secretariat, following consultation with members of the Animals Committee through the Chair, are presented in Annex 1.

f) The Secretariat, in consultation with members of the Animals Committee through the Chair, has determined that based on information that Thailand submitted to SC67 and on previous occasions, that recommendations d) to g) have not or not sufficiently been acted upon. However, subject to confirmation from Thailand that the suspension of exports of *Hippocampus* spp. remains in force, *Hippocampus trimaculatus* could be removed from the review subject to the same condition as for *H. kelloggi, H. Kuda* and *H. spinnossima,* which is to say that Thailand must inform the Secretariat and the Chair of the Animals Committee about any change in the trade suspension for *H. trimaculatus*, together with a justification, for their agreement.

11. **Togo: *Chamaeleo gracilis***

Background to the case

a) The Animals Committee selected *Chamaeleo gracilis* for the Review of Significant Trade at AC25. At AC27, it determined that trade in *C. gracilis* from Togo was of “urgent concern” and formulated recommendations.

b) At SC66 (see document SC66 Doc. 31.1), the Secretariat explained that it had received no information from Togo in relation to the implementation of the recommendations of the Animals Committee for *C. gracilis*. The Secretariat, in consultation with the Chair of the Animals Committee, therefore recommended that the Standing Committee should recommend that all Parties suspend trade in specimens of *C. gracilis* from Togo until that country demonstrated compliance with Article IV, paragraphs 2 (a) and 3, and provided full information to the Secretariat regarding compliance with the recommendations of the Animals Committee.

c) At SC67, document SC67 Doc. 15, including SC67 Doc. 15 Annex 3, which contained a study on four species of fauna subject to international trade in Togo, including *C. gracilis*, was considered. The Standing Committee requested Togo to establish export quotas for *C. gracilis* for 2017 of 2,500 live specimens of ranched origin, and 500 live specimens of wild origin; and urged Togo to implement recommendations d) to i) by 2 June 2017 (see Annex 1 of document SC67 Doc. 15). It should be noted that SC67 Doc. 15 determined that recommendation c) was only partially implemented and so is also considered in this current review.

Response from range State

d) Togo established export quotas for *C. gracilis* for 2017 of 2,500 live specimens of ranched origin, and 500 live specimens of wild origin. These quotas were published on 6 March 2017, but Togo did not request the inclusion of the size restriction of a maximum snout to vent length of 8 cm for live specimens of source code R to be exported, as requested under recommendation f).

e) No other new information has been received concerning the implementation of recommendations d) to i) since SC67.

Provisional assessment by the Secretariat

f) The original recommendations by the Animals Committee and any previous decisions by the Standing Committee, a summary analysis of the information submitted by Togo in response to these recommendations (contained in SC67 Doc. 15 Annex 3), and the evaluation thereof by the Secretariat, following consultation with members of the Animals Committee through the Chair, are presented in Annex 1. The Animals Committee has made further detailed comments and recommendations that can be found in Annex 2.

g) The Secretariat, in consultation with the members of the Animals Committee through the Chair, has determined that Togo has yet to fully implement recommendation c) and has not yet implemented recommendations d) to i) of the Animals Committee.

12. **Togo: *Kinixys homeana***

Background to the case

a) The Animals Committee selected *Kinixys homeana* for the Review of Significant Trade at AC25. At AC27, it determined that trade in *K. homeana* from Togo was of "possible concern" and formulated recommendations.

b) In document SC66 Doc. 31.1, prepared for consideration at SC66, the Secretariat explained that it had received no information from Togo in relation to the implementation of the recommendations of the Animals Committee for *K. homeana*. The Secretariat, in consultation with the Chair of the Animals Committee, therefore recommended that the Standing Committee should recommend that all Parties suspend trade in specimens of *K. homeana* from Togo until that country demonstrated compliance with Article IV, paragraphs 2 (a) and 3, for this species, and provided full information to the Secretariat regarding compliance with the recommendations of the Animals Committee.

c) At SC67, document SC67 Doc. 15 Annex 3, which contained a study on four species of fauna subject to international trade in Togo, including *K. homeana*, was considered. The Standing Committee requested Togo to establish export quotas for *K. homeana* for 2017 of 400 live specimens of ranched origin with a size limit of less than 10 centimetres, and zero of wild origin for 2017; and urged Togo to implement recommendations c) to h) by 2 June 2017 (see Annex 1 of document SC67 Doc. 15). It should be noted that SC67 Doc. 15 determined that recommendation d) was only partially implemented and so is also considered in this current review.

Response from range State

d) Following the request by SC67, Togo established export quotas for *Kinixys homeana* for 2017 of 400 live specimens of ranched origin, and zero of wild origin for 2017. These quotas were published on the 6th March 2017. However, Togo did not request that the size restriction recommended by SC67 be included with the quota and these are [therefore] not included in the quotas listed on the Secretariat's web page.

e) No new information has been received concerning the implementation of recommendations c) to h).

Provisional assessment by the Secretariat

f) The original recommendations by the Animals Committee and any previous decisions by the Standing Committee, a summary analysis of the information submitted by Togo in response to these recommendations (contained in SC67 Doc. 15 Annex 3), and the evaluation thereof by the Secretariat, following consultation with members of the Animals Committee through the Chair, are presented in Annex 1. The Animals Committee has made further detailed comments and recommendations that can be found in Annex 2.

g) The Secretariat, in consultation with the members of the Animals Committee through the Chair, has determined that Togo has yet to implement recommendations c) to h), with the exception of recommendation d) which SC67 deemed to have been partially implemented.

Problems identified by the Animals and Plants Committees not related to the implementation of Article IV, paragraph 2 (a), 3 or 6 (a).

13. Resolution Conf. 12.8 (Rev. CoP17) paragraph 2 directs the Standing Committee to address problems identified in the course of the review process that are not related to the implementation of Article IV, paragraph 2 (a), 3 or 6 (a), in accordance with other provisions of the Convention and relevant Resolutions. In this regard, cases identified during the 29th meeting of the Animals Committee and the 23rd meeting of the Plants Committee are presented in Annex 3 for consideration by the Standing Committee.

Review of recommendations to suspend trade that have been in place for longer than two years

14. Under Resolution Conf. 12.8 (Rev. CoP17) paragraph 1 p), the Standing Committee, in consultation with the Secretariat and the Chair of the Animals and/or Plants Committee, shall review recommendations to suspend trade that have been in place for longer than two years, evaluate the reasons why this is the case in consultation with the range States, and if appropriate, take measures to address the situation. Such reviews have taken place on an irregular basis, at SC57, SC59, SC62 and most recently at SC66 (see document SC66 Doc. 31.2). The Secretariat reports that it will provide the next full report for consideration at SC70.

Progress on the implementation of Decisions 17.108 to 17.110

15. At CoP17, the Conference of the Parties adopted Decisions 17.108 to 17.110 on the *Review of Significant Trade* as follows:

Directed to the Secretariat

17.108 *The Secretariat, within six months of the adoption of Resolution Conf. 12.8 (Rev. CoP17) on* Review of Significant Trade in specimens of Appendix-II species *and building on the work done to date, shall develop, test and establish a Review of Significant Trade Tracking and Management database as an essential tool for the effective implementation and transparency of the process.*

17.109 *The Secretariat, subject to the availability of funds, within six months of the adoption of Resolution Conf. 12.8 (Rev. CoP17), shall develop a user-friendly guide to the Review of Significant Trade that can also be included in the initial letter to range States.*

17.110 *The Secretariat, subject to the availability of funds, within nine months of the adoption of Resolution Conf. 12.8 (Rev. CoP17), shall develop a comprehensive training module on the Review of Significant Trade (including case studies as appropriate).*

16. The Secretariat is pleased to report that funding has been secured to move all of the Decisions related to the Review of Significant Trade forward. The Secretariat would particularly like to acknowledge the generous support of the European Union in this regard.

17. Concerning Decision 17.108, some progress has already been made. Taking into account the new Review of Significant Trade process, as well as the technological advances in electronic document management, the Secretariat will develop a new, in-house Review of Significant Trade (RST) tracking and management database system, with a focus on improving the user friendliness, particularly for Parties that are subject to the Review of Significant Trade. The development of this new system will require highly experienced semantic web technology professionals, and the allocation of substantial time to carefully plan and execute the required tasks. The Secretariat developed a realistic project plan and timeframe, as outlined in document AC29 Inf. 19/PC23 Inf. 13. The work plan has been revised in light of comments from the scientific Committees and the Secretariat is making progress in moving the project forward. There will likely be a continuous process of development and improvement over the coming years. However, as an interim measure, the CITES Secretariat has developed a tabular system and made this searchable under various parameters (including Party, taxonomic order, phases/stages and meeting). This interim tool is available on the CITES website (https://cites.org/eng/imp/sigtradereview/interim_rst_system).

Recommendations

18. The Standing Committee is invited to adopt the recommendations made by the Secretariat detailed in Annex 1 of the present document, and take note of the additional comments and advice issued by the Animals Committee contained in Annex 2.

19. The Secretariat recalls that at its 59th meeting (SC59, Doha, March 2010), the Standing Committee noted that any recommendations that it made to suspend trade under the Review of Significant Trade applied only to trade covered by Article IV of the Convention, and not to trade covered by Article VII. That is to say they do not apply to specimens of animal species bred in captivity or of plant species propagated artificially – sources “C” and “A”.

20. The Standing Committee is invited to consider where action is needed in the cases referred by the Animals and Plants Committees presented in Annex 3.

21. The Standing Committee is invited to take note of the information presented in paragraphs 14 to 17.

RECOMMENDATIONS OF THE ANIMALS AND STANDING COMMITTEE FOR SPECIES SELECTED FOR THE REVIEW OF SIGNIFICANT TRADE; RESPONSES FROM RANGE STATES; DETERMINATION OF IMPLEMENTATION AND RECOMMENDATIONS TO THE STANDING COMMITTEE

Recommendations of the AC, and previous decisions of the SC where these exist	Summary of responses from range States	Determination of implementation and actions recommended
***Hippopotamus amphibius* (Common hippopotamus)**		
<u>Mozambique (MZ) (Possible concern)</u> <u>Within 90 days (by 4 January 2012):</u> a) The Management Authority should provide an explanation of the 'internal system of annual quotas' and other management measures in place, and clarify the perceived discrepancies between reported Customs data (imports) and CITES data (exports) referred to in document AC25 Doc 9.4; b) Information derived from the national survey undertaken in 2008 on the distribution, abundance and conservation status of *H. amphibius* in MZ, including details of methodologies employed; and c) Justification for, and details of, the scientific basis by which it has been established that the quantities of *H. amphibius* exported were not detrimental to the survival of the species and in compliance with Article IV, paragraphs 2 (a) and 3. *At its 62nd meeting (SC62, Geneva 2012), the Standing Committee recommended suspension of trade in* Hippopotamus amphibius *from Mozambique. The suspension entered into force on 7 September 2012. It was reviewed at SC66 (Geneva, 2016) and maintained.*	- Mozambique provided two documents in May 2017, in response to the consultation letter from the Secretariat: (1) a report entitled "Status, management and Non-Detriment Finding for *Hippopotamus amphibius* (Common Hippopotamus) in Mozambique", and (2) a report entitled "Study of the distribution, abundance and conservation status of common hippopotamus (*Hippopotamus amphibius*)", which is the final report of the 2016 hippo-focused aerial survey (BassAir 2017). Mozambique has requested that the BassAir report be treated as confidential, although the results of this survey are presented in the NDF document. - Mozambique's NDF for hippo, including details concerning the overall status of the species in the country and the proposed management regime, will be adaptively implemented. The NDF concludes that the low level of off-take generated by sport hunting is not detrimental to the survival of the species, and the amount of revenues generated are of crucial importance for the conservation of the species, particularly because of the benefits provided to local communities. The report also notes that the major threats to hippo populations in Mozambique are habitat modification and conflicts with humans. - The BassAir report concerns a hippo-focused national aerial survey, initiated by Mozambique's National Administration for Conservation Areas (ANAC) as part of the MOZBIO (World Bank) project, that was carried	<u>The Secretariat's and Animals Committee's determination regarding implementation of the recommendations</u> The recommendations of the Animals Committee have been complied with. <u>Actions recommended by the Secretariat</u> **The Standing Committee is invited to remove *Hippopotamus amphibius* from Mozambique from the Review of Significant Trade.**

	out between 20 November and 4 December 2016. The results of the survey estimate that there are around 7,300 individuals in the surveyed areas across Mozambique. The areas surveyed by Mackie et al. (2012) were resurveyed for consistency. Taking into account correction factors and the existence of other suitable areas of habitat, the minimum population of hippo is estimated to be greater than 8,000 individuals. The proposed maximum offtake of 80 animals (including problem animal controls and community quotas) represents 1% of the population. <u>Regarding recommendation a):</u> - Mozambique has confirmed that the hunting quota allocation will be limited to the hotspots identified in the 2016 hippo survey, specifically along the Rovuma-Lugenda rivers (in Niassa National Reserve), in the Cahora Bassa Dam and in the Zambezi river. The quota for sport hunting will be set at between 0.5% and 0.6% of the population (limited to adult males) found in the hunting areas. The maximum sustainable offtake is 80 individuals, which represents 1% of the estimated total population of 8,000. Previously (2009-2012), Mozambique's quotas for hippo were set at between 1.27% and 2.07% of the 2008 population estimate of 8388 (AGRECO, 2009). The revised quota is therefore more conservative than the previous one. Mozambique also provides clarification on the perceived discrepancies between reported customs data (imports) and CITES data (exports) referred to in document AC25 Doc. 9.4, which noted that more than twice the number of teeth of wild origin were reported by importers than reported by Mozambique. An analysis of the 2012 annual report determined that 12 "skulls" instead of 12 "teeth" were reported and appeared in 66 out of the 98 permits issued for 99 hippos that year. Noting that 12 teeth equates to one hippo, this may help to explain the discrepancies noted. <u>Regarding recommendation b):</u> Mozambique has not provided any information derived from the national survey undertaken in 2008	

	on the distribution, abundance and conservation status of *H. amphibius* in MZ, including details of methodologies employed. Instead, it has provided more up-to-date information from a hippo-focused aerial survey carried out in 2016, with comprehensive details of the methodologies employed. Regarding recommendation c): Mozambique has provided a detailed NDF that will cover a five-year period (2017-2022), but will be updated earlier if new information becomes available. The NDF acknowledges that there is no national management plan for the species, but states that work on this plan can now start thanks to funding received through the MOZBIO project. - In summary, the NDF document presented lays out in much detail the current situation of the population and compares it with earlier estimates and survey results done. In particular, it addresses the concerns linked to the estimate by the International Union for Conservation of Nature (IUCN) of around 18,000 animals that indicates a strong decline of the population of hippos in Mozambique. There appears to be good reasons to doubt those figures and they may have been an overestimate of the actual numbers. Concerning the current distribution, population size and threats to the species, those are very well presented and confirm an actually stable state of the population with more than 8,000 individuals. The proposed management of the species with a maximum harvest of 80 individuals, including eventual killings of problem animals, seems to be a sustainable harvest. In addition, the announcement of the establishment of national management plan as well as the continuation of the assessment of the population status are also good signs that a sustainable harvest programme is being implemented in line with the requirements of CITES.	

***Pandinus imperator* (Emperor scorpion)**		
Togo (TG) (Possible concern) <u>Within 90 days, the Management Authority should:</u> a) Inform the Secretariat that Togo will maintain an annual export quota at a level not higher than the current published export quota (1000 wild and 16,500 ranched specimens) and as a precautionary measure, maintain the current size restriction of a maximum total length of 10 cm (or maximum body length, excluding the tail, of 5 cm) of live specimens of source code R to be exported which should be published with the export quota; and b) Provide the CITES Secretariat with detailed information on the control measures used to differentiate between ranched and wild-caught specimens to ensure that the authorized exports of ranched specimens are not augmented by mis-declared wild specimens. <u>Within 2 years the Management Authority should:</u> c) Conduct a national status assessment, including an evaluation of threats to the species; and advise the Secretariat of the details and any management measures in place (highlighting where new management measures have been introduced to take into account any new information available on the status of the species in Togo); d) Establish revised annual export quotas (if appropriate) for wild taken and ranched specimens based on the results of the assessment; and e) Provide a justification for, and explanation of, the scientific basis by which it is determined that these quota(s) would not be detrimental to the survival of the species in the wild and are in compliance with Article IV, paragraphs 2 (a) and 3.	At SC67, Togo submitted a study concerning four species, including *P. imperator*, in response to the recommendations from the Animals Committee. <u>Concerning recommendation a):</u> No export quota has been notified, but this is understandable in light of the current trade suspension for this species from Togo. <u>Concerning recommendation b):</u> The recommendation has been partially implemented. The report provides some details on the ranching operations in Togo stating that, based on Ineich (2006), the species is exploited by ranching in an area defined for five consecutive years by the different breeding farms. However, section 4.1.1 on ranching does not mention any methods used for *P. imperator*. Some information on collection method is found in the section. The report creates some doubts over the production rates reported from ranching farms. For example, according to data in Table 10, of the six farms, four seem to have no animals or very few animals. Bearing in mind that it takes at least 8-10 months to produce specimens of a suitable size for export, there are question marks over the number of specimens that are claimed to have been exported. The report does not contain an explanation of how wild caught animals are kept apart from ranched specimens in the farms concerned, or what control measures are used to differentiate wild from ranched specimens in trade. The study notes that the distinction between C and R sources is generally not understood and that rigorous checks on entries and outputs from each establishment would not be possible. A permanent marking system has yet to be made available to differentiate between wild and ranched specimens.	<u>The Secretariat's and Animals Committee's determination regarding implementation of the recommendations</u> Recommendation b) and c) have been partially implemented. Recommendations a), d) and e) of the Animals Committee have not yet been complied with. <u>Actions recommended by the Secretariat</u> **The Standing Committee is invited to:** **(i) retain *Pandinus imperator* from Togo in the Review of Significant Trade, and** **(ii) urge Togo to fully implement recommendations a) to e) by 27 April 2018.**

	Concerning recommendation c): The recommendation has been partially implemented. The study states that "there are very abundant populations of this species in southern Togo and the species is quite frequent throughout the country" but there is no source given for this statement. An assessment of the population has been made, but more at a local level within the area of exploitation. The report bases assessment of the population on visits to six approved breeding farms and field surveys in the collection areas used by these farms to establish the trend and population status. Five areas, as listed in Table 9 were surveyed by identifying the number of scorpion "galleries" in a lane 50m in width with recorders spaced at 10m intervals, covering surface areas of 1 hectare. The number of individuals is estimated from the number of "galleries" present or if individuals were actually counted. It appears that all areas were fallow land. Data presented in the document on the abundance and densities of *Pandinus imperator* are given as between 122 to 147 individuals per hectare at Ahépé and 181 to 217 individuals per hectare at Adangbe. However, these figures are not further extrapolated in terms of the area of suitable or currently occupied habitat of the species. There is also no comparison of data from areas where no harvest is occurring with those where harvesting is carried out. This would allow for the confirmation of the report's conclusion that the harvest has no negative effect on the populations. Climate change and over-exploitation are identified as threats in the report. No details of any management measures are provided. Concerning recommendation d): The study asserts that the harvest has no negative effect on the populations, claiming that "the quota of 16,500 for Togo, appears to be well adapted to the potential production and the international demand", and that the export quota for ranched specimens could even be increased. It concludes that an increase to 20,000 ranched specimens would not be detrimental to the	

	survival of the species, but does not back this statement up with supporting information. Concerning recommendation e): The report provides some information with regard to this recommendation. It states that the quotas established by Togo have been relatively constant since their inception, though it is also noted that the quotas have been regularly exceeded and that "they do not take any scientific basis into account". The report recommends that future quotas should be set taking into account not only the number of females but also the proportion of females actually reproducing. Finally, the report states that there are a number of concerns raised about the operational capacity of both the Scientific and Management Authorities in Togo. This calls into question how NDFs are made, and how the ranching operations are monitored.	
***Python reticulatus* (Reticulated python)**		
Malaysia (MY) (Possible Concern) Within 90 days (by 31 August 2014) the Management Authority should: a) Provide justification for, and details of, the scientific basis by which it has been established that the export quotas for wild specimens of *P. reticulatus* are not detrimental to the survival of the species and are in compliance with Article IV, paragraphs 2 (a) and 3; b) Provide details to the CITES Secretariat on the control measures used to differentiate between specimens originating from Peninsular MY and Sabah; Within 2 years (by 2 June 2016): c) Provide the Secretariat with the results of the non-detriment finding study due for completion by the end of 2015; and	- On 2 June 2016, Malaysia submitted a study entitled "Information in Peninsular Malaysia's Non-Detriment Findings approach for trade in reticulated python (*Python reticulatus*) skins" as a response to recommendations c) and d) of the Animals Committee. Other available information was taken into consideration during this review, including the following: - AC29 Doc. 31.1 *"Non-Detriment Findings for snakes: guidance for CITES Scientific Authorities"* - AC29 Inf. 16 *"Sustainable management of the trade in reticulated python skins in Indonesia and Malaysia"* - AC29 Inf. 17 *"Trade in python skins: Impact on livelihoods in Peninsular Malaysia"* Concerning recommendation c): The report entitled "Information on Peninsular Malaysia's Non-Detriment Findings approach for trade	The Secretariat's and Animals Committee's determination regarding implementation of the recommendations The outstanding recommendations c) and d) have been complied with. Actions recommended by the Secretariat **The Standing Committee is invited to:** **(i) remove *Python reticulatus* from Malaysia from the Review of Significant Trade, and** **(ii) urge Malaysia to publish their revised quota of 162,000 skins from Peninsular Malaysia.**

d) Establish, in consultation with the Secretariat, a revised annual export quota (including a zero quota if appropriate) for wild taken specimen based on the results of the study mentioned above. *At SC66, the Standing Committee determined that recommendations a) and b) had been implemented and encouraged MY to finalize implementation of recommendations c) and d) by 2 June 2016.*	in reticulated python (*Python reticulatus*) skins" represents the 2015 study referred to in recommendation c). This report has been prepared by the CITES Management and Scientific Authorities, in close consultation with python traders and hunters in Peninsular Malaysia, as well as the Python Conservation Partnership (PCP) and the IUCN Species Survival Commission's Boa and Python Specialist Group. The objectives of the report are stated as to: 1. provide a summary of the biology and trade of reticulated pythons in Malaysia; 2. provide detailed results of Malaysia's non-detriment findings studies; 3. present steps taken to revise management protocols and future NDF monitoring programmes for reticulated pythons in Malaysia; and 4. provide information to support the conclusion of non-detrimental trade in reticulated python skins from Malaysia. The report provides details on the distribution of reticulated python and the range of habitats that this generalist species occupies, an historical overview of the levels of trade, the national legislation protecting the species in the wild and the conditions under which the species can be hunted and traded, as well as the monitoring regime for python skin traders. The report also provides details on the 4-year mark recapture study in Peninsular Malaysia and how this study has been used to estimate the population of reticulated python. In an effort to improve the quality of the population estimate, the Department of Wildlife and National Parks (DWNP) began collecting biological data from harvested pythons and monitoring processing facilities (2012-2016). Results suggest that these pythons possess a suite of attributes that make them resilient to harvesting. For example, the body sizes were found to be increasing, which one would not expect if the population was subject to over-harvesting Stakeholder holder interviews were also conducted to try to identify temporal trends on attributes of python	

	harvesting. The report also highlights changes that will be made to improve the management and regulation of trade, and increase confidence that harvest will continue to be non-detrimental to the survival of the species in the wild, including the prohibition of hunting and capture of reticulated pythons smaller than 240cm snout-vent length. It is estimated that this size restriction will reduce the total volume of trade by 13%. The report concludes that the trade in reticulated python is sustainable as (a) reticulated pythons remain abundant, (b) they are only harvested in part of their range, (c) they thrive in modified habitats, (d) capture frequency is low, (e) python harvest is seasonal, (f) a large proportion of pythons reproduce before being harvested, (g) stakeholders actively engage in sustainable practices, (h) monitoring is on-going, (i) management of trade is robust and can be adaptive if necessary, and (j) there is no evidence of illegal trade. <u>Concerning recommendation d):</u> The NDF study concludes that the harvest quota of 162,000 specimens per year is sustainable. The report gives a population estimate of between 181,424 to 651,177 animals in 2013, which would mean that the harvest could potentially represent between 25% and 89% of the total population. However, Malaysia contend that these estimates (by the nature of the sampling methodology used) are unreliable and that the population is likely to be significantly higher than the extrapolated estimates of between 181,424 and 1,904,952 animals, which would represent between 26% and 1175% of the population. Therefore, rather than revise the quota, Malaysia proposed to put in place additional levels of regulation to control harvest (by imposing size limits) to help ensure that the harvest is non-detrimental. It is worth recalling that Malaysia began to impose a voluntary export quota of 180,000 python skins from 2005, as a trade control at national level. In 2010, the Department of Wildlife and National Parks (DWNP) had started population studies of reticulated python using	

	mark-recapture method as part of its Non-Detrimental Findings (NDFs). In 2011, the quota was reduced to 162,000 python skins based on hunting and trade trends, as well as the remaining skins stocked by traders in Peninsular Malaysia. Although the quota was reduced, the NDF study using mark–recapture method was continued. The annual export quota of 162,000 python skins that was established in 2011 represents less than 27% of the estimated population in Peninsular Malaysia as calculated by Malaysia, which is considered not detrimental to the population as the nature of this species represents high survival probability. In summary, the document presented by Malaysia sums up quite well the discussions within CITES on the sustainable use of this species. The difficulty with having accurate population estimates for snakes is real, because the methods commonly applied, such as estimating population based on species biology and potential habitat, or mark and recapture surveys, do not give reliable data. The shortcomings of earlier population estimates are well explained in the report. The much more compelling evidence showing that the intensive harvest over the last twenty years has had no negative effect on key populations parameters in the species can be taken as good evidence that the numbers exported have been sustainable. With all the biological knowledge that has been gathered, the commencement of a management regime with the use of size limits in the harvest, rather than with quotas, seems to be a conservative way forward. It is also in line with the NDF guidance recently adopted at AC29.	

***Hippocampus trimaculatus* (Three-spot Seahorse)**		
Thailand (TH) (Urgent Concern) Keeping in mind the action items contained in AC27 Inf. Doc. 9 and respecting work that has already been completed for *Hippocampus* species in TH: <u>Within six months (by 2 December 2014) the Management Authority should:</u> a) Clarify what legal protection is afforded to *H. trimaculatus* in TH and provide information to the Secretariat on controls or regulation of fishing activity that might otherwise detrimentally impact on seahorse populations; b) Provide available information to the Secretariat on the distribution, abundance, threats and conservation status of, and any current management measures in place for *H. trimaculatus* in TH; and c) Provide justification for, and details of, the scientific basis by which, it has been established that the quantities of *H. trimaculatus* exported will not be detrimental to the survival of the species and in compliance with Article IV, paragraphs 2 (a) and 3 taking into account any potential unregulated and/or illegal off-take and trade. <u>Within one year (by 2 June 2015) the Management Authority should:</u> d) Provide information from studies (existing or new) that assess variation in the spatial and temporal abundance of *H. trimaculatus* to enable areas of high seahorse density to be identified, as the basis for considering area restrictions on nonselective fishing gear that obtains Hippocampus species as bycatch, and provide a report to the Secretariat; e) Develop and implement adequate control measures and inspection to enhance the enforcement of the reported ban on trawling within 3-5 km of the coast, as the main means of reducing incidental capture of *H. trimaculatus;*	Thailand provided partial information addressing the recommendations of the Animals Committee, which was tabled at SC67 but only considered for three other species of seahorse: *Hippocampus kelloggi, H. kuda* and *H. spinosissimus*. This submission is now revisited with regard to *H. trimaculatus*. Noting that many of the actions and activities reported on referred to all *Hippocampus* species and so are also relevant to *H. trimaculatus*. The submission includes a letter dated 29 June 2016, in which Thailand provided an update on its seahorse monitoring programme that commenced in 2016. However, it appears that *Hippocampus trimaculatus* was not collected during the 2016 survey. The letter goes on to state that Thailand is currently working with Project Seahorse to develop population models of seahorses in response to exploitation pressure by using an age-structured model and that existing knowledge of the life history of *H. trimaculatus* has been incorporated and considered in this study. There has been no update on the progress of this study since then. Thailand also reported that the Department of Fisheries has developed a workplan for 10 Coastal Fisheries Research and Development Centres to set up seahorse hatcheries/nurseries, and to provide approximately 100,000 individuals of seahorse annually, which it envisages will take pressure off wild population and promote seahorse aquaculture. No further details have been provided. The submission by Thailand to SC67 asserted that it has established adaptive management programmes that are efficient in preventing the deterioration of seahorse resources by fishing activities, facilitate monitoring of trade of *Hippocampus* spp., and allow for review of relevant management measures to ensure that trade would not become detrimental to the survival of seahorses in the wild.	<u>The Secretariat's and Animals Committee's determination regarding implementation of the recommendations</u> Recommendations d) to g) have been partially implemented. <u>Actions recommended by the Secretariat</u> **The Standing Committee is invited to:** **(i) remove *Hippocampus trimaculatus* from the Review of Signficant Trade, subject to confirmation from Thailand that the suspension of exports of all *Hippocampus* spp. remains in force, and** **(ii) urge Thailand to inform the Secretariat and the Chair of the Animals Committee about any change in the trade suspension for *H. trimaculatus*, together with a justification, for their agreement.**

Within 2 years (by 2 June 2016) the Management Authority should: f) Establish a detailed monitoring program of landings of *H. trimaculatus* at representative sites, taking into account different gear types and means of extraction and recording catch and effort metrics and provide a report to the Secretariat; g) Implement additional measures, including spatial and/or temporal restrictions on fishing activities, to support non-detriment findings, in compliance with Article IV.2.a and IV.3. *At SC66, the Standing Committee congratulated Thailand for the progress achieved in implementing the recommendations a), b) and c) of the Animals Committee, noting however that recommendations d) and e) have not been implemented within the agreed timeframe. Thailand was requested to finalize the implementation of recommendations d), e), f) and g) by 2 June 2016.*	Concerning recommendation d): Thailand refers to the results of the research project that was submitted to SC67, and that gives general information on seahorses (*Hippocampus* spp.) but not specific to *H. trimaculatus*. It provides preliminary results from field studies and interviews, as well as providing distribution maps. Surveys are on-going. Concerning recommendation e): Thailand informs that the Department of Fisheries has developed a new fisheries management plan, which facilitates the undertaking of more effective surveillance measures, e.g. port-in/port-out inspection of fishing vessels, application of Vessels Monitoring System (VSM), and enhancing co-ordination between patrol vessels and local communities. Measures were also put in place to limit fishing capacity, and it is estimated that unlicensed trawlers and push netters of 2,051 vessels would be displaced. In addition, encroachment of fishing vessels of 30 Gross Tonnage (GT) and over in prohibited areas in the Gulf of Thailand and Andaman Sea during seasonal closures was also strictly prohibited through application of VMS, thus helping ensuring effective enforcement and compliance with measures for conservation and management of seahorses. Furthermore, a notification was issued by the Ministry of Agriculture and Cooperatives on restriction offshore gears, fishing methods, and prohibited fishing areas for 2016. Concerning recommendation f): Thailand states that it has implemented the project to monitor seahorse catches, species composition and length frequency distribution through: i) data collection from research trawlers: data was collected 4 times a year at 63 sampling sites in the Gulf of Thailand, and 22 sites in the Andaman Sea; ii) data collection from landing survey: data was collected annually from: a) trawls, traps and gillnets fisheries; and	

	b) first-level traders to determine changes in trade. Concerning recommendation g): The Government of Thailand has endorsed the new Royal Ordinance on Fisheries (November 2015) with the primary aim to reform the country's existing Fishery Law and facilitate the implementation of actions to combat illegal, unreported and unregulated (IUU) fishing. Several new policies and regulations related to trawlers were also issued accordingly. In addition, the Department of Fisheries of Thailand developed its new Marine Fisheries Management Plan, which stipulates required actions and measures, particularly to replace the "open-access" fisheries with "limited-access" in order to balance the level of fishing efforts and the available fishery resources based on the Maximum Sustainable Yield (MSY) (see Annex 5 to this document) In summary, it is clear that Thailand has introduced a number of measures and improvements to their fisheries policy and management in relation to seahorses in general, but it is not clear what actions have been taken with specific regard to *Hippocampus trimaculatus.* However, regarding trade from Thailand in *Hippocampus kelloggi, H. kuda* and *H. spinosissimus*, the 67th meeting of the Standing Committee recommended that Thailand be removed from the Review of Significant Trade process for these three species of seahorse. The Standing Committee recognized that Thailand suspended the exportation of specimens of *Hippocampus* spp. from 1 January 2016 until further notice; and recommended that Thailand inform the Secretariat and the Chair of the Animals Committee about any change in the trade suspension for *H. kellogi, H. kuda and H. spinosissimus*, together with a justification, for their agreement. As this suspension covers all *Hippocampus* species, it would also apply to *Hippocampus trimaculatus.*	

***Chamaeleo gracilis* (Slender Chameleon)**		
Togo (TG) (Urgent Concern) Within 90 days (by 31 August 2014) the Management Authority should: a) Provide the Secretariat with available information on the status, distribution and abundance of *C. gracilis* in TG; b) Inform the Secretariat that TG will maintain an annual export quota at a level not higher than the current published export quota. c) Provide information on management of ranched animals in trade (e.g., ranching facilities including stock number, sources, production levels, survival rate of female specimens used in the ranching operation) and the details of impacts on wild populations; d) Provide a justification and the scientific basis by which the current export quotas of x (source W) and x (source R) live specimens were established and considered not to be detrimental to the survival of the species in the wild and in compliance with Article IV, paragraphs 2 (a) and 3; e) Provide the CITES Secretariat with detailed information on the control measures used to differentiate between ranched and wild-caught specimens to ensure that the authorized exports of ranched specimens are not augmented by mis-declared wild specimens; and f) As a precautionary measure impose a size restriction of a maximum snout to vent length of 8 cm for live specimens of source code R to be exported and which should be published with the annual export quota. Within 2 years (by 2 June 2016) the Management Authority should: g) Conduct a national status assessment, including an evaluation of threats to the species; and advise the Secretariat of the details and any management measures in place (highlighting where new management measures have	TG provided partial information addressing the recommendations of the Animals Committee. This information was considered at SC67. No new information has been provided by Togo since that meeting. *Concerning recommendation a):* The study submitted by TG provides partial information addressing this recommendation. It indicates that *C. gracilis* is primarily a savannah species. It also exists in the edge of forest areas, but does not penetrate riparian forests. The species presents a very high distribution at country level. In the rainy season, many individuals are found on the main roads of the country where they are usually run over. The species is captured in the areas of Notsé, Assrama, Tététou, Tomety-Kondji, Kpele and others. It appears to be especially present in gallery forests. The study furthermore states that the current work does not provide data on the population size of the species. It is stated that the population status of the species is relatively stable in TG. *Concerning recommendation b):* TG informed the Secretariat of a quota for 2016 of 500 wild-sourced specimens and 2,500 ranched specimens. The same quotas were published for 2017 (as instructed by SC67). However, the recommended size restriction in recommendation f) was not requested. *Concerning recommendation c):* The study contains partial information on six select ranching facilities. It does not contain details regarding the impacts of ranching on the wild population. It is said that the ranching facilities collect wild gravid females which, after laying their eggs, are released within the catch areas.	The Secretariat's and Animals Committee's determination regarding implementation of the recommendations The recommendation from the Standing Committee for Togo to establish quotas has been complied with in part. Recommendation b) has been complied with, although it is noted that this should have been done in tandem with recommendation f). Recommendation a) and c) have still only been partially complied with. Recommendations d), e), f), g), h), and i) of the Animals Committee have not been complied with. Actions recommended by the Secretariat **The Standing Committee is invited to:** **(i) request that Togo establish a zero quota for wild and ranched specimens of *C. gracilis*, and** **(ii) urge Togo to implement recommendations a), c), d), e), f), g), h), and i) of the Animals Committee) by 27 April 2018.**

been introduced to take into account any new information available on the status of the species in TG); h) Establish revised annual export quotas (if appropriate) for wild taken or ranched specimens based on the results of the assessment; and i) Provide a justification for, and explanation of, the scientific basis by which it is determined that these revised quotas would not be detrimental to the survival of the species in the wild and are established in compliance with Article IV, paragraphs 2 (a) and 3. *SC66 recommended the suspension of trade in specimens of* C. gracilis *from TG until that country demonstrates compliance with Article IV, paragraphs 2 (a) and 3, for this species, and provides full information to the Secretariat regarding compliance with the recommendations of the Animals Committee.* *At SC67, the Standing Committee requested Togo to establish export quotas for* C. gracilis *for 2017 of 2,500 live specimens of ranched origin, and 500 live specimens of wild origin; and urged Togo to implement recommendations d) to i) by 2 June 2017 (see Annex 1 of document SC67 Doc. 15).*	<u>*Concerning recommendation d):*</u> The study does not contain information in this regard. <u>*Concerning recommendation e):*</u> The study does not contain information in this regard. <u>*Concerning recommendation f):*</u> The information in the study is unclear. It states that for exports to Europe, the current maximum length is 6 cm. Elsewhere, it also states that the proposed precautionary measure of 8 cm is well justified and it recommends to revise the maximum length to 10 cm. <u>*Concerning recommendation g):*</u> This recommendation has not been implemented. The study recommends to make a national population inventory of the species to inform the establishment of annual quotas on a more rational basis. It is said that this exercise should propose new catch areas. <u>*Concerning recommendation h):*</u> This recommendation has not been implemented. <u>*Concerning recommendation i):*</u> This recommendation has not been implemented.	
***Kinixys homeana* (Home's Hinge-back Tortoise)**		
Togo (TG) (Possible Concern) <u>Within 90 days (by 31 August 2014),</u> the Management Authority should provide the following information to the Secretariat for transmission to the Animals Committee to review at its 28th meeting: a) available information on the status, distribution (including extent of distribution in protected areas) and abundance of *K. homeana* in TG; b) confirmation that TG will maintain an annual export quota at a level not higher than the current published export quota.	TG provided partial information addressing the recommendations of the Animals Committee. This information was considered at SC67. No new information has been provided by Togo since that date. <u>*Concerning recommendation a):*</u> The study submitted by TG states that the current distribution area of *K. homeana* is in the forest area between Togo and Ghana. The current locations for collecting live specimens are Badou Tomegbe, Akloa, Kpélé Elé, Kpadapé, and Hanyigban, among others. It is likely to find this species in the Assoukoko and Fazao Malfakassa protected areas. Recent research	<u>The Secretariat's and Animals Committee's determination regarding implementation of the recommendations</u> The recommendation from the Standing Committee for Togo to establish quotas has been complied with in part. Recommendation d) has been partially complied with. Recommendations c), e), f), g) and h) of the Animals Committee have not been

c) a justification for, and details of, the scientific basis by which it has been established that the quantities of *K. homeana* exported as wild and ranched specimens are not detrimental to the survival of the species and are in compliance with Article IV, paragraphs 2 (a) and 3; d) the management of ranched animals in trade (e.g. ranching facilities, stock numbers, sources, production levels, survival rate of female specimens used in the ranching operation) and on wild populations; e) the control measures to differentiate between ranched, captive produced, and wild-caught specimens to ensure that the authorized exports of ranched and captive produced specimens are not augmented by mis-declared wild specimens; Within two years the Management Authority should: f) Conduct a national status assessment, including an evaluation of threats to the species; and advise the Secretariat of the details and any management measures in place (highlighting where new management measures have been introduced to take into account any new information available on the status of the species in TG); g) Establish revised annual export quotas (if appropriate) for wild taken and ranched specimens based on the results of the assessment; and h) Provide a justification for, and explanation of, the scientific basis by which it is determined that these quotas would not be detrimental to the survival of the species in the wild and are established in compliance with Article IV, paragraphs 2 (a) and 3. *At SC67, the Standing Committee requested Togo to establish export quotas for* Kinixys homeana *for 2017 of 400 live specimens of ranched origin with a size limit of less than 10 centimeters, and zero of wild origin for 2017; and urged Togo to implement recommendations c) to h) by 2 June 2017 (see Annex 1 of document SC67 Doc. 15).*	indicates the species' presence in the Togodo National Park. It is said that the populations of the species in its whole distribution area are seriously threatened, and that it has become rare in TG. But elsewhere, the study states that it is common along streams in forest areas. *Concerning recommendation b):* TG has informed the Secretariat of a quota for 2016 of 500 wild sourced specimens and 2,000 ranched specimens, which is the same as in previous years. The report furthermore recommends to lower this quota in the future to zero wild-sourced specimens and 400 ranched specimens. Togo established export quotas for *Kinixys homeana* for 2017 of 400 live specimens of ranched origin, and zero live specimens of wild origin. These quotas were published on 6 March 2017. However, Togo did not request that the size restriction on ranched specimens be published along with the quota. *Concerning recommendation c):* The study contains no information on this matter. *Concerning recommendation d):* The study contains partial information on six select ranching facilities. The study does not contain details regarding the impacts of ranching on the wild population. *Concerning recommendation e):* The report does not contain information in this regard. *Concerning recommendation f):* This recommendation has not been implemented. The study recommends to make a national population inventory of the species to determine the population size and to evaluate if its trade is possible. *Concerning recommendation g):* This recommendation has not been implemented. *Concerning recommendation h):* This recommendation has not been implemented.	complied with within the extended deadline. Actions recommended by the Secretariat **The Standing Committee is invited to:** **(i) request that Togo establish a zero quota for wild and ranched live specimens of *K. homeana*.** **(ii) urge Togo to implement recommendations c), d), e), f), g) and h) of the Animals Committee) by 27 April 2018.**

Comments from the Animals Committee (AC) on the species/range States combinations

Regarding *Hippopotamus amphibious* from Mozambique

The Animals Committee is of the view that the response from Mozambique adequately addresses the questions asked by the AC concerning the Review of Significant Trade. It therefore recommends to SC69 the lifting of the trade suspension and removal of the species/country combination from the Review process. It commends Mozambique for its report and would like to add some more detailed comments.

- The offtake of up to 80 animals in a population estimate of over 8,000 animals can be considered to be non-detrimental to the survival of the species, especially considering that the offtake is mainly limited to the stronghold populations in the country.

- A future monitoring of the population with regular surveys will assure the creation of an adaptive management plan.

- In addition, the 80 animals are a sum of 40 trophy hunting animals and the removal of up to another 40 problem animals so that it is ensured that no more than 80 animals are being removed from the populations.

- The Animals Committee considers that the coordination between these two types of offtake (trophy hunting and removal of problem animals) should be well managed and integrated into a future management plan.

- The Animals Committee would like to be kept updated on the progress made by Mozambique and in order to showcase this as a good example of species management, invite Mozambique to present its management plan, once it is established, at a future Animals Committee meeting,

Regarding *Pandinus imperator* from Togo

The Animals Committee is of the view that the response from Togo does not adequately address the questions raised by the AC concerning the Review of Significant Trade in this species. It therefore recommends to SC69 to maintain the suspension of trade in this species and to retain it in the Review of Significant Trade. It would like to make the following comments in order for Togo to address more precisely the concerns of the AC:

- The study submitted does show efforts by Togo to demonstrate that *Pandinus imperator* can be considered a common species and therefore the export quota of 20,000 animals could be considered to be sustainable. In addition, it tries to demonstrate the capability of the ranching procedures to produce a large amount of the animals to be exported. However, concerning these views, the AC would like to make the following comments and recommendations to Togo:

    i) The population survey study on fallow land reveals a rather high density of the species. However, no extrapolation of the numbers of animals detected is made to estimate the total population by comparing the occurrence of that habitat type and the area of distribution of the species. Additionally, no data exist about the densities of the species in different types of habitat and how much of such suitable habitat is available and potentially inhabited by the species. Combining this information would allow the estimation of the potential population for harvest.

    ii) In addition, the harvest type described in the study, i.e. the removal of all specimens in the area until no more can be found, before a move to the next area, is considered to be a detrimental type of harvest, in particular if the animals have to be dug up and a large proportion of the burrows necessary for this species to survive are destroyed. Harvest should be conducted on a limited proportion of the populations in a rotational manner so that the effect on the population is not detrimental.

    iii) Concerning the ranching procedures, the Animals Committee is of the view that the study does not convincingly show that the harvest is in line with the correct use of source code R. The farms listed in the study and the numbers of animals observed at these facilities, in combination with the lengthy period it takes to produce offspring that can be exported, raises doubt whether the

numbers claimed to be produced from this ranching programme can be coming from these facilities.

- In general, the Animals Committee is of the view that all animals exported from Togo appear to fit the source code W and an appropriate NDF for the species should address the concerns mentioned above.

Regarding *Python reticulatus* from Malaysia

The AC is of the view that the response from Malaysia adequately addresses the questions asked by the AC concerning the Review of Significant Trade. It therefore recommends to SC69 removal of the species/country combination from the Review process. It commends Malaysia for its report and invites Malaysia to keep the Animals Committee informed about their harvest levels at a future Animals Committee meeting, in order to keep the Committee updated on the progress made and to showcase it as a good example.

Regarding *Chamaeleo gracilis* from Togo

The Animals Committee is of the view that the response from Togo does not adequately address the questions raised by the Animals Committee concerning the Review of Significant Trade in this species. Togo has not convincingly demonstrated that the harvest or ranching of this species is sustainable. It therefore recommends to SC69 to retain it in the Review of Significant Trade. It would like to make the following comments in order for Togo to address more precisely the concerns of the AC:

In particular, questions remain concerning the following aspects:

- The data collected on the abundance and densities of *C. gracilis* needs to be elaborated further. For instance, to obtain a rough estimate of the total population of the species, the figures obtained from the transect studies should be assessed in relation to the area of suitable or currently occupied habitat of the species. In addition, a comparison of densities in different habitats should be presented, which would allow a refinement of such an estimate.
- It is stated that the population is stable, however, data to support this should be included.
- There should be a comparison of data from areas where no harvest is occurring with those where harvesting is carried out. This would allow for the confirmation of the repeated assurance that the harvest has no negative effect on the populations.
- The harvest method is currently not on a rotational basis, which would allow time for areas to recover. The biology and in particular the details of recruitment should be taken into consideration.
- How farms keep wild-caught specimens separate from ranched specimens should be explained.
- The ranching operation also needs to be explained. If as described in the document presented at SC67, animals are distributed by various middlemen to the breeding farms according to the needs of those farms, there is a doubt how track is kept of the individual animals in order to put them back in the place they have been taken from.
- There is a need to explain discrepancies between the numbers of animals in the facilities and numbers claimed to be produced in those facilities, which raises doubts about the claim that the species is ranched.

Regarding *Kinixys homeana* from Togo

The Animals Committee is of the view that the response from Togo does not adequately address the questions raised by the Animals Committee concerning the Review of Significant Trade in this species. Togo has not convincingly demonstrated that the harvest or ranching of this species is sustainable. It therefore recommends to SC69 to retain it in the Review of Significant Trade. It would like to make the following comments in order for Togo to address more precisely the concerns of the AC:

- Management of the stocks for ranching needs to be explained, including how it is assured that laundering of wild taken specimens through the facility is prevented, whether the stock of the ranching facilities is supplemented with wild specimens and, if yes, how the sustainability of this is assured.
- It needs to be explained how 400 specimens can be produced by the numbers of animals observed in the farms, particularly given the low fecundity of the species (max 5 eggs per female).

- It should be noted that carapace length is usually taken as ‘straight-line’ carapace length, measured with calipers (only sea turtles are measured ‘over the curve’ with a measuring tape).

- The report makes a number of recommendations, but it is not clear if these recommendations have been put in place by Togo.

- For clearer guidance on making NDFs for turtles, the Animals Committee recommends that Togo refer to the contents of document AC28 Doc. 15 Annex 2. *Non-Detriment Findings and Trade Management for Tortoises and Freshwater Turtles - a guide for CITES Scientific and Management Authorities.*

Problems identified by the Animals and Plants Committees not related to the implementation of Article IV, paragraph 2 (a), 3 or 6 (a).

A. The following two cases have been identified through the Review of Significant Trade process at the 29th meeting of the Animals Committee (AC29) and referred to the Standing Committee from consideration at its 69th meeting (SC69):

1. *Uromastyx aegyptia*/Jordan

The Animals Committee noted that illegal trade was reported in *Uromastyx aegyptia* coming from Jordan.

2. *Triceros montium*/Equatorial Guinea

During the discussions on trade in *Trioceros montium*, a Cameroonian endemic species, as identified in table 3 of Annex 1 to document AC29 Doc. 13.2, the Animals Committee noted exports of wild specimens had been reported from Equatorial Guinea, which is not a range State for this species.

B. The following case has been identified through the Review of Significant Trade process at the 23rd meeting of the Plants Committee (PC23) and referred to the Standing Committee from consideration at its 69th meeting (SC69):

1. *Dendrobium chrysotoxum, D. moschatum*/Lao PDR

The Plants Committee noted that, while there is no recent legal CITES reported trade in wild specimens of *Dendrobium chrysotoxum* and *Dendrobium moschatum* from Lao People's Democratic Republic, field-based studies have indicated continued large-scale unreported international trade in *Dendrobium* species from that country, including *Dendrobium chrysotoxum*. This is at odds with the sudden reported shift in trade from wild-sourced specimens to artificially-propagated specimens, noting that these species are difficult to cultivate. The Plants Committee also noted the ongoing processes in the Standing Committee for this country.

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DA TERRA, AMBIENTE E DESENVOLVIMENTO RURAL (MITADER)

NATIONAL ADMINISTRATION FOR CONSERVATION AREAS (ANAC)

UNIVERSIDADE EDUARDO MONDLANE

Status, Management and Non-Detriment Finding for *Hippopotamus amphibius* (Common Hippopotamus) in Mozambique.

Prepared under the Mozambique Conservation Areas for Biodiversity and Sustainable Development project (MOZBIO) sub-component 2.2

Maputo, April 2017

Background on CITES Review of Significant Trade (RST) for Hippo in Mozambique

1. Since 2008, the Convention on International Trade in Endangered Species of Wild Fauna and Fauna (CITES) initiated a process under the Review of Significant Trade (RST) as delineated in Resolution Conf.12.8 (now revised at CoP17). At the 23rd Meeting of the CITES Animals Committee (AC23 April 2008) *Hippopotamus amphibius* was included in the RST due to alleged declining populations and increasing trade (AC23 WG1 Doc. 1). All 23 range States, including Mozambique, were retained in the RST at AC24 (AC24 Summary Record).

2. In July 2011 at AC25 (AC25 Summary Record), *Hippopotamus amphibius* was categorised as of "possible concern" for Mozambique on the following basis: *"Widespread and locally abundant with an estimated population size of 18,000 individuals, however whilst stable/increasing in a few areas, thought to be declining overall. Poaching and drought are the main threats. High levels of trade, with consistent exports of 50-90 trophies annually in recent years. Occurs in a number of protected areas yet level of protection unknown and management measures including a detailed basis for non-detriment findings are unknown. On this basis, categorised as Possible Concern" (AC25 Doc.9.4 Annex).* The following recommendations were formulated:

   a) Provide an explanation of the 'internal system of annual quotas' and other management measures in place and clarify the perceived discrepancies between reported Customs data (imports) and CITES data (exports) referred to in document AC25 Doc. 9.4;

   b) Provide information derived from the national survey undertaken in 2008 on the distribution, abundance and conservation status of H. amphibius in Mozambique, including details of methodologies employed; and

   c) Provide justification for, and details of, the scientific basis by which, it has been established that the quantities of H. amphibius exported were not detrimental to the survival of the species and in compliance with Article IV, paragraphs 2 (a) and 3.

3. At the 62nd Meeting of the Standing Committee (SC), as no response was received from Mozambique, the Secretariat and AC Chair determined that recommendations had not been complied with (SC62 Doc.27.1). The SC agreed to suspend trade for *Hippopotamus amphibius* from two range States including Mozambique (SC62 Summary Record). The suspension entered into force on 7 September 2012 (Notification to the Parties No. 2012/057). In January 2016, at CITES SC66 (SC66 Summary Record), Mozambique informed the SC that it was undertaking research on *Hippopotamus amphibius* status and management in the country in response to the Significant Trade recommendations, and that it would share the results with the Secretariat and the Standing Committee when concluded.

Summary of Findings

4. The Common Hippopotamus (*Hippopotamus amphibius)* - hereafter referred to as Hippo - was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) at the Ninth meeting of the Conference of the Parties (Fort Lauderdale (USA), November 1994) (CITES,1994). In terms of Article IV of the Convention, an export permit shall only be granted for an Appendix II species when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species.

5. Mozambique has used export quotas, as also recommended in Resolution Conf. 14.7 (Rev. CoP15) on "Management of nationally established quotas", to effectively meet the requirement of Article IV of CITES and to ensure that the species is maintained throughout its range at a level consistent with its role in the ecosystems.

6. In Resolution Conf. 14.7 (Rev. CoP15) the CITES Parties recognized the linkage between export quotas and Non-detriment findings (NDFs) and adopted guidelines to manage these quotas. In particular, they agreed that an export quota system is a management tool, used to ensure that exports of specimens of a certain species are maintained at a level that has no detrimental effect on the population of the species. The setting of an export quota effectively meets the requirement of CITES to make an NDF for species included in Appendix I or II and, for species in Appendix II, to ensure that the species is maintained throughout its range at a level consistent with its role in the ecosystems in which it occurs.

7. The present document fully responds to the CITES Standing Committee recommendations and details the undertaking of a non-detriment finding (NDF) assessment (Figure 1 and Table 1) for the Hippo in

Mozambique in accordance with the CITES NDF checklist available at : https://www.cites.org/sites/default/files/eng/cop/11/info/03.pdf and with Resolution Conf.16.7 (Rev.CoP17). It is based on the best currently available information, as of April 2017. It also contains information on the proposed management regime that will be adaptively implemented and overall on the status of the species in the country.

8. The biological characteristics of the species do not render it at a high risk to over-harvesting (Figure 1). Hippos are generally tolerant of human activities and are regarded as a pest species outside of protected areas, particularly in communal areas. Although restricted to areas in proximity of water, individuals disperse efficiently between water sources. The species is reasonably adaptable to different environments and hippos are known to forage in agricultural lands.

9. A hippo-focused aerial survey, initiated by the Mozambique's National Administration for Conservation Areas (ANAC) as part of the MOZBIO (World Bank) project, was carried out between 20 November and 4 December 2016 (BassAir 2017). The results of this survey estimated around 7300 individuals (6497 hippos observed adjusted to 6742 applying the corrections factors suggested by Mackie et al 2012) in the surveyed areas across Mozambique. For the sake of consistency, the same areas surveyed by Mackie et al 2012 were surveyed. As some areas were only partially surveyed, data from aerial surveys undertaken in the same year, 2016, in Gorongosa National Park, and Sabie Game Park (Corumana Dam), have been added to the total and data from the Maputo Special Reserve have been adjusted in line with the total count of wildlife in the Reserve. However, some areas remain to be surveyed specifically for hippos especially in the Zambezi Delta comprising the Marromeu area and adjacent Coutadas along the Zambezi River. The minimum population of hippo estimated in Mozambique is likely greater than 8,000 individuals.

10. Although the species is categorized as Vulnerable by the IUCN Red List (Lewison, R. & Oliver, W. 2008), the IUCN Red List assessment is now in need of a review on the status of the species in Mozambique based on the information contained in the present document. The same is true for the UNEP-WCMC review as presented at CITES SC66 (SC66 Doc.31.2 Annex 2) as both documents contain outdated information on the status of the species in Mozambique as well as other inaccuracies that are detailed in the present document. The quality of information for the species in Mozambique is now nearly optimal thanks also to the 2016 specialized Hippo survey (Bass Air 2017.

11. The major threats to the hippo populations in Mozambique are: habitat modification and conflicts with humans. There are no specific figures on illegal hunting and trade of hippo in Mozambique, which is thought to be very limited, based on ANAC data.

12. Mozambique hunting quota allocation will be limited to the hotspots identified in the 2016 hippo survey and namely along the Rovuma-Lugenda rivers (in Niassa National Reserve), in the Cahora Bassa Dam comprising the hunting blocks in the Tchuma Tchato Community Area and in the Zambezi river. The legal harvest of hippos, which will include harvesting for hunting trophies as well as harvest for problem animal control, is and will be minimal. The harvest regime is aimed at achieving conservation benefits with the partial reinvestment of revenues in conservation activities with benefits for the local communities thereby increasing tolerance for hippos.

13. The methodology for allocating hippo hunting quotas is discussed in detail in the NDF (point 14) following the recommendations provided in the 2016 hippo survey report (BassAir 2017). In particular, it is recommended to set the quota for sport hunting in Mozambique, at a percentage between 0,5% and 0,6% of the populations (limited to adult males) found in the hunting areas (blocks and coutadas) that are within the three major hotspots found in the 2016 hippo survey (BassAir 2017), integrated by other data. The resulting maximum sustainable offtake, recommended as total quota for Mozambique, including also hippo harvested for problem animal control and community quotas, is of 80 individuals and this limited offtake does not represent a threat to the survival of the species. Although hippos can withstand maximum sustainable offtakes at a level close to their population growth rate (Martin & Thomas, 1991), Mozambique's quotas for hippo for the period 2009-2012 were set at a level between 1.27% and 2.07%, of the 2008 population estimate reported by the countrywide survey (AGRECO 2009) that, although it was carried out at a very low sampling intensity (3%), estimated the hippo population at 8388 (CL 3896–12879). This survey was the scientific basis on which hunting quotas were allocated. The current quota allocation is more conservative than the prior quota, and Mozambique's hippo population appears to have remained stable since 2008, taking also into account the geographic limits of the current survey.

14. Data on exports are presented in the NDF and an analysis of the 2012 Annual Report to CITES was

carried out, to ascertain the origin of the abnormal number of skulls reported for that year that would have represented 764 hippos exported. It was discovered that erroneously 12 "skulls" instead of 12 "teeth" were reported and appeared in 66 out of 98 permits issued for 99 hippos in that year. A similar analysis was done for the year 2011 and there were 94 permits issued for 95 hippos. It is crucial to note that 12 teeth are normally exported as a trophy, the 4 canines and the 8 incisors. Therefore 12 teeth represent a hippo. The discrepancies in reporting suggested by the CITES recommendations are probably based on this mistake and recommendations are presented (see point 19 of the NDF).

15. In order to enhance monitoring of harvest, a specific monitoring system is envisaged, with the main aim to obtain data on hippo population dynamics.

Conclusions

16. Since the CITES trade suspension entered into force in late 2012, Mozambique has witnessed a period of substantial legislative and administrative reforms: a new government was formed in 2014 which made some important structural changes which also affected the CITES management authority. Since 2014, all wildlife matters are under the Ministry of Land, Environment and Rural Development (MITADER), and in particular under the National Administration for Conservation Areas (ANAC). New wildlife legislation has been enacted including the recent amendment (2016) to the Conservation law of 2014 which imposes stiffer penalties for illegal use of wildlife and a new decree on CITES has been approved in 2016 which includes the administrative framework for CITES implementation. It is foreseen that Mozambique's CITES legislation will be evaluated as Category 1, i.e. legislation that is believed generally to meet all requirements for effective implementation of CITES as reported during the 17th Meeting of the Conference of the Parties to CITES. (see https://cites.org/sites/default/files/eng/cop/17/WorkingDocs/E-CoP17-22-A3-R1.pdf). There is a positive momentum for conservation of natural resources in Mozambique.

17. Thanks to the financial contribution of the World Bank, the Mozambique Conservation Areas for Biodiversity and Sustainable Development project (MOZBIO) is operational, including the component that began in 2016 to provide technical assistance on CITES and sport hunting administration, a key sector for wildlife conservation in the country. Through MOZBIO, funding was made available to carry out the recent hippo survey. In the past, a lack of funding delayed implementation of the hippo survey.

18. The radar chart below summarizing the NDF assessment (Figure 1) undertaken for *Hippopotamus amphibius* (Common Hippopotamus - Hippo) demonstrates that international trade, which will be limited to sport hunting trophies, poses a low and non-detrimental risk to the species in Mozambique. The weakest area of the non-detriment finding for *Hippopotamus amphibius* relates to the absence of a national management plan for the species. However, ANAC, through funding from MOZBIO is starting the necessary steps to produce a species-specific management plan, that, although not an international requirement, will provide a useful framework approach to the conservation and management of the species. Implementation of a sustainable sport-hunting program has been targeted to provide sustainable funding for wildlife authorities and rural communities in areas where hippo populations are abundant.

19. Finally, we envisage that the Scientific Authority of the importing countries will accept these findings that the exportation of hippo hunting trophy is not detrimental to the survival of the species. If the importing countries have data that indicate otherwise we are ready to discuss that information in a collaborative way.

20. This NDF, made in accordance with Article IV of CITES and with the non-binding guiding principles of CITES Resolution Conf.16.7 (Rev.CoP17) and CITES Resolution Conf. 17.9, concludes that the low level of off-take generated by sport hunting is not detrimental to the survival and the species and the amount of revenues generated by this low level of off-take are of crucial importance for the conservation of the species, particularly because of the benefits provided to local communities. The NDF covers a five-years period (2017-2022) and will be updated earlier if new information will becomes available.

Figure 1: Radar chart summarizing the non-detriment finding assessment for *Hippopotamus amphibius* (Common Hippo) in Table 1, made in accordance with the CITES NDF checklist (https://www.cites.org/sites/default/files/eng/cop/11/info/03.pdf). Higher scores are indicative of higher risks. The limited area shaded in the radar chart demonstrates an overall moderate risk of legal harvest to the species.

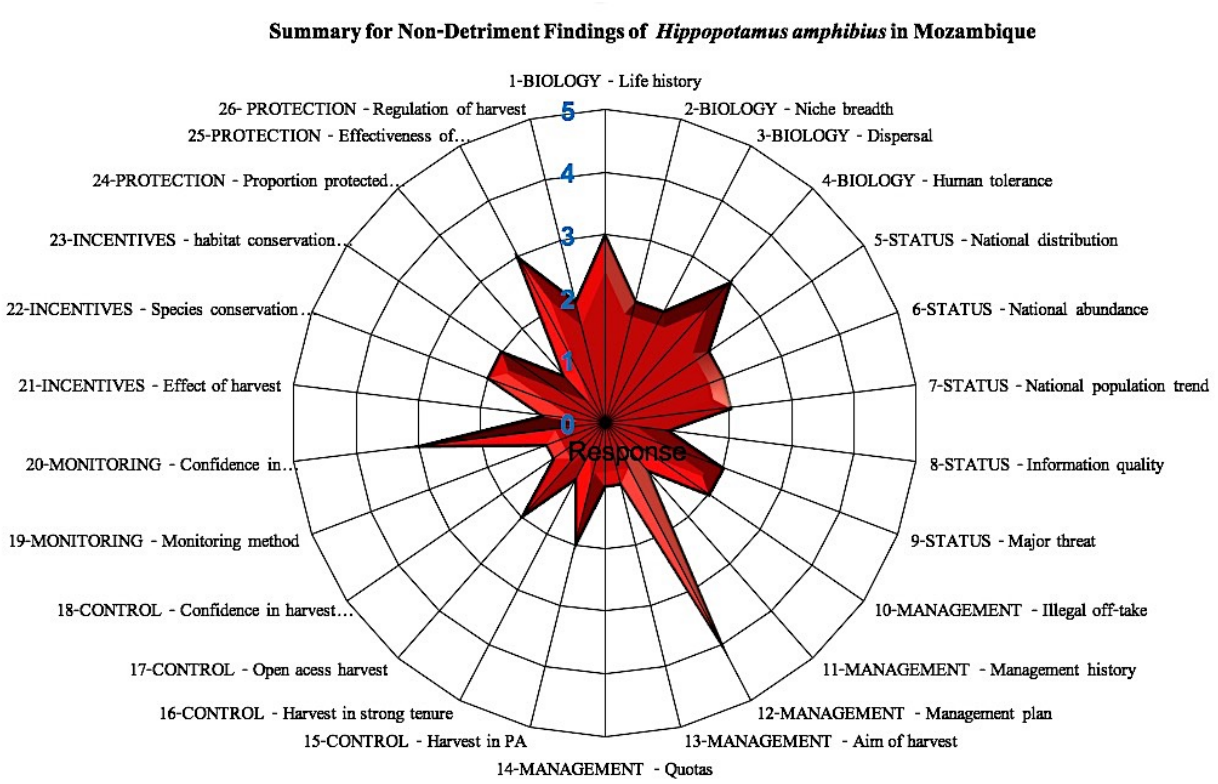


Table 1: Detailed NDF assessment for *Hippopotamus amphibius* (Hippo) conducted in accordance with the CITES NDF checklist available at https://www.cites.org/sites/default/files/eng/cop/11/info/03.pdf . Scores assigned to each question are indicated in bold text along with detailed explanations/justifications where relevant. Higher scores are indicative of higher risks.

Biological characteristics:		
1. Life history: What is the species' life history?	High reproductive rate, long-lived	1
	High reproductive rate, short-lived	2
	Low reproductive rate, long-lived	**3**
	Low reproductive rate, short-lived	4
	Uncertain	5
The common hippopotamus, commonly referred to as hippo, is an unmistakable species, with a barrel-shaped, almost hairless body and short limbs, the males weighing on average 1500 kg and the females 1300 kg (Eltringham 1999) although higher weights are reported (Lewison 2011). Individuals reproduce on average every 2 years with gestation lasting for eight months and lactation lasting for 10-12 months although it can extend to 18 months (Lewison 2011). Hippo typically has an adult *male:female* ratio of 1:1 (Smuts & Whyte, 1981), compared to 1:2 typical of most large mammals. Longevity is reported to be at a maximum of 45 years with a few individuals possibly reaching 48 years (Laws 1968). 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.		
	Extreme generalist	1

2. Ecological adaptability: To what extent Is the species adaptable (habitat, diet, environmental tolerance etc.)?	**Generalist**	**2**
	Specialist	3
	Extreme specialist	4
	Uncertain	5

Hippos are reliant on freshwater wetland features such as rivers, lakes, and springs. Typically, these animals spend most daylight hours in water, coming out at night to forage on short green grass consuming about 20-45 kg. of grass, daily (Lewison 2011). Although hippos are typically regarded as obligate herbivores and short-grass grazing specialists, the available data indicate that carnivory by hippos is an inherent dimension of their fundamental ecological niche (Dudley et al.2016). They are also known to consume farm crops leading to conflicts with humans. Hippos can be found resting on riverbanks when daytime temperatures are moderate.

3 Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very Good	1
	Good	**2**
	Medium	3
	Poor	4
	Uncertain	5

With sufficient grazing available, hippo tend to remain close to rivers. Grazing pressure tends to decrease with distance from water (Lock 1972). However, drought, arid conditions or competition with humans may cause hippo to seek resources some distance from their daily living space. In the Serengeti hippo tend to remain within 1.5km of the Mara River (Olivier & Laurie 1974); in Kruger National Park hippo are found up to about 5km from the Letaba River (Pienaar et al 1966) and up to 7km in the Queen Elizabeth National Park (Field 1970). Individuals of both sexes are prone to vagrant movements and may be found in water bodies far from their normal haunts (Skinner & Smithers, 1990). The wanderings of "Huberta" a hippo that moved from Natal to the Cape Province in South Africa over a period of three years and for a distance of about 1,800 km, is well documented (Chilvers, 1931 in Skinner & Smithers, 1990).

4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	1
	Pest /Commensal	2
	Tolerant	**3**
	Sensitive	4
	Uncertain	5

The 2016 hippo survey report (BassAir 2017) discusses the correlation between hippo densities and human settlements. Hippo densities were not consistently lower nearer to human settlements, as it was expected. Some areas with higher densities of hippo indeed coincided with lower densities of permanent human settlements (e.g. in the Niassa NR, Maputo SR and along the shores of the Cahora Bassa dam, as well as along the Save, Limpopo and Maputo Rivers;). Similarly, some rivers with high human densities nearby indeed had no (or very few) hippo, e.g. the Lurio and Ligonha Rivers. However, there were also areas where the absence of hippo was not associated with high human densities, and others where hippo were widespread and/or abundant despite high levels of anthropogenic disturbance (e.g. along the Zambezi River). As discussed in point 9 below, the hippo is, after the Nile crocodile and the elephant, the species more often associated with human-wildlife conflicts.

National status

5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	1
	Widespread, fragmented in country	**2**
	Restricted and fragmented	3
	Localised	4
	Uncertain	5

The results of the 2016 partial aerial survey (BassAir 2017) show that hippo is a widespread species with a fragmented distribution in Mozambique.

Figure 2 shows the Hippo distribution and densities along the major rivers, lakes and dams of Mozambique during the 2016 survey in the late dry season while Figure 3 shows the geographic features of rivers and other waterbodies in the countries to make the reading of Figure 2 easier.

It has to be noted that the 2016 Hippo aerial survey was limited, for the sake of consistency, to the same waterbodies surveyed in 2010 (Mackie et al 2012). In any case Hippos are unquestionably distributed in areas not shown in Figure 2.

Figure 2: Hippo distribution and densities along the major rivers, lakes and dams of Mozambique during the late dry season of 2016 (survey areas in red, major rivers in blue, dispersion of hippo in brown circles). (Source: BassAir 2017.)

Figure 3: Map of Mozambique showing main rivers and waterbodies. Source: FAO, 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO)

6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	**2**
	Uncommon	3
	Rare	4
	Uncertain	5

The estimated abundance of hippo in Mozambique exceeds 8,000 individuals, more than twice the numbers estimated in 2010 (Mackie et al 2012). This estimate results from a targeted survey of hippo in 2016 (BassAir 2017) and from specific surveys in Gorongosa National Park-GNP (Stalmans M. & Peel M. 2016), Maputo Special Reserve-MSR (Hanekom, C.C. & Cumbane, R. 2016) and Sabie Game Park-SGP (de Villiers 2014,2015 and 2016). GNP and MSR were only partially surveyed and SGP was not surveyed at all during the specialized hippo aerial survey of 2016.

Moreover, as discussed in the 2016 hippo survey Report (BassAir 2017) the Marromeu complex (including the lower reaches of the Zambezi Delta), was purposefully omitted from the survey because the time required to cover their vast areas made this prohibitive during a country-wide count. The most recent data on the Marromeu-Zambezi Delta Complex includes two survey programs that were conducted in 2008 and 2009, the first one covering the late dry season of 2008 and the second one following in late wet season of 2009 of the Marromeu Complex, covering the Marromeu Special Reserve and adjacent parts of Coutadas 10, 11, 12, and 14. 115 hippos were estimated in 2008 and 252 in 2009 (Beilfuss et al 2010). In addition, a survey focused on elephants was conducted in November 2014 with the assistance of the Great Elephant Census project and WCS (Grossmann et al 2014a). This aerial survey estimated 142 (27-327 CL) hippos but only in the Marromeu Special Reserve as adjoining Coutadas and the Zambezi Delta itself were not covered. In 2016, a survey of the Marromeu Complex was carried out (CEAGRE 2017 in prep.). Although the results are still being analysed, 80 hippos were directly observed in the area; it has to be noted that the Marromeu Complex was extremely dry in 2016 and there were signs of hippos moving to the adjoining stretch of the Zambezi River that was not surveyed.

In addition, the Rovuma river in a stratum east and outside of the Niassa National Reserve, was surveyed in 2011 and estimated to contain 262 hippos (CL 27-564) (Craig 2012a). After 2011, this stratum (called WWF North) has never been surveyed again. (Craig 2013, Grossmann et al.2014b, BassAir 2017).

These were surveys of all large mammals and they are likely to be an underestimate for hippo given that they were not targeted at this species. It is a priority to carry out a survey focused on hippo in the Marromeu Complex in the near future, including also the upstream stretch of the Zambezi river where the 2016 hippo survey (BassAir 2017) stopped, in order to establish the abundance of hippo in this area.

Furthermore, ANAC has data on the regular surveys done in Sabie Game Park (355km2), a private Game Reserve on the border with South Africa's Kruger National Park. Between 2014 and 2016 these surveys have estimated 56-136 hippos in the portion of the Corumana Dam and other minor waterbodies pertaining to the Game Park (de Villiers 2014,2015 and 2016), the lowest count being 56 hippos in 2016, due probably to the persistent drought in the region.

To the estimates reported in the 2016 Hippo survey (BassAir 2017) and presented below in Table A, the results of surveys in note (1) substitute the estimate for Lake Urema and other waterbodies within the boundaries of the Gorongosa National Park, and in note (2) substitute the data for Maputo Special Reserve. It has to be noted, importantly, that these estimates represent minimum numbers of hippos present in Mozambique.

The apparent over count of hippo in 1986 (Tello in Lewison & Oliver,2008) followed by what the 2016 hippo survey (BassAir 2017) has confirmed as an undercount in 2010 (Mackie et al 2012), is likely to have led to an exaggeration of hippo decline in Mozambique. Furthermore, as recognized by Mackie et al 2012 their data set included several limitations such as the primary focus of the 2010 river counts was the crocodile (Fergusson, 2010), the estimate of hippo numbers along the south shoreline of Lake Cahora Bassa was from a survey designed to count the land-based wildlife and the estimate of hippo numbers in Maputo Special Reserve was from 5 years earlier.

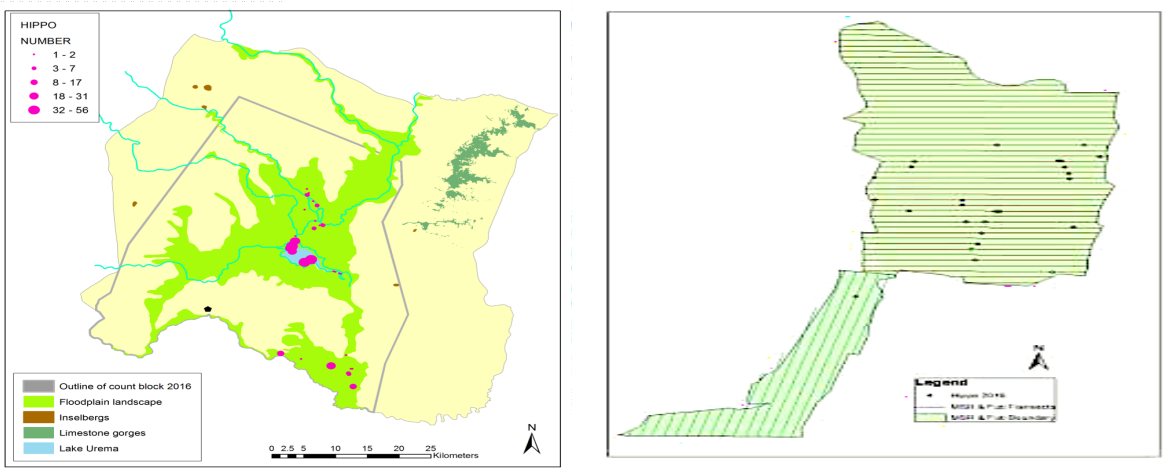
Table A: Summary of hippo population in each of the 2016 survey stretches. Availability biases calculated from counts on multiple photographs of the same hippo pod along waterbodies with different levels of visibility (see Mackie et al 2012). (Modified from BassAir 2017 see notes 1 & 2)

Waterbody	#Hippo observed	Correction factor for availability bias	#Hippo accounting for availability bias	#Hippo estimated for entire waterbody
Lake Malawi (Niassa)	0	1.03	0	0
Lucheringo River	13	1.03	13	20
Rovuma River	289	1.03	298	327
Lugenda River	771	1.04	802	802
Luatize River	0	1.04	0	0

Messalo River	0	1.04	0	0
Lurio River	0	1.04	0	0
Ligonha River	0	1.04	0	0
Zambezi River	1185	1.03	1221	1221
Cahora Bassa	3864	1.04	4019	4420
Pungwe River	4	1.05	4	6
Lake Urema (Note 1)	0	1.05	0	0
Save River	124	1.03	128	179
Limpopo River	15	1.03	15	23
Elefantes River	0	1.03	0	0
Massingir dam	92	1.04	96	96
Incomati River	36	1.04	37	41
Maputo River	22	1.05	23	23
Lebombo dam	0	1.05	0	0
Maputo SR lakes (Note 2)	82	1.05	86	129
TOTAL	**6497**		**6742**	**7288**

Note	Area	Source and comments	Hippo directly counted
(1)	Gorongosa National Park (including part of Pungwe River and Lake Urema). Total Count of 50% of the Park. See Figure 4 (left).	Stalmans M. & Peel M. **2016**. Previous reports (Stalmans 2012 and Stalmans et al 2014) provides figures on hippo recovery in Gorongosa NP, from 50 counted in the year 2000 to 227 counted in 2012, to >430 counted in 2014. Note that these are only the numbers of animals that were directly counted and no extrapolations were made.	**440**
(2)	Maputo Special Reserve (MSR). Total Count of 100% of the Reserve. See Figure 4 (right).	Hanekom, C.C. & Cumbane, R. **2016**. Total counts are done on a yearly basis since 2011 and the population has almost reached the pre-war (1972) estimates of 272 Hippo.	**219**

Figure 4: 2016 hippo distribution in Gorongosa National Park (left), and Maputo Special Reserve (right). (Source in Notes 1 and 2 above).



Priority areas for future, hippo-focused surveys include the above-mentioned Marromeu Complex, Lake Malawi (Niassa) only partially surveyed in 2016, the complete survey of the Rovuma River including the strata surveyed in 2011(Craig 2012a) and the un-surveyed Shire River from the confluence with the Zambezi up to the border with Malawi including adjacent lakes such as Calue and Damablangade and transboundary lakes such as Chilwa and Chiuta and lake Amaramba. Several other waterbodies could hold potential, although maybe minor, hippo populations in Mozambique.

7. National population trend: What is the recent national population trend?	Increasing	1
	Stable	**2**
	Reduced, but stable	3
	Reduced and still decreasing	4
	Uncertain	5

Although it is quite difficult to establish a baseline on which assessing trends in hippo populations in Mozambique and to compare data from the 2016 surveys with previous ones - as different methodologies were used and previous surveys were not devoted to hippos but to other species - it is clear that the hippo population in Mozambique is still large and most likely stable. The 2016 hippo survey is therefore considered the baseline on which to compare future hippo-focused surveys.

The hippo population in Mozambique appears to be large (8,000+) and stable. Note that caution should be exercised in relying upon old surveys or reports in evaluating the population trend, as some used different methodologies or surveyed hippo incidentally to other species.

In particular, the IUCN Red List Assessment for the Common Hippopotamus (Lewison, R. & Oliver, W. 2008) relied on an estimate from Tello (1986) that estimated the hippo population in Mozambique at about 18,000 individuals with most (10,000–12,000) reported to be in an area which includes the Marromeu National Reserve and four coutadas, known as the Marromeu Complex in the Zambezi river delta. However, this estimate is not considered accurate given the devastating impact of the 15-year civil war on Mozambique's biodiversity. Accordingly, this estimate has not been used as a baseline in more recent papers evaluating the hippo population post-war, including a paper on Biodiversity and War in Mozambique (Hatton et al 2001) which summarizes the effects of the 1977-1992 Civil War (the first post-war democratic elections were held in 1994) on the biodiversity in the country. It is also not reported in the survey report of Beilfuss and al 2010 which includes also the history of wildlife surveys in the area. The study from Mackie et al. 2012 also raised doubts on the reliability of the Tello (1986) estimates and their use in the IUCN assessment. As the civil war in Mozambique has had devastating effects on wildlife in many areas of the country, the present document discards completely the Tello 1986 estimate for the Marromeu Complex - as reported in the IUCN Red List Assessment for the Common Hippopotamus (Lewison, R. & Oliver, W. 2008) - which, furthermore was done in a period when it was almost impossible to travel safely within the country. In order to clarify the situation, it is worth noting that Eltringham (1999) reported some estimates from Mozambique as *in litt.* from Tello as follows: Gorongosa National Park (3483 in 1972 and 3597 in 1977) and the Zambezi Delta (2000–3000). Therefore, Eltringham (1999), based on Tello (*in litt.* to Eltringham 1999) has never reported 10,000-12000 hippos in the Marromeu Complex. These data, although no methods were specified and presumably were guess estimates, are in line with the most reliable data on hippo population during the pre-war period as reported for the Marromeu Complex (Zambezi Delta) in Hatton 2011 (250-2820 hippos) and Beilfuss et al 2010 and for Gorongosa National Park in Hatton 2011 and in Stalmans 2012 and Stalsman et al 2014. In particular, Stalsman (2012) provides figures on the wildlife recovery in the Gorongosa National Park since the pre-war estimates of 1972 (Tinley, 1977) and an important analysis of aerial survey methodologies. Therefore, we concur with Mackie et al. 2012 when they stated: "*The origin of the estimate of 10,000– 12,000 hippos [in the Marromeu Complex] is a mystery to us and maybe it was simply an error: perhaps the area of the Complex was mistaken for its hippo population? Whatever its origin, this error has been perpetuated for 25 years*."

In the majority of aerial surveys done in Africa in the last decades, systematic reconnaissance flight (SRFs) methodology has been the primary method used to assess large mammal populations. These surveys use fixed-wing aircraft to observe animals and can be effective for estimating population size and trend across large areas provided that they are methodologically consistent over the years (Craig 2012b), but heterogeneous observation conditions can lead to biases that may significantly underestimate the true population.

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 and 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 analysing trends (Schlossberg et al. 2016).

In recent years (2000-to date) several aerial surveys have taken place in Mozambique, the great majority using SRF methodology and carried out to estimate trends in large mammals. This kind of survey is not really suitable for hippos. Even the study of Mackie et al 2012 included several limitations as reported in point 6 above and is considered an underestimate. The first countrywide wildlife survey in Mozambique was carried out in 2008 (AGRECO, 2008) and while it was undertaken at a very low sampling intensity (3%), it did not cover all areas and suffered from the above-described shortcomings of SRF methodology, it provided an important baseline for abundance and distribution of several species. This is the survey upon which the Mozambique Government has calculated hunting quotas since 2009 (see point 14). The 2008 countrywide wildlife survey estimated hippo population in the country at 8388 individuals (CL 3896 – 12879).

The 2016 Hippo survey (BassAir 2017) was preceded by an inception report on the planning and design of the survey (BassAir

2016) and took place between 20 November – 4 December 2016 during the late dry season, in order to maximize the visibility of hippo when the surface water levels were at their minimum. The survey used a Bell 206 Jet Ranger helicopter, which made it possible to: i) fly with the minimum requirement of four observers, enabling a more accurate count, as well as the inflight training of ANAC field staff in survey techniques; ii) fly slower, turn back, or even hover, enabling observers to recount animals that may have been hidden or submerged when the aircraft first passed, and iii) reduce availability bias, which is one of the largest sources of error in surveys. Availability bias was minimized by the two observers in the front of the aircraft scanning the survey rivers as far as possible ahead, and warning all other observers of any upcoming hippo. Since hippo frequently submerge as soon as the aircraft is overhead, the technical advisor took a series of photographs (as suggested also by Jachmann 2001) from as far away as possible, and counted the hippo pods from each photograph during the analysis component after the completion of the survey. Counting multiple photographs of the same hippo pod also provided a means of quantifying availability bias against the correction factors used by Mackie et al (2012), by calculating the proportion of hippo "available" in each photograph, out of the maximum number of hippo counted in all photographs of that group. In general, the maximum count was used as the final figure for the pod's size (Mackie et al 2012). Since crocodiles occupy the same aquatic habitat as hippo, a secondary count of crocodiles was undertaken simultaneously. Crocodiles encountered during the hippo survey were also counted. Wherever possible, the size of the observed crocodile was subjectively categorized as either small (<1.5m), medium (1.5 – 3m), large (3-4m) or extra-large (>4m). Since care was taken to retain the primary focus of the survey on hippo, the particular method and speed of flying was better suited to observing hippo than crocodiles. It should therefore be accepted that the crocodile count is likely to be an undercount, and as such should be seen as a Minimum Number Alive, rather than a representative population estimation.

In any case, it is certainly required that IUCN prioritize the revision of the Red List assessment (Lewison, R. & Oliver, W. 2008) for the Hippo population in Mozambique.

In conclusion, points 6 and 7 satisfy the CITES request to Mozambique to "*Provide information derived from the national survey undertaken in 2008 on the distribution, abundance and conservation status of H. amphibius in Mozambique, including details of methodologies employed*;" contained in point b) of the outstanding recommendation of the Standing Committee under the CITES Review of Significant Trade.

8. Quality of information: What type of information is available to describe abundance and trend in the national population?		
	Quantitative data, recent	**1**
	Good local knowledge	2
	Quantitative data, outdated	3
	Anecdotal information	4
	None	5

As the quality of information is now nearly optimal thanks to the 2016 specialized Hippo survey (Bass Air 2017), it is suggested that, in light of that survey report and of the information provided in this document, IUCN and UNEP-WCMC review their data for Mozambique, both in the IUCN Red List assessment (Lewison, R. & Oliver, W. 2008) and in the data that UNEP-WCMC provides to CITES and to other institutions such as the European Union.

To this end it is clear that the information provided by UNEP-WCMC to the CITES Standing Committee in document SC66 Doc. 31.2 Annex 2 were not clear and needs to be updated in many areas including alleged decline(see points 6 and 7), sustainable offtake levels (see point 14), main threats (see point 9) and legislation (see point 16 in the Conclusions page 4).

9 Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ invasive species/ other: and how severe is it?		
	None	1
	Limited/Reversible	**2**
	Substantial	3
	Severe/Irreversible	4
	Uncertain	5

The major threats to hippo in Mozambique have been categorized as follows:

a) Habitat Loss

It is widely acknowledged that the most important direct threat to biodiversity comes in the form of the conversion, loss, degradation, and fragmentation of natural ecosystems. (Heywood, (ed.) 1995). According to the 2015 Global Forest Assessment (FAO 2015) and based on a model developed during the National Forest Inventory (Marzoli 2007) it is assumed that the deforestation rate in Mozambique is 219.000 ha/year and has anthropogenic causes.

The study "Habitat Mapping in Mozambique" (CEAGRE 2015), illustrates that the country is mostly (586,009 km2, 74.2%) covered with natural habitats, while modified habitats cover 61,831 km2 (7.8%) and mixed habitat cover 141,918 km2 (18%). Modified areas are strictly associated with human population concentration, with the southern coastal zone, the Limpopo Corridor, the Beira Corridor, the provinces of Zambézia and Nampula in general, showing extensive modified areas and coincidentally, areas with greater population concentration.

b) Human-Wildlife Conflict

The Human population in Mozambique was, according to the last official census done in 2007, 20.632.434 people with a density of 26 people per km^2. It was projected at 27.128.530 for 2017 with a human density of about 33 people per km^2. The next national population census is scheduled to take place in the period 1-15 August 2017 (Instituto Nacional de Estatística- National Institute of Statistics).

Human population growth and demand for more land, water and other natural resources are intensifying conflicts between people and wildlife worldwide and Mozambique is no exception. Human-wildlife conflict (HWC) arise from direct and indirect negative interactions, leading to economic losses to agriculture through destruction of crops, human fatalities and injuries, depredation of livestock and retaliatory killings of wildlife. In southern Africa, intensification of land conversion to cultivation and/or human settlement is a key factor driving people into more direct contacts with wildlife (Lamarque et al.2009). HWC has a worldwide dimension but its effects are particularly severe in countries with rural communities living at or near the poverty level.

Without a way of benefiting from wildlife including hippo, wildlife is regarded as a liability and economic cost to rural communities, who suffer crop losses, other damages and lose human lives to wildlife. The most effective strategy to prevent this displacement is to integrate wildlife into rural economies as assets and to demonstrate that wildlife contributes to the welfare and development of people. The involvement and empowerment of rural people in natural resource management, in combination with economic and financial incentives through sustainable use, and linked with skills development and capacity building, should be the driver behind changes in attitudes towards wildlife of communities in Mozambique.

Several researches have been conducted on human wildlife conflict in Mozambique (among others Anderson & Pariela 2005, Lamarque et al. 2009, Dunham et al 2010, Bell et al. 2011).

In 2009, the Council of Ministers of the Government of Mozambique approved a five-years (2009-2014) National Human-Wildlife Conflict Mitigation Strategy (Estratégia de Gestão do Conflito Homem-Fauna Bravia) (Government of Mozambique, 2009). The main objective of the strategy was to ensure the permanent protection of people and goods, contributing to the conservation and sustainable use of wildlife to the economic and social benefit of the current and future generation of Mozambicans. The implementation of the HWC National Strategy involved several state services. The Ministry of Agriculture (MINAG) and the Ministry of Tourism (MITUR) were responsible for wildlife management respectively outside and inside conservation areas. In a supporting role, the Ministry of Public Works and Habitation (MOPH) was in charge of water supply in rural areas and the Ministry for the Coordination of Environmental Action (MICOA) was in charge of land use planning together with the Ministry of the State's Administration (MAE). A total of 32 districts out of 128 (25%), were identified as of critical HWC incidence.

Since 2015, the Ministry of Land, Environment and Rural Development (MITADER), though ANAC, is responsible of all wildlife management in the country implementing the new Conservation Law 16/2014 and the national HWC Strategy, which is now is in process of being revised and updated for the next 5 years, with the support of FAO. Drafts are in an advanced stage of preparation and the revised strategy (Government of Mozambique, in prep.) is expected to be approved by the end of 2017.

Among wildlife species, hippo appears to be, after the Nile crocodile and the elephant, the most involved in human conflicts in Mozambique (Government of Mozambique, in prep.). Human/hippo conflicts involve mainly the loss of human lives, human injuries, loss of crops and associated loss of incomes for local communities and is mainly due to an increase in settlements of people around or inside protected areas.

The following table B shows reported human-hippo conflicts entered in the HWC database maintained by ANAC.

Table B: Human-Hippo conflicts 2012 to 2016

Year	*People killed by hippo*	*People Injured by hippo*	*Crop damaged by hippo (ha)*	*Hippo killed in PAC*
2012	*12*	*3*	*65*	*17*
2013	*3*	*1*	*47*	*16*
2014	*0*	*3*	*52*	*22*
2015	*7*	*8*	*21*	*12*
2016	*10*	*3*	*68*	*42*
Total	***32***	***18***	***253***	***109***

Source: ANAC

In the period 2006- 2011, 27 people were killed by hippos and 85 Hippos were taken in Problem Animal Control (PAC) operations. From a preliminary analysis of these figures it seems that the increase in hippo killed in PAC operations is due to the fact that no hippos were given in quotas for sport-hunting due to the CITES trade suspension and this fact has in some cases exacerbated conflicts especially in areas with a high density of human population.

Harvest management:		
10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	1
	Small	**2**
	Medium	3
	Large	4
	Uncertain	5
From information gathered around the country, it appears that poaching is not an issue for hippo in Mozambique. It is believed to be very small but more information is needed.		
11. Management history: What is the history of harvest?	**Managed harvest: ongoing with adaptive framework**	**1**
	Managed harvest: ongoing but informal	2
	Managed harvest: new	3
	Unmanaged harvest: ongoing or new	4
	Uncertain	5

Trophy hunting is managed and regulated at the national level. Since the entry into force of the Forest Law 10/99 and its Regulation 12/2002, hunting has been managed through a quota system (see point 14). Hippo harvest is informed through specific studies and information gathered from authorities at the National, Provincial and district level and from concessionaires of the hunting areas. Management is adaptive with formal oversight and feedback through mandatory safari operator's Activity annual reports. Hunting areas are allocated trough a closed tender process. In Niassa National Reserve the tender process is established by the Reserve Management Authority on the basis of the leasing contract with ANAC.

In the Tchuma Tchato Community Programme hunting blocks are allocated through a direct negotiation between the Safari Operator and the Tchuma Tchato Programme Unit now in the Provincial Department of Land, Environment and Rural Development (MITADER- formerly Provincial Department of Tourism). It comprises 12 Blocks of which one was transformed in the Magoé National Park and three are not operational at the moment and in the process of being possibly transformed into National Reserves.

All hunting concessions are awarded to private safari operators subject to a binding contract. The obligations for the safari operator foreseen in the contract includes but are not limited to:

- Submit a management plan for approval by ANAC
- Submit for approval by ANAC by 30 March each year, the Annual Plan of Activities for the year in question and ensure its proper implementation. This plan is submitted together with the proposed quotas for the next season and the Annual Activity Report of the previous year. The first Annual Activity Plan must be submitted to ANAC within sixty (60) days from the date of the award of the contract. For the following years, the Annual Activity Plan shall be in accordance with the management plan in force;
- Send to ANAC by the 15th of December of each year, the Annual Activity Report prepared according to a format established by ANAC, which include, inter alia, personnel available, days of safaris made and quota utilization;
- Comply with and enforce the applicable laws and use and exploit the Hunting Area only under the terms and limits of this contract and ensure that the Professional hunter complies with applicable law and made the Concessionaire jointly liable for acts done by him;
- Require the approval of ANAC for activities related to hunting and ecotourism operations in the concession area in accordance with the rules established by law;
- Request ANAC, sufficiently in advance, hunting quotas and game hunting and PH licenses and pay their fees under the Act and under this contract;
- Ensure compliance with the hunting quotas approved for the respective hunting season, comply with and enforce hunting regulations and other legislation in force;
- Monitoring of poaching and other illegal activities by establishing and maintaining a supervisory body composed of sworn inspectors, guards and/or community workers which should focus on the recruitment of members of local communities;
- Collaborate with ANAC in the control and prevention of fires, indiscriminate use of natural resources, prospecting and illegal mining, soil erosion, contamination of water courses and the use of poisons and illegal fishing methods and movement of people once approved zoning plan;
- Carry out regular inventory of wildlife populations and their habitats, and simple systems of monitoring the trend of wildlife populations;

- Ensure that local communities currently residing in the Hunting Area be treated with courtesy, that their rights under the law in force are respected, to be established and develop with them, generating partnerships of mutual benefits that can be verifiable and quantifiable;
- Make all the agreements with the local communities in writing and within fifteen (15) days, deliver a copy to ANAC for approval and a copy to the government of the district area where the local community is established for knowledge and monitoring purposes;
- Give the local communities the benefits that have been agreed, as well as those resulting from the legislation that governs the matter, and support the development of income activities that benefit local communities;
- Distribute, whenever possible, part of game meat harvested by tourist hunters to local communities, health institutions, children, prison and school centers, or other places that take care of disadvantaged groups;

Concessions are awarded in general for a period of 5 years' renewable for 10 years if the obligations of the contract have been duly respected. In the Tchuma Tchato Community Programme some of the concessions have been granted for a renewable period of 20 years.

The Concessionaire is required by contractual obligations to purchase a number of licenses and permits, and pay various taxes to Government. Some of these fees are paid by the safari operators while others are paid by hunting clients.

The revenues obtained by the different fees from safari operators and sport hunters are re-invested in the operational costs of the Conservation Areas managed by ANAC including anti-poaching salaries and equipment.

12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and co-ordinated local and national management plans	1
	Approved national /state/ provincial management plan(s)	2
	Approved local management plan	3
	No approved plan: informal unplanned management	**4**
	Uncertain	5

At present, there is no management plan for the species. ANAC, through funding from the MOZBIO project, is starting the necessary arrangements to develop a specific management plan, that, although not an international requirement, will provide a useful framework approach to the management of the species.

At national level ANAC/MITADER is the institution responsible for wildlife management and is also the CITES Management Authority. Other institutions collaborating in wildlife management are:
At National Level:
DNT – National Directorate of Land responsible for land use planning;
DNF – National Directorate of Forest, Ministry of Agriculture, responsible for Forest Management at national level;
Veterinary Services- Ministry of Agriculture;
Universities;
Environmental Police.
At Provincial Level
Provincial Directorate of Land, Environment and Rural Development (DPTADR), cooperates in: conflict resolution and local land use planning and initial advice on quotas allocation.
At District Level
District Services of Economic Activities (SDAE).

13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	**Generate conservation benefit**	**1**
	Population management/control	2
	Maximise economic yield	3
	Opportunistic, unselective harvest, or none	4
	Uncertain	5

The harvest regime is aimed at achieving conservation benefits with the partial reinvestment of revenues in conservation activities with benefits for the local communities thereby increasing tolerance for hippos.

14 Quotas: Is the harvest based on a system of quotas?	**Ongoing national quota: based on biologically derived local quotas**	**1**
	Ongoing quotas: "cautious" national or local	2
	Untried quota: recent and based on biologically derived local quotas	3

	Market-driven quota(s), arbitrary quota(s), or no quotas	4
	Uncertain	5

Sport hunting is governed by the Forestry and Wildlife Law (Law10/99) and its regulations (Decree 12/2002) with a system of hunting quotas. Until the year 2014, the establishment of hunting quotas was made by two bodies (National Directorate of Conservation - DNAC / Ministry of Tourism MITUR and National Land Management and Forestry - DNTF / Ministry of Agriculture) responsible for the management of wildlife resources in the country. With the formation of the new government after the 2014 elections, the management of the natural resource sectors have been integrated into the Ministry of Land , Rural Development Environment (MITADER) and the National Administration of Protected Areas was created (ANAC), which implies the management of national network of conservation areas including the management of hunting in Mozambique and ANAC since 2014 is the sole authority responsible for the implementation of hunting legislations including the allocation of hunting quotas. The hunting regulations are in the process of being revised.

The size and composition of quotas depends on the estimated number of animals present in the hunting area, adjusted upwards and downwards for the various species on offer, depending on their population trends and impact of hunting on trophy quality. (Booth & Chardonnet, 2015)

Hunting quotas are given for areas open to foreign sport hunting such as Coutadas (Hunting Reserves), and Hunting Blocks around Niassa National Reserve, Community Programs hunting blocks (Tchuma Tchatu and Chipanje Chetu) and Game Farms, as well as areas for local national hunting (Multiple Use areas) and community quotas in selected areas.

Quotas are set in a participatory way between ANAC, Provincial Authorities and Safari Operators, whose Annual Activity Report is mandatory for quota setting, and are informed by surveys and local studies following the model described in the Quota setting Manual (WWF 1997 and edition in Portuguese,2004) which is widely used in Southern Africa. Until 2014 the quota was split between Ministry of Tourism and Ministry of Agriculture that was mainly in charge of Fazendas do Bravio (Game Farms).

Although hippos can withstand maximum sustainable offtakes at a level close to their population growth rate (Martin & Thomas, 1991), Mozambique's quotas for hippo for the period 2009-2012 were set, as shown in Table C, at a level between 1.27% and 2.07%, of the 2008 population estimate reported by the countrywide survey done in 2008 (AGRECO 2009) that, although it was carried out at a very low sampling intensity (3%), estimated the hippo population at 8388 (CL 3896–12879). This survey was the scientific basis on which hunting quotas were allocated.

Table C Hippo Hunting Quotas 2009-2012

YEAR	*QUOTA*	*Percentage of the population (estimate 8388 AGRECO 2009)*
2009	*161*	*1.92*
2010	*174*	*2.07*
2011	*123*	*1.47*
2012	*115*	*1.27*

Source: ANAC

Therefore, the assumption made in Mackie et al 2012, reported also by UNEP-WCMC in Standing Committee document SC66 Doc.31.2 Annex 2 , that the quotas were not sustainable as they were approaching the population growth rate, was unfounded as it was based on a wrong quota figure and their undercount of hippo in Mozambique.

The 2016 Hippo survey report (BassAir 2017) includes a series of recommendations on quota setting and in particular that the quotas shall not exceed 1% of the population and that they should be given only in the areas where a significant population of hippo was found.

While there is a wide agreement on the latter recommendation it is important to define the limits of the sport hunting quota. The quota recommended here is a two-tiered quota; the first tier is for sport hunting (restricted to adult males) and the second is for PAC (unselective) and communities. For sport hunting, in a model proposed by Martin (2005a and 2005b) it appears that the proportion of a hippo population which can be sustainably hunted to provide trophies is as low as that for elephant. For the hunting quota, restricted to adult males, the model implies an annual growth rate of about 7% and assumes that sport hunting will be restricted to hippos of 20 years and older (because of their large canines and body size). The model set the sustainable offtake of trophy hunting quotas at 0.5% of the total population, which is very similar to the proportion commonly used for elephant trophy hunting (0,3%-0,5%) around Southern Africa.

Furthermore, the sustainable offtake of trophy hunting quotas at 0.5% of the total population, is not affected by any other management interventions taking place at the same time (for example problem animal control) provided these other uses are unselective with regard to age and sex and fall within the overall sustainable limits (1%). Under adaptive management, the ages

of the animals killed should be monitored and, in succeeding years, the quotas should be adjusted upwards or downwards according to the criterion that a) there should be some animals amongst those killed which have reached an age of 30 years and b) the results of the monitoring in a given area are taken into account.

It is therefore recommended to set the quota for sport hunting in Mozambique, as illustrated in Table D below, at a percentage between 0,5% and 0,6% of the populations (limited to adult males) found in the hunting areas (blocks and coutadas) that are within the three major hotspots found in the 2016 specialized survey (BassAir 2017), integrated by other data as mentioned in point 6.

The quotas could be set at a higher percentage of 0,6% in the Cahora Bassa area and in the Lugenda-Rovuma basin and at 0,5% in the Zambezi River. The quota will include the Marromeu Complex at the condition that a proper monitoring programme, as discussed in the last paragraph of point 19, is started in the area leading to a proper scientifically-based assessment of the hippo population. In any case the sport hunting quota for the whole Zambezi River shall not exceed 6 hippos.

Table D: Recommended Sport Hunting Quota for Hippo in Mozambique

Area	*Quota*	*Comments*
Lugenda-Rovuma Complex *(Only in Niassa National Reserve Hunting Blocks bordering the rivers)*	*Set at 0,6%* *7*	*5 Lugenda River* *2 Rovuma River*
Cahora Bassa Dam *Only in Hunting Blocks in the Tchuma Tchato Community Program.*	*Set at 0,6%* *27*	*The majority of the quota should be given to hunting blocks in the southern shores of the Cahora Bassa Dam.*
Zambezi River	*Set at 0,5%* *6*	*3 hippos Coutada 7* *3 hippo in the Marromeu Complex coutadas.*
TOTAL	*40*	

The second quota tier, which includes PAC activities, shall carried out in accordance with the above-mentioned limits and shall be limited to serious cases. Caution should be taken in areas with low hippo densities, as removal of these animals is highly unlikely to be compensated for by natural dispersal from other source areas. This includes quotas in Multiple Utilization Areas (provincial hunting areas with no tourism hunting).

A small community quota can be maintained in hunting areas (besides coutadas and hunting blocks) with established community conservation activities.

It has to be understood that quotas are representing the maximum sustainable offtake in a given year. Real and actual offtakes are normally much lower thus enhancing sustainability. Furthermore the peculiar reproductive strategy of hippos (see point 1) as described by Smuts & Whyte (1981), has important implications for hippo management. It should be possible to maintain a hippo population in a highly productive state by harvesting: the corollary is that by not harvesting the population is unlikely to increase greatly – its own regulatory mechanisms will come into play to limit population growth.

In conclusion, the maximum sustainable offtake is of about 80 hippos (CL 70-90), representing about 1% of the estimated country population, with half of this number for sport hunting, spatially limited to the hotspots identified in the 2016 aerial survey (BassAir 2017) and to adult males, and the remaining part for PAC and community use.

Finally, the above satisfies the CITES request to Mozambique to "*Provide an explanation of the 'internal system of annual quotas' and other management measures in place*" contained in the first part of point a) of the outstanding recommendation of the Standing Committee under the CITES Review of Significant Trade as quotas for the period 2009-2012 were sustainable and they will be significantly reduced.

Control of harvest

15. Harvesting in Protected Areas: What percentage of the legal national harvest, occurs in State-controlled Protected Areas?	High	1
	Medium	**2**
	Low	3
	None	4
	Uncertain	5

The 32,5% (13 Hippos) of the proposed sport-hunting quota for hippo (see point 14) will be limited to State-controlled Protected Areas such as Coutadas, and some of the hunting blocks of the Niassa National Reserve.

Mozambique's system of Conservation Areas (CAs) has two purposes: to conserve ecosystems, wild habitats, biological diversity and natural resources for the benefit of present and future generations; and secondly, to contribute to the development and the social-economic well-being of Mozambicans, particularly the poor communities that live nearby.

The system is currently made up of seven National Parks, eight National Reserves, 17 Forest Reserves, 20 official hunting reserves (coutadas) and two Community Conservation Programs. Furthermore, Community Conservation Areas are now foreseen in the new Conservation Law and when established they will add to the system of CAs.

The currently legally established CAs cover about 219,231 km^2, which represent nearly the 28% of the country's land surface (799,380km^2). The approval of the Conservation Areas Law 16/2014 and its recent revision in 2016, the establishment of the Administração Nacional das Areas de Conservação (ANAC, National Administration of Conservation Areas) as an autonomous public agency tasked with the management of all Conservation Areas, the establishment of the Fundação para a Conservação da Biodiversidade (BIOFUND, Foundation for the Conservation of Biodiversity), mandated to raise funds to support the long-term management of Mozambique's Conservation Areas through innovative conservation financing tools, including the establishment of an endowment fund, the recent creation of new CAs (e.g. Ponta d'Ouro Marine Reserve, Lake Niassa Reserve, Magoe National Park and several new coutadas) and the improvement in the management effectiveness of CAs in the past 15 years, is a strong basis for ensuring the sustainable development of Mozambique's CAs and their contribution to poverty alleviation, biodiversity conservation and economic growth.

Hunting areas included in Conservation Areas (NNR Blocks, Coutadas, Community Programs and Game Farms) cover an extension of 131,425 km^2, equivalent to nearly the 17% of the country's land surface.

The extension of Conservation Areas is shown in Table E and they are mapped in Figure 5.

Table E: Extension of Conservation Areas in Mozambique (ANAC)

CONSERVATION AREAS FOR SUSTAINABLE USE (HUNTING AREAS)	Size in km^2	Percentage (%) of the country land area. (799,830 km^2)
Official Coutadas (20)	62,495	7,82
Niassa National Reserve Buffer Area Blocks (9)	27,977	3,50
Community Programs - Tchuma Tchato (12 blocks) + Chipanje Chetu	36,418	4,55
Game Farms (42)	4,535	0,57
TOTAL HUNTING AREAS	**131,425**	16,44
STRICTLY PROTECTED AREAS		
National Parks (7)	36,470	4,56
National Reserves (8)	49,096	6,14
Forest Reserves (17)	2,240	0,28
TOTAL STRICTLY PROTECTED AREAS	**87,806**	10,98
TOTAL CONSERVATION AREAS	**219,231**	**27,42**

Source: ANAC

Coutadas (Official Hunting Reserves) were created by colonial legislation in the 1930s. During the 1960's these were consolidated so that by the 1970's some 17 of these hunting areas had been gazetted as official reserves. Much of the hunting at that time focused on meat harvesting with limited sport hunting taking place.

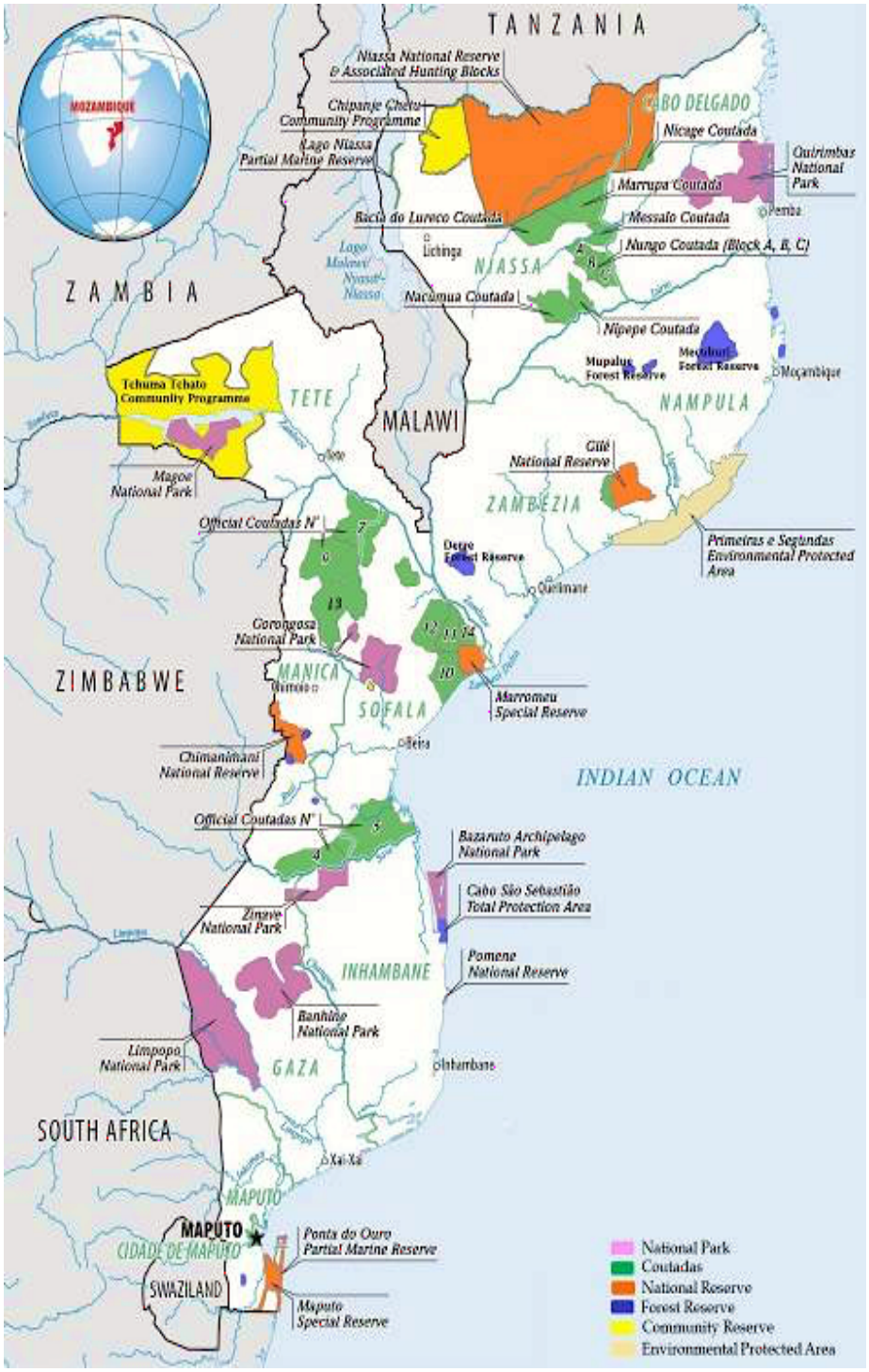
During the civil war period (1977-1992), organized sport hunting was effectively closed down and uncontrolled wildlife harvesting for meat was widespread across the country to feed the troops, leading to a decline in wildlife in many areas (Anstey, 2009, Hatton et al 2011).

As the hunting sector emerged from this period following the General Peace Agreement of 1992, so too were there changes in the number of hunting coutadas that were available. Some, such as Coutada 16, were incorporated into the Limpopo National Park while others were overrun by human settlements. Some coutadas were closed as the wildlife populations had been depleted and were not suitable to support a sustainable hunting industry. Those that remained open (Coutadas 4, 5, 7, 9, 10, 11, 12, 13,14 and 15) went through various periods of rehabilitation and only became active from 2002 onwards.

Following the creation of ANAC in 2014 several areas that were designated as Multiple Utilization Areas were transformed and gazetted as coutadas that according to the Conservation Law 16/2014 are designated as Conservation Areas for sustainable utilization and managed in accordance with a management plan duly approved by ANAC.

The right to hunt is only recognized by means of the concession contract between the State and the operator.

Figure 5 Conservation Areas of Mozambique (ANAC)



16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	**High**	**1**
	Medium	2
	Low	3
	None	4
	Uncertain	5

67,5% (27 Hippos) of the proposed sport-hunting quota for hippo (see point 14) will be allocated to the Hunting blocks in the southern shore of Lake Cahora Bassa where 50% of the Mozambique Hippo population is found, benefiting the rural communities in the area.

As an area with strong resource tenure, the Tchuma Tchato Community Programme in Tete Province originated in 1993 as an effort to start Community Based Natural Resource Management in the area around the Cahora Bassa Dam. The programme was initiated by the Direção Nacional de Florestas e Fauna Bravia (National Directorate for Forestry and Wildlife, DNFFB) and later

supported by IUCN, Ford Foundation and others (Filmao et al.1999) Local institutions were developed to manage the relationship with the operator, manage the local resources (including fisheries) and most importantly create a benefit sharing mechanism to re-distribute a portion of the state's royalties back to the local level from taxing of the hunting (Cunliffe, 2002). A specific Ministerial Decree of 2003 authorized a share of these taxes with 33% going to the local communities. The Tchuma Tchato Community area, including the Magoè National Park, hold the largest hippo population in Mozambique, the second largest elephant population in the country, shared with Zambia and Zimbabwe, and, among other species, important populations of lion, leopard and buffalo.

Other areas with strong local control over resource use are represented by Game Farms (Fazendas do bravio). Formerly established under the Ministry of Agriculture as areas designated to the breeding of wild species, Game Farms (Fazenda do bravio) are now considered Conservation Areas for sustainable use by the new Conservation Law 16/2014 and are fenced areas of private domain, designated for the conservation of fauna and flora where the right to hunt is limited to the holder of the land use rights (Land License or DUAT) or to those who have been authorized by that holder, provided that both acquire the respective license issued by the competent authority. There are 43 registered Game Farms in Mozambique covering an area of 4834km^2(483,414 hectares). The holder of the game farm may set up the balanced exploitation of certain species for meat production and utilization of by-products and other remains. The holder of the game farm who puts animals in captivity is responsible for their feeding, health and maintenance and he/she is the owner of the animals he introduces. If the holder of the game farm intends to claims ownership of the animals found in the area, he can buy them from the State. The repopulation of species is allowed on game farms, subject to the provisions in national legislation and in the management plan.

As of 2016 only 7 Game Farms are fully fenced. To obtain a license to operate a Game Farm. the applicant must meet the following criteria: Obtain land license (DUAT in accordance with Land Law); submit a Management Plan; introducing the wildlife in accordance with the law and carrying capacity. Since February 2016 the management and licensing of Game Farms is under ANAC. No Hippo Harvesting will take place in Game Farms except for potential PAC operations or community quotas.

17. Harvesting in areas with open access: What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	None	1
	Low	**2**
	Medium	3
	High	4
	Uncertain	5

A very limited number of hippos were allocated in quotas given to free areas designated a Multiple Use areas, managed at provincial level. This quota was given mainly for Problem Animal Control (PAC).

18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	1
	Medium confidence	2
	Low confidence	3
	No confidence	4
	Uncertain	5

The main constraints to effectively implement harvest controls are of financial nature. Now that since 2014-15 all hunting areas are under the control of ANAC and through the World Bank MOZBIO project, a better coordination of activities is underway. Training of provincial directorates on hunting issues is also important to improve the quality of the controls they are already performing.

Monitoring of harvest

19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	**Direct population estimates**	**1**
	Quantitative indices	2
	Qualitative indices	3
	National monitoring of exports	4
	No monitoring or uncertain	5

Harvest Monitoring in Mozambique is based on a variety of systems:

a) Aerial surveys (see points 6 and 7);

b) An important monitoring tool is represented by the regular verification of the conditions included in the Management Plan of the hunting area, in the Annual Plan and in the Annual Activity Report that is done according to a specified format, valid for all hunting areas in the country (Hunting Blocks, Community Programs, Coutadas and Game Farms) Safari operators enter in a contractual agreement with ANAC in accordance with law 10/99 and law 16/2014 and among the various obligations for the safari operator prescribed in the contract, there is the Safari Operator's Annual Activity Report, where the operators are obliged to report all the activities related to the hunting season. These reports, developed by ANAC in a format to be compiled by the operators, contain an important amount of information such as quota and harvest monitoring, wildlife monitoring, law enforcement activities and communities and social aspects. These reports are analysed by ANAC also to verify any differences between the activities implemented and planned in the Annual Plan, which is another obligation of the safari operators;

c) The provincial offices of MITADER monitor the harvest of hippos through the trophy ownership certificates issued for every trophy harvested in Mozambique and through periodical visits to the hunting areas;

d) The Niassa National Reserve (NNR) developed internal hunting regulations since 2006 when it was managed by the Sociedade para a Gestão e Desenvolvimento da Reserva do Niassa Moçambique (SRN) in partnership with the then Ministry of Tourism. These hunting regulations were revised in 2013 since the Reserve is now co-managed by Wildlife Conservation Society and ANAC/MITADER since 2012. The Niassa Carnivore Project (NCP) is conducting regular monitoring of wildlife, in particular on large carnivores, in the NNR and some of the adjacent hunting blocks and other concessions since 2003. Regular counts of hippo in the Lugenda River between the Mbamba River confluences and the Msangezi River confluence (26 km) were done on foot and by canoe between 2004 and 2015. The hippo population in the monitored stretch of the Lugenda river has steadily increased from 76 hippos in 2004 to 183 hippos in 2015 (NCP 2015); and

e) CITES Annual Report data could play a very important role in monitoring, and better use of these data, along with better communication between CITES Authorities of different countries, would allow to build up increasingly accurate pictures of the effects of international trade on population trends. An analysis was done in accordance with the "Guide to using the CITES Trade Database", available at: http://trade.cites.org/cites_trade_guidelines/en-CITES_Trade_Database_Guide.pdf , with the following methodology: a search was done on the online CITES trade database (http://trade.cites.org/en/cites_trade/) using the trade terms, "trophies", "teeth", "tusks" and "skulls" and selecting the year range 2004-2013, Mozambique as the country of export, "All countries" for importing countries, "All sources", "All purposes", selecting "trophies", "teeth", "tusks" and "skulls" for trade terms, searching by taxon: *Hippopotamus amphibius*, selecting output type "csv", and selecting report type "Comparative Tabulations". The records where the origin was provided were deleted as these data represent re-exports. The following data were retrieved and are presented in table F.

Table F: Trade in Hippo hunting trophies from Mozambique 2004 – 2013 (source CITES Trade Database- MZ CITES Annual Reports)

Year	*Trophies*	*Teeth*	*Tusks*	*Skulls*
2004	*50*			
2005	*90*	*12*		
2006	*65*			
2007	*67*			
2008	*51*			
2009	*83*	*168*	*56*	*10*
2010	*68*	*36*	*402*	*6*
2011	***0 (95) see Note***	268	860	82
2012	***0 (99) see Note***	102	130	764
2013	*0*		*12*	

Note: 94 permits were issued for 95 hippos in 2011 and 98 permits were issued for 99 hippos in 2012 based on the analysis of the CITES annual reports of Mozambique.

In particular, an analysis of the 2012 Annual Report to CITES was carried out, to ascertain the origin of the abnormal number of skulls reported for that year that would have represented 764 hippos exported! It was discovered that erroneously 12 "skulls" instead of 12 "teeth" were reported and appeared in 66 out of 98 permits issued for 99 hippos exported in that year. A similar analysis was done for the year 2011 and there were 94 permits issued for 95 hippos.

12 teeth are normally exported as a trophy (Moore J. (AMOS Mozambican Association of Safari Operators) pers.comm.), the 4 canines and the 8 incisors. Therefore 12 teeth represent a hippo. The discrepancies in reporting suggested by the CITES recommendations are probably based on this mistake. The analysis is available on request. For the sake of clarity, sometimes a tooth is broken or missing and a tooth or a couple of teeth will not slide out of the jaw. If a client wants the skull, the tooth / tusk in the skull is left in the skull instead break open the skull / jaw in order to remove it. The taxidermist will take care of the removal before export. Adult hippos have thirty-six teeth including two incisors, one canine, three premolars and three molars on each half of the jaw on both sides. However, Adult hippos can retain some of their milk teeth for some years after developing their adult teeth meaning some hippos can have as many as forty teeth for a few years. (Laws 1968).

Moreover, it takes time 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 leading to a misjudgement of harvest levels.

Furthermore, as we cannot judge the annual reports of the importing countries we recommend a series of actions based on the following assumptions; a) trade analysis based on the CITES Trade Database is at least outdated by two years, and therefore it cannot detect with the necessary timing possible infractions and b) as mentioned above, it takes time 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 leading to a misjudgement of harvest levels.

Taking the above into account it is recommended that permits issued by the CITES Management Authority of Mozambique for

hippo or in general for hunting trophies of CITES-listed species be verified as follows:

a) Any Party that wishes to verify the authenticity of CITES permits and certificates issued by Mozambique should make a request for verification of CITES documentation to the CITES Management Authority of Mozambique;
b) On request, the CITES Management Authority of Mozambique will provide information to allow permit verification (e.g., provide a copy of the permit or certificate as issued, or verify a copy of the document provided by the importing country); and
c) The CITES Management Authority of Mozambique will provide information within 15 business days of the request for verification. If this is impossible, the Management Authority shall indicate a date by which they consider it will be possible to provide the information requested.

The procedure outlined above will avoid erroneous trade analysis and will also improve CITES enforcement as a whole, with the possible detection of fraudulent permits accepted by the countries of import.

In conclusion, the above satisfies the request to Mozambique to "clarify the perceived discrepancies between reported Customs data (imports) and CITES data (exports)" referred to in document AC25 Doc. 9.4" contained in the second part of point a) of the outstanding recommendation of the Standing Committee under the CITES Review of Significant Trade as levels of export of hippo trophies from Mozambique in the 2009-2012 period were not cause for concern.

Finally, although there is a monitoring system in place as discussed above, it is recommended to ANAC to adopt a specific monitoring system for hippo that all hunting concessions that have hippo in quota shall implement. The proposed monitoring system, using ground counts, has been provided to ANAC as a separate document. As population dynamics of hippo appears to be unusual (Smuts & Whyte 1981, Chomba et al. 2012), the population response to management interventions is difficult to predict. The proposed system includes several key parameters that needs to be monitored: population numbers, ages of all hippo killed, reproductive data, habitat use and human/hippo conflict because harvesting through sport hunting and problem animal control should be seen as an active adaptive management research opportunity. Under active adaptive management the effort is deliberately varied over a period of time so that the population characteristic (or response to the harvest) can be defined.

20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	1
	Medium confidence	2
	Low confidence	**3**
	No confidence	4
	Uncertain	5

There are budgetary, manpower and logistical constraints in Mozambique, but generally regular monitoring of hippo harvest takes place and will be optimal with the implementation of the specific monitoring system for hippo outlined in point 19.

Incentives and benefits from harvesting:

21. Utilisation compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	**Beneficial**	**1**
	Neutral	2
	Harmful	3
	Highly negative	4
	Uncertain	5

When compared with the threats identified in point 9 above, legal, regulated harvest is beneficial for a variety of reasons.

Legal hunting is beneficial because it generates incentives for landowners (government, private individuals or communities) to conserve or restore wildlife on their land thereby conserving habitats, generate revenue for wildlife management and conservation, including anti-poaching activities and increase tolerance for living with wildlife, reducing the effects of human-wildlife conflicts and reducing illegal killing (IUCN 2016, Cooney et al.2017).

Concessions holders secure the areas with antipoaching teams, provide permanent and seasonal jobs to local people, provide benefits to the local communities in kind and cash, and improve habitat and wildlife conditions.

As also recognized by the authors of recent reports on the aerial survey of elephants carried out in 2014" Current protection status seems to be dependent on the management holders of hunting concessions in the area" (Grossmann et al 2014c). This report is from the area that holds the most important hippo population in Mozambique, the second largest elephant population and an important lion population. The same applies to the majority of the areas where hunting occurs in Mozambique. The recent decrease of hunting clients due to the world economic crisis, but also to restrictions on import of some species, could have disastrous consequences on the wildlife in Mozambique. The hunting operators are the first line of defence in the fight against illegal activities and their devotion to conservation is limited if financial resource is taken away by blanket import suspensions.

The analysis of the Safari Operator's s Annual Activities Reports shows a high degree of commitment and actions of the hunting operators toward wildlife conservation but also toward improving the livelihoods of some of the poorest rural communities in Africa.

22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	1
	Medium	**2**
	Low	3
	None	4
	Uncertain	5

An analysis of the Safari Operator's s Annual Activities Reports shows the following benefits that sport-hunting provides to wildlife and their habitat:

1) direct revenues e.g., jobs for local people. Safari Hunting Companies employed more than 800 people in 2015 of which about 40% were seasonal workers. Among these people there were also the anti-poaching teams.
2) Meat is provided to the local communities. Although is difficult to assess the quantity, it is an important source of protein and increase the tolerance of communities toward wildlife and their understanding of legal regulated harvesting.
3) assignment of monetary value to large dangerous animals and thus, increased incentive for rural people to tolerate hippos outside of National Parks,
4) increased financial and logistical support for anti-poaching,
5) protection of native species through decreased bush-meat poaching, Thousands of snares are removed annually by the anti-poaching teams of the hunting operators.
6) protection of habitat against land conversion and unsustainable resource extraction e.g., logging and mining
7) decreased livestock presence, overgrazing and associated desertification

Each point serves to reduce existing threats as well as tolerance of rural communities toward wildlife, all of which serve to reduce poaching.

In financial terms anti-poaching, area management and community development voluntary expenditures were analysed for 13 Hunting Operators and data are presented in Table G below.

Table G: Voluntary Contributions of 13 Hunting Operators for Anti-poaching, Block development and community development 2013-2015 (in USD).

Anti-poaching (USD)	*Block Development (USD)*	*Community Development (USD)*	*TOTAL*
1.222.500,00	*955.150,00*	*830.300,00*	*3.007.950,00*

Source: ANAC

23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	1
	Medium	**2**
	Low	3
	None	4
	Uncertain	5

Legal harvesting of hippo contributes to habitat conservation because the hunting operators through their anti-poaching teams and through their contractual and legal obligations, provide important actions for this purpose. Habitat conservation is a priority in hunting concessions.

Throughout current hippo range, the best quality and largest tracts of intact habitat are located in Conservation Areas(CAs) which includes Hunting Areas such as Coutadas, Hunting Blocks of NNR, Community Programs and game farms (CEAGRE 2015), that together comprise nearly contiguous ecosystems. In Mozambique, hunting areas declared as CAs that support hippo is approximately twice the size to its National Parks and National reserves where hunting is prohibited. Sport-hunting serves to keep lands wild thereby protecting vast tracts of habitat. Therefore, where hunting operations are in place, the threat of habitat modification and loss are significantly reduced.
In many of Mozambique's Hunting areas, safari hunting operations represent an important form of protection for wildlife and other natural resources. In the absence of safari operations and where there are no other sources of income and meat for rural people, encroachment and habitat degradation via deforestation (e.g. charcoal production) occurs very quickly i.e., often within a matter of weeks to months. Initial encroachment for resource extraction (charcoal, poaching) is typically followed by establishment of villages, conversion to agriculture, and introduction of domestic livestock.

With the establishment of hunting and the protection that it provides for the habitat and animals, many short-term effects of habitat modification can be reversed in a short time (relocation of settlements, secondary regeneration of bush). Likewise, although the recovery period could be longer, habitats that have suffered longer-term negative impacts to the environment (severe habitat degradation by overgrazing of livestock) can, under proper management, be restored to support wildlife. Examples in Mozambique of the above are some of the Coutadas, or, in the SADC region, the Conservancies in Namibia, in conservancies in Zimbabwe's South Lowveld and Zambia's Open Game Ranches.

Thus, sport-hunting serves to significantly reduce the rate of habitat degradation and loss, and, when established and promoted in already degraded areas can serve to restore habitat for hippo and wildlife.

Protection from harvest:

24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	**>15%**	**1**
	5-15%	2
	<5%	3
	None	4
	Uncertain	5

Harvest is prohibited in the recently established (2013) Magoè National Park that covers nearly 45% of the southern shore of Cahora Bassa Dam that accounts for 50% of the hippo populations in Mozambique. Other important hippo populations excluded from harvest are found in Gorongosa National Park, and in protected areas along the Save River (Zinave National Park and Coutadas 4 and 5 that will not receive a quota for the time being). Therefore, a substantial part of the population is excluded from harvest. Moreover, according to the Mozambique legislation, it is a crime, punishable with imprisonment up to sixteen years, to harvest without a license, any protected or prohibited species of wildlife, including the species listed in Appendices I and II of CITES.

25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	1
	Medium confidence	**2**
	Low confidence	3
	No confidence	4
	Uncertain	5

As one of the poorest countries in the world Mozambique faces important environmental challenges. In particular, budgetary constraints have been and, in some cases, continue to be an impediment to achieve proper effectiveness of natural resources' protection. In the last years thanks to the successful partnership between the government and many key national and international players over the past 15 years, including among others, the World Bank, IFC, GEF, AfD, KfW, PPF and USAID, several progresses have been achieved including the approval of a new Conservation Policy and Conservation Areas Law (16/2014); and the establishment of the Administração Nacional das Áreas de Conservação (ANAC) as an autonomous public agency tasked with the management of all Conservation Areas. Recently (2016), the 2014 Conservation Law has been strengthened with stronger penalties to punish illegal activities especially on wildlife related crimes.

Moreover, the Government of Mozambique, with the assistance of the World Bank, is implementing the MOZBIO project, an ambitious long-term program that brings biodiversity conservation, tourism development and poverty reduction together. A sub-component of this project is dealing with the improvement of sustainable wildlife utilisation and will support the provision of training and technical assistance, including advisory services for the establishment of a management system for revenues collected from sport hunting, to improve the statistics and collection of sport hunting activities, and development of sport hunting and species plans and studies and land availability studies.

Trophy hunting in Mozambique has developed over the last 15 years to the point where it is now recognized as a sustainable and economically viable form of land use that is consistent with the national policy of promoting wise-use of wildlife. It is also recognized that the industry can directly benefit rural communities living within, or bordering onto Reserves and hunting areas, and can contribute significantly to the protection of CAs in general. Such benefits can be in the form of employment, social amenities (schools, clinics etc.) and from skills transfer across a broad range of opportunities (camp managers, mechanics, administration, professional guiding, hospitality etc.) (World Bank 2014).

26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse)?	Very effective	1
	Effective	**2**
	Ineffective	3
	None	4
	Uncertain	5

The quota system together with the restricted hunting season (April-November) are the main mechanisms for restricting harvest. Management of damage causing animals outside of protected areas is based on a National Strategy with clear interventions options.

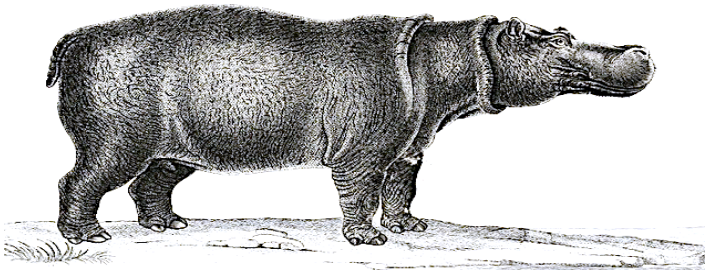


Illustration from: Frédéric Cuvier - Histoire naturelle des mammifères (1819–1842)

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INFORMATION ON PENINSULAR MALAYSIA'S NON-DETRIMENT FINDINGS APPROACH FOR TRADE IN RETICULATED PYTHON (*Python reticulatus*) SKINS

This report has been prepared for the CITES Secretariat by the CITES Management and Scientific Authorities of Malaysia.

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INTRODUCTION

The harvest and trade of reticulated pythons (*Python reticulatus*) for their skins has been ongoing in Malaysia since the 1950's (Groombridge and Luxmoore, 1991; Jenkins and Broad, 1994). Today, a harvest quota restricts the number of specimens harvested each year to 162,000, making Malaysia the largest exporter of reticulated pythons after Indonesia (Ashley, 2013). In 2002, the European Union banned imports of reticulated python skins from Peninsular Malaysia because of high trade volumes and a lack of robust data on harvest sustainability. Despite the European ban, pythons continue to be harvested by local people and exported to other markets, primarily in Asia.

Reticulated pythons were selected for the CITES Review of Significant Trade process after CoP15 in Doha. During this review, harvest and export of the species from Malaysia was highlighted as of "possible concern", due to uncertainty about the conservation status and sustainability of international trade in Malaysian snakes. At CITES AC28 in Tel Aviv, Israel, the Animals Committee provided the following recommendations, which must be addressed by Malaysia by 2 June 2016:

- *Provide the Secretariat with the results of the non-detriment finding study due for completion by the end of 2015*, and

- *Establish, in consultation with the Secretariat, a revised annual export quota (including zero quota if appropriate) for wild taken specimen based on the results of the study mentioned above*.

The present report is Malaysia's response to these recommendations. The report has the following objectives:

1) To provide a summary of the biology and trade of reticulated pythons in Malaysia,

2) To provide detailed results of Malaysia's non-detriment findings studies,

3) To present steps taken to revise management protocols and future NDF monitoring programs for reticulated pythons in Malaysia

4) To provide information to support the conclusion of non-detirmnetal trade in reticulated python skins from Malaysia.

A NOTE ON THE CONTENT OF THIS REPORT

Malaysia is comprised of three distinct administrative regions: the east Malaysian states of Sabah and Sarawak on the island of Borneo, and Peninsular Malaysia on mainland Asia (comprised of 11 states). Sarawak does not harvest or export reticulated pythons for trade and Sabah has historically exported only small numbers (< 12,000). Since 2013, Sabah has implemented a quota of 3,000 individuals; however, this quota has not been fulfilled in recent years (S.N.A. Acheh pers. comm. 2015). For this reason, the present report focuses exclusively on the harvest and trade of reticulated pythons in Peninsular Malaysia, where all Malaysian python skins destined for export are sourced. Further details on differentiation of pythons from Sabah and Peninsular Malaysia was provided to the CITES Secretariat and accepted at AC27 in Veracruz, Mexico.

CHAPTER 1: SUMMARY OF RETICULATED PYTHONS AND THEIR TRADE IN PENINSULAR MALAYSIA

Basic Biology

The reticulated python (*Python reticulatus*) is one of the most abundant and widespread animal species in Southeast Asia (Murphy and Henderson, 1987; Auliya, 2006). Reticulated pythons are also the world's longest terrestrial land animal, with recorded lengths of up to 10 metres (Murphy and Henderson, 1987). However, most individuals grow to around 4 meters in length (Shine *et. al.* 1999). Reticulated pythons are habitat generalists, being found in primary and secondary forests, swamps, degraded agricultural lands and even cities, up to the altitude of 1,500 m above sea level (Cox *et. al.* 1998; Auliya, 2006). Available evidence suggests that reticulated pythons have benefitted from the expansion of oil palm plantations throughout their range due to high densities of rodents preyed upon by the snakes (Shine et al. 1999). The retiuculated python is distributed throughout all Malaysian states, and is particularly common in Peninsular Malaysia (Fig. 1).

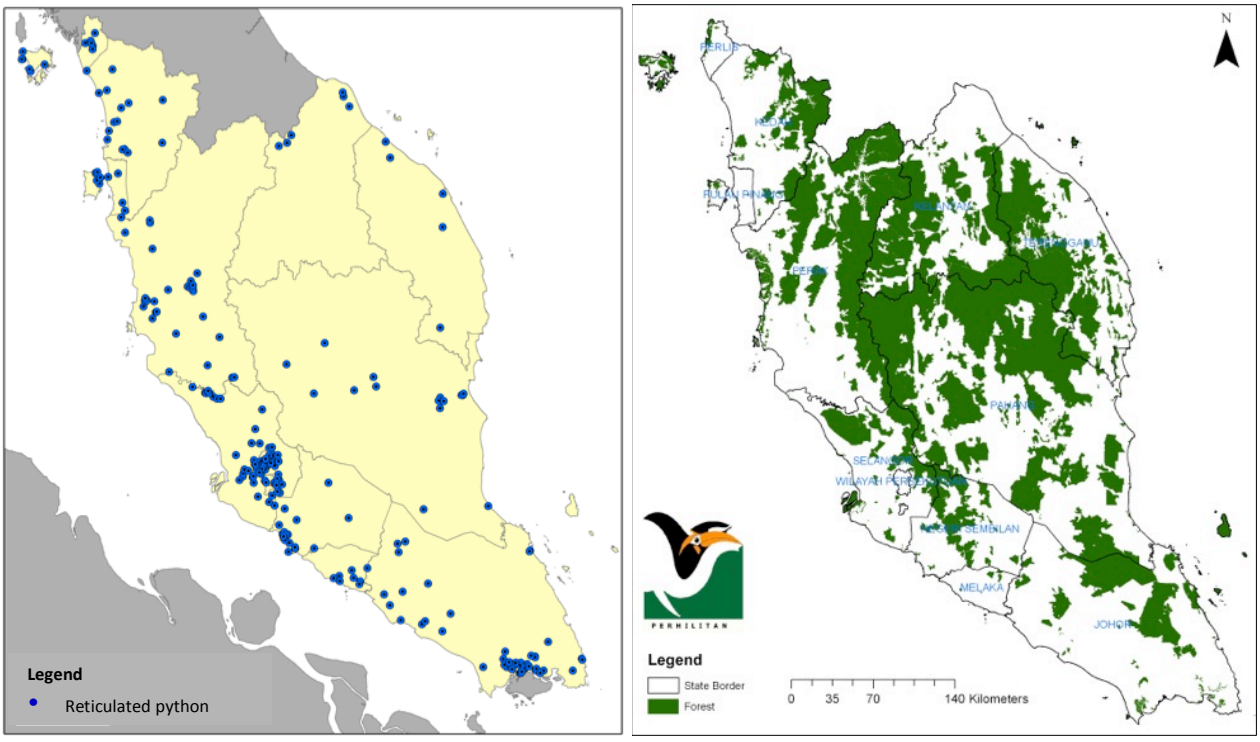


Fig. 1. The distribution of (left) reticulated pythons and (right) forests in Peninsular Malaysia. Data on python locations recorded from inventories, population studies and human-wildlife conflicts. It is reasonable to assume the species is distributed throughout Peninsular Malaysia.

Overview of Trade from Peninsular Malaysia

The skins of reticulated pythons are highly sought after for use in fashion products (e.g., garments and handbags). Other snake-derived products (e.g., byproducts of the skin trade, such as meat and gall bladders) are also traded within local markets. Peninsular Malaysia imposed a voluntary export quota of 180,000 skins in 2005. In 2010, the Malaysian CITES Scientific Authority (the Department of Wildlife and National Parks or PERHILITAN) began an intensive CITES non-detriment findings study on reticulated pythons. As a precautionary measure, and to better reflect export volumes in previous years, in 2011 the export quota was reduced to 162,000 skins per year. Exports have remained stable since that time (Fig. 2).

The Malaysian CITES Scientific and Management Authorities are unable to explain the large fluctuations in trade volumes directly before and after the ban on imports by the European Union. These exports took place at a time when trade regulation was weaker than it is today. For this reason, we are reluctant to draw conclusions about sustainability using these data.

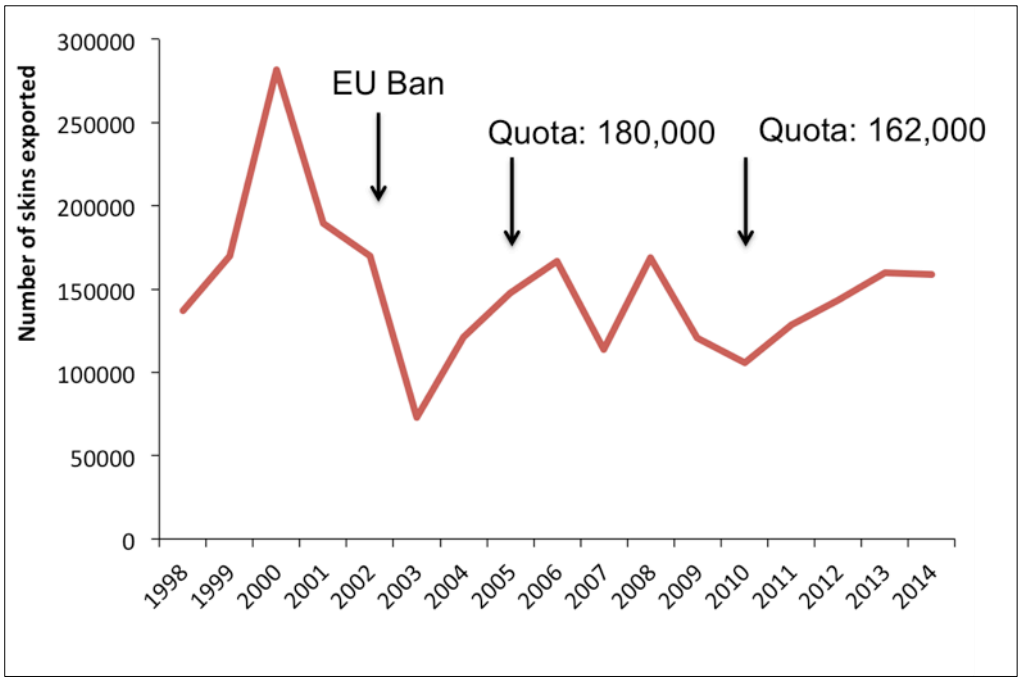


Fig. 2. Annual exports of reticulated python skins from Peninsular Malaysia since 1998. Arrows indicate the years in which significant events took place. EU = European Union.

Hunting and Trade Management

The trade in reticulated pythons is regulated by the Department of Wildlife and National Parks (DWNP) Peninsular Malaysia (*Jabatan Perlindungan Hidupan Liar dan Taman Negara*; PERHILITAN), which acts as the CITES Scientific Authority. Together with the Malaysian Ministry of Natural Resources and Environment (NRE), PERHILITAN also acts as the CITES Management Authority. The reticulated python is a protected species in Peninsular Malaysia, but hunting of the species is allowed by the Wildlife Conservation Act 2010 (Act 716) under the following conditions:

i. Only licensed hunters are legally permitted to catch *P. reticulatus* using nets or by hand. No shooting or destructive methods are allowed. Initially, Malaysia implemented a maximum catch quota of 50 pythons per hunting license, which was valid for three months of the hunting period. When the Malaysian Wildlife Conservation Act 2010 (Act 716) replaced Act 76 in 2010, the cost of hunting licences increased from USD 12 to USD 117 per licence for 50 heads (Federal Government Gazette: Wildlife Conservation (License, Permit and Special Permit Fees) Regulations 2013). However, this sudden substantial increase in fees was disproportionate to the market value of pythons and was revised to USD 24 per licence in 2013 (Federal Government Gazette: Wildlife Conservation (License, Permit and Special Permit Fees) (Amendment) Regulations 2013). Hunting licences are now valid all year with allowable hunting periods between the hours of 0700 to 1900 (Federal Government Gazette: Wildlife Conservation (Open Season, Methods and Times of Hunting) Order 2014).

ii. Hunting licenses issued by a state are only applicable for hunting activities within that respective state. For example, if a hunter collects pythons from both Selangor and Perak States, two licenses are required.

iii. Licensed traders are allowed to source their pythons from licensed hunters or other licensed traders. Every trade transaction must be recorded in a logbook provided by PERHILITAN. Transaction details include the date of transaction, number of pythons, source person (with license number), and remaining stock. Enforcement officers check this logbook regularly.

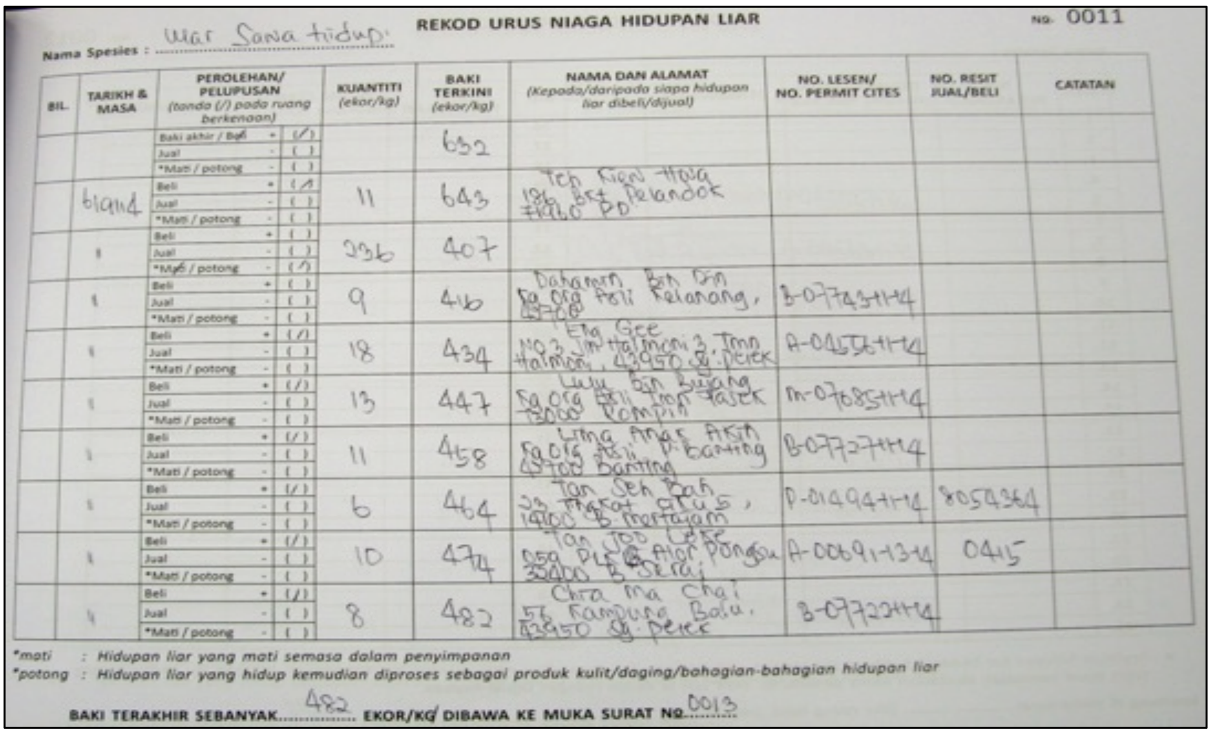
iv. CITES exports are issued by CITES registered offices in Kuala Lumpur, Penang or Johor Bahru. When an application for export is submitted, the exporter is required to make the stock available for examination by officers of PERHILITAN. Officers count and record every single skin destined for export, and seal and stamp the boxes with unique identifiers held by the department. When the exports are checked by customs, any skin not possessing a PERHILITAN stamp, or having a broken seal, are seized.

v. State Government has the right to impose additional regulations via the State's Enactments, as natural resources are considered State-owned. Such an enactment has

been implemented by the Sultan of Johor, who has forbidden hunting of all animals except feral pigs in the state.

Sustainability Monitoring

In addition to hunting licences, PERHILITAN issues logbooks to all python skin traders and requires records of data and aquittals for trade in pythons (Figs. 3 & 4). The information gathered includes the number of snakes purchased and killed for trade, the names and addresses of all hunters selling snakes, and the total body mass of pythons brought to processing facilities. PERHILITAN uses the data gathered to examine trends in harvest numbers, verify hunter details and link the information to enforcement actions taken by the Department.


REKOD URUS NIAGA HIDUPAN LIAR

No. 0011

Nama Spesies : Ular Sawa hidup.

BIL.	TARIKH & MASA	PEROLEHAN/ PELUPUSAN (tanda (/) pada ruang berkenaan)	KUANTITI (ekor/kg)	BAKI TERKINI (ekor/kg)	NAMA DAN ALAMAT (Kepada/daripada siapa hidupan liar dibeli/dijual)	NO. LESEN/ NO. PERMIT CITES	NO. RESIT JUAL/BELI	CATATAN
		Baki akhir / Beli + (/) Jual - ( ) *Mati / potong - ( )		632				
	6/and4	Beli + (/) Jual - ( ) *Mati / potong - ( )	11	643	Teh Kien Hoa 186 Bkt Pelandok 71960 PD			
	"	Beli + ( ) Jual - ( ) *Mati / potong - (/)	236	407				
	"	Beli + ( ) Jual - ( ) *Mati / potong - ( )	9	416	Dahamin Bin Din 5a Org Asli Kelanang, 42700	B-07743-1-14		
	"	Beli + (/) Jual - ( ) *Mati / potong - ( )	18	434	Eng Gee No 3 Jln Halmoni 3, Tmn Halmoni, 43950 Sg. Pelek	A-04556-1-14		
	"	Beli + (/) Jual - ( ) *Mati / potong - ( )	13	447	Lulu bin Bujang Kg Org Asli Tpn Pasek 73000 Rompin	M-07685-1-14		
	"	Beli + (/) Jual - ( ) *Mati / potong - ( )	11	458	Lina Anak Akin Kg Org Asli P. Banting 42700 Banting	B-07727-1-14		
	"	Beli + (/) Jual - ( ) *Mati / potong - ( )	6	464	Tan Seh Bah 23 Tingkat Atas 5, 14000 B. Mertajam	P-01494-1-14	8054364	
	"	Beli + (/) Jual - ( ) *Mati / potong - ( )	10	474	Tan Joo Leke 059 PLG Alor Pongsu 35400 B. Serai	A-00691-13-14	0415	
	"	Beli + (/) Jual - ( ) *Mati / potong - ( )	8	482	Chia Ma Chai 56 Kampung Baru, 43950 Sg. Pelek	B-07722-1-14		

*mati : Hidupan liar yang mati semasa dalam penyimpanan
*potong : Hidupan liar yang hidup kemudian diproses sebagai produk kulit/daging/bahagian-bahagian hidupan liar

BAKI TERAKHIR SEBANYAK 482 EKOR/KG DIBAWA KE MUKA SURAT NO. 0013

Fig. 3. An example trader logbook used for record keeping in Peninsular Malaysia. Traders are required to record every trade transaction.

(a)

WILDLIFE TRADING RECORD **No. 0011**

Species Name: Live Reticulated python

No.	DATE & TIME	ACQUIRE/DISPOSE (mark (/) in relevant column)		QUANTITY (heads/kg)	CURRENT BALANCE (heads/kg)	NAME & ADDRESS (to/from who wildlife are bought/sold)	LICENSE NO./ CITES PERMIT NO.	BUY/SELL RECEIPT NO.	NOTE
		Final balance / ~~Buy~~	(/)		632				
		Sell	( )						
		*Dead/slaughtered	( )						
	6/9/14	Buy	(/)	11	643	Tek Kion Hwa, 186 Bukit Pelandok, 71960 PD			
		Sell	( )						
		*Dead/slaughtered	( )						
	"	Buy	( )	236	407				
		Sell	( )						
		*~~Dead~~/slaughtered	(/)						
	"	Buy	(/)	9	416	Dahaman bin Din, Kg Orang Asli Kelanang, 41700	8-0774311-14		
		Sell	( )						
		*Dead/slaughtered	( )						

(b)

WILDLIFE TRADING RECORD **No. 0011**

Species Name: Reticulated python skins

No.	DATE & TIME	ACQUIRE/DISPOSE (mark (/) in relevant column)		QUANTITY (heads/kg)	CURRENT BALANCE (heads/kg)	NAME & ADDRESS (to/from who wildlife are bought/sold)	LICENSE NO./ CITES PERMIT NO.	BUY/SELL RECEIPT NO.	NOTE
		Final balance / ~~Buy~~	(/)		2,043				
		Sell	( )						
		*Dead/slaughtered	( )						
	6/9/14	Buy	( )	236	2,279				
		Sell	( )						
		*~~Dead~~/slaughtered	(/)						

Fig. 4. Translation of the logbook presented in Figure 3 (above), showing information recorded for (a) transactions involving live pythons and (b) their skins. The different logbooks traders are required to keep allows syncronisation and thus verification of information for enforcement purposes.

Traceability

PERHILITAN does not require individual skins to be tagged. Instead, whenever a trader applies to the Department for issuance of CITES permits, the trader must allow Department staff to visit their premises and verify the packaging of the python skins. The boxes of skins are packaged together and closed using a department-issued seal. In some states, the shipment is then escorted to the port by department staff. If the seals are broken or tampered with at any point, the shipment is void and is seized at customs.

CHAPTER 2: THE BASIS FOR NDF – MARK RECAPTURE

Background

In 2010, the Malaysian CITES Scientific Authority (PERHILITAN) initiated an intensive mark-recapture study on reticulated pythons in Peninsular Malaysia. The objective was to census the wild python population, and use the data gathered to inform a precautionary and science-based harvest quota for this species. It was our hope that the results of this research would provide a baseline of reticulated python abundance in Peninsular Malaysia, and allow the Scientific Authority to conduct follow-up monitoring to examine trends in population densities under constant offtake.

***Important note:** PERHILITAN submitted a naïve population density estimate to the CITES Secretariat in 2013. At that time, the field study described herein was still in operation and data were still being gathered and analysed. To comply with the Secretariat's request for information, PERHILITAN submitted brief preliminary results only. Since then, we have gathered a larger amount of data, and have re-analysed those data using a more robust methodology. This has resulted in a change in our original population size estimates.

Methodology

We surveyed five sites for reticulated pythons between 2010 and 2013 (Table 1). Each site comprised two habitat types: (1) secondary forests, and (2) oil palm plantations. One of our sites (Setiu) was chosen as a control site because no hunting licenses have been issued for reticulated pythons in the state of Terengganu. Sabak Bernam was chosen because it is a site of intensive harvest with a high number of snake hunters. The other sites were chosen as intermediately harvest sites.

Table 1. Name and geographic locations of mark-recapture study sites for reticulated pythons in Peninsular Malaysia.

Geographic location in Peninsular Malaysia	Mark-recapture sites
East	Setiu, Terengganu
Mid-West	Sabak Bernam, Selangor
North	Kerian, Perak
East	Pekan, Pahang
North	Kuala Muda, Kedah

Survey Protocols

We used two methods to capture pythons. First, we deployed fishing nets with a maximum mesh size of 3-inches across slow flowing rivers and man-made drainages (Fig. 5). Where possible, we set nets in shaded areas following advice from the licensed hunters who assisted us (captures of pythons are much lower if nets are set in areas of direct sunlight). No bait was used to attract the snakes. Instead, pythons are captured when they swim into the nets and become tangled in the mesh. The second method used to capture pythons was a modified bubu (fish trap), with a trap opening of 3 feet in diameter. Branches with leaves (e.g. of palm trees) were placed on both sides of the bubu and extended to the riverbank (to ensure that any python swimming in the canal is directed to the bubu opening). We baited the traps with live ducklings to attract pythons, which can detect the heat of the prey species. Ducklings were provided food and monitored for well-being throughout the study.

Fig.5. Nets and fish traps deployed in small drainages to capture pythons

We checked all nets and fish traps twice per day for one week. At each site we deployed 20 nets and 10 fish traps (divided evenly between the two habitat types), with a distance of 250 metres between each net and trap. This corresponded to a linear survey distance of 3.75 km per habitat type. To obtain a survey area measurement, we assumed that pythons would travel to and use canals from the surrounding landscape. Canals in our survey landscapes (secondary

forest and oil palm plantations) are built parallel to one another with a mean distance of 50 m between them. We assumed that pythons would travel to and use the canals nearest to them. Therefore, we assumed a working survey width of 50 m (25 metres either side of the canal in which we established our nets and fish traps). Thus, we surveyed 0.1875 km^2 in each habitat type (3.75 km x 50 m). To establish a naïve population density estimate we divided the total number of pythons captured by the survey area in each habitat. We assumed equal catchability within drainages in both habitat types at all sites.

Once pythons were captured, we marked all individuals using a passive intergrative transponder (PIT) tag to allow identification on subsequent encounters. In addition, we clipped the ventral scales of all snakes in a unique configuration as a back-up (Fig. 6). For every snake we also recorded the following morphological data: sex, head length (HL, mm), snout-vent length (SVL, mm), tail-length (TL, mm), and body mass (BW, g). We sexed pythons by inserting a steel probe into the cloacal bursae and recording probe depth. Saliva and blood samples were also collected and deposited at Wildlife Genetic Resources Bank (WGRB) for future references in DNA analysis.

Fig. 6. Ventral scale marking of reticulated pythons as part of a study in Peninsular Malaysia.

Results

In 2010 we captured four pythons within secondary forest and three pythons in oil palm plantations (Table 2). No snakes were captured in Kerian and no recaptured were recorded. Due to the small sample sizes despite the high catch effort, sampling was repeated at the same sites in 2011. In 2011 we captured six pythons in secondary forest and five in oil palm plantations (Table 2). There was also no recapture record for this year. In order to derive a more presentable estimate for the python population in Peninsular Malaysia, sampling was widened to additional sites in the following year. We established a mark-recapture study site in Pahang (a state in east Peninsular Malaysia) and Kuala Muda, which is located further North-west

(Table 1). Sampling days and catch effort for 2012 was the same as the previous year. Similar to the two previous years, only a small number of pythons were captured in 2012 (Table 2).

Table 2: Records of python caught during mark-recapture studies between 2010 and 2012.

Year	Site	Sex	Habitat	Method	TOL (mm)	TL (mm)	SVL (mm)	HL (mm)	BW (g)
2010	Sabak Bernam	Female	Secondary forest	Net	2,740	400	2,340	60	6,500
		Female	Secondary forest	Net	3,570	530	3,040	90	12,200
		Male	Secondary forest	Bubu	3,780	530	3,250	110	15,500
		Female	Oil palm plantation	Net	2,860	410	2,450	90	5,500
	Setiu	Female	Secondary forest	Bubu	3,218	423	2,785	96	10,500
		Female	Oil palm plantation	Bubu	3,200	435	2,765	90	7,350
		Female	Oil palm plantation	Bubu	3,400	451	2,949	109	9,500
	Kerian	No captures							
2011	Sabak Bernam	Female	Secondary forest	Net	3,210	420	2,790	90	11,000
		Female	Secondary forest	Bubu	3,954	504	3,450	117	15,700
		Male	Secondary forest	Net	2,860	399	2,461	80	7,000
		Female	Secondary forest	Bubu	3,882	365	3,517	115	21,100
		Male	Oil palm plantation	Net	3,035	445	2,590	95	9,000
		Female	Oil palm plantation	Net	2,736	373	2,363	75	5,100
		Female	Oil palm plantation	Net	3,090	495	2,595	89	8,600
	Setiu	Female	Oil palm plantation	Bubu	3,400	451	2,949	109	9,500
	Kerian	Male	Secondary forest	Bubu	3,220	370	2,850	110	9,600
		Male	Secondary forest	Net	3,270	460	2,810	90	7,900
		Female	Oil palm plantation	Bubu	3,425	483	2,942	100	12,500
2012	Pekan	Male	Oil palm plantation	Net	3,010	425	2,585	95	9,000
		Male	Oil palm plantation	Net	3,020	420	2,600	100	7,000
		Female	Oil palm plantation	Net	3,317	459	2,858	110	9,100
		Male	Oil palm plantation	Net	2,850	385	2,465	90	5,900
	Kuala Muda	Male	Secondary forest	Net	3,225	420	2,805	90	9,000
		Male	Secondary forest	Bubu	3,640	540	3,100	100	9,090

We used the basic results from surveys between 2010 and 2012 to derive a naïve estimate of population size for reticulated pythons in Peninsular Malaysia. Naive estimates were calculated based on the number of pythons at all study sites for each habitat, divided by the total coverage of those habitat types in Peninsular Malaysia (Table 3).

Table 3. A naïve population estimate for reticulated pythons in Peninsular Malaysia, 2012.

Habitat type coverage	**Estimated Individual/km^2**	**Naïve population estimates (individual)**
Forest (61,555 km^2)	5-21	307,775 – 1,292,655
Oil palm plantation (29,157 km^2)	5-21	307,775 – 612,297
Total		**615,550 – 1,904,952**

To improve our density estimates, in 2013 we increased our catch effort to 10 days and deployed 100 nets and 20 fish traps at each sampling site (divided equally between the two habitat types). This resulted in a linear survey distance of 15 km. Mulitplied by the width of the survey area (50 m), we assumed a total survey area of 0.75 km^2. We observed a significant increase in the number of snakes captured at all sites except Sabak Bernam (which underwent significant land modification in that year; Table 4).

Table 4: Records of python caught during mark-recapture study in 2013. Note: *R represent recapture occasion recorded for this python.

Year	Site	Sex	Habitat	Method	TOL (mm)	TL (mm)	SVL (mm)	HL (mm)	BW (g)
2013	Kuala Muda	Female	Secondary forest	Bubu	3,800	490	3,310	110	15,000
		Male	Secondary forest	Net	3,250	355	2,895	95	9,100
		Male	Oil palm plantation	Net	2,570	360	2,210	70	5,000
		Male	Oil palm plantation	Net	2,950	385	2,565	85	8,500
		Male	Oil palm plantation	Net	2,560	360	2,200	65	5,500
		Female	Oil palm plantation	Net	2,930	405	2,525	80	7,500
		Female (*R)	Oil palm plantation	Net	2,790	420	2,370	75	8,000
		Female	Oil palm plantation	Net	3,400	430	2,970	90	11,000
		Female	Oil palm plantation	Net	2,990	400	2,590	110	7,700
		Female	Oil palm plantation	Net	2,390	340	2,050	80	5,000
		Male	Oil palm plantation	Net	2,520	690	1,830	70	5,000
		Female	Oil palm plantation	Net	2,490	330	2,160	70	5,000
		Male	Oil palm plantation	Net	2,350	340	2,010	70	4,400
		Female	Oil palm plantation	Net	2,820	400	2,420	90	6,400
	Sabak Bernam	Male	Oil palm plantation	Bubu	3,480	500	2,980	100	12,600
	Kerian	Male	Secondary forest	Net	3,490	450	3,040	110	9,500
		Female	Secondary forest	Net	2,690	345	2,345	70	5,000
		Male	Oil palm plantation	Net	2,880	360	2,520	75	5,500
		Male	Oil palm plantation	Net	3,460	490	2,970	80	12,500
		Male	Oil palm plantation	Net	2,570	355	2,215	80	6,200
		Female	Oil palm plantation	Net	1,840	410	1,430	90	7,900

In the final year of surveying, we re-calculated the naïve population estimate for reticulated pythons in Peninsular Malaysia. The results are presented in Table 5.

Table 5: A naïve population estimates of reticulated python in Peninsular Malaysia, 2013.

Habitat type coverage	Estimated Individual/km^2	Naïve population estimates (individual)
Forest (61,555 km^2)	2-3	123,110 – 184,665
Oil palm plantation (29,157 km^2)	2-16	58,314 – 466,512
Total		**181,424 – 651,177**

Conclusion

Our four-year study yielded some interesting results. Overall, capture rates in oil palm plantations were higher than in forested areas (29 in oil palm *vs*. 16 in forest), despite similar sampling effort. Although our data are not sufficient to conclude that python densities have increased in this habitat type, at the very least we know that oil palm plantations do provide suitable habitat for this species.

So what is the size of the python population in Peninsular Malaysia? Our two sampling periods provided markedly different results, but we are reluctant to draw conclusions about the impact of harvesting or the suitability of the current quota (162,000). Extrapolation of our naïve estimates suggest that the python population in Peninsular Malaysia is anywhere between 181,424 and 1,904,952 individuals. However, we strongly doubt the accuracy of these estimates, and suspect the total population may be considerably higher. These doubts are probably justified. For example, our results suggest that absolute numbers of pythons is higher in harvested compared to non-harvested areas; this is an immensely improbable situation. Furthermore, other population estimates for large-bodied snakes suggest much higher densities (Luiselli, 2006), including for tropical pythons in similar habitats (Natusch and Natusch, 2011).

Other attempts at calculating population density for reticulated pythons have faced similar difficulties to our study (Abel, 1998; Riquier, 1998; Auliya, 2006). The biological traits of pythons and the habitats they occupy create a number of logistical impediments when attempting to enumerate underlying abundances. Our low capture rate and single recapture preclude the use of proper mark-recapture statistical analyses, and only allow a crude naïve estimate to be calculated. Such an estimate is fraut with biases, which further decreases the reliability of our results. For example:

- We captured pythons within watercourses, which make up a relatively tiny proportion of the area at our study sites. Because we do not know the frequency by which pythons utilise these watercourses, we may well be under or overestimating python abundance.

- Attempting to capture pythons using nets resulted in a highly skewed size demographic. All of the 45 pythons we captured were between 230 and 380 cm in length. However, juvenile reticulated pythons measure approximately 80 cm in length, and grow to more than seven metres. Therefore, we failed to capture 75% of the known body sizes present in the population. Although large individuals probably occur at low frenquenies throughout the species' range, we should expect high numbers of juvenile specimens. These results strongly suggest that python densities at our sampling sites (of all sizes) are much larger than estimated here.

- Pythons are remarkably cryptic, and are known to spend considerable periods of time in single locations (sometimes months; Slip and Shine 1988; Shine et al. 1998). The short duration of our study means many snakes were probably not moving (and thus could not be captured) during our trapping period. Yet, our density estimates assume we captured all individuals present within the survey area at that time.

- Our estimates included only forested areas and oil palm plantations, because we did not survey other habitat types. Yet pythons are known to occupy other habitat types (including urban areas), which add another 39,000 km^2 (and potentially another 819,000 pythons) to our estimates.

Taking these caveats into account, it is clear that even our modest population estimates are considerably higher than the annual harvest quota of 162,000 pythons per year. Ultimately, however, we must conclude that mark-recapture field studies do not bring us any closer to making a proper assessment of python population sizes in Peninsular Malaysia, and hence the impact of different harvest regimes on population persistance. Coupled with the need to expend substantial resources in order to undertake such studies, the DWNP has explored other ways to undertake assessments of non-detrimental harvests. This has led us to the studies described below (see Chapter 3).

CHAPTER 3: BASIS FOR NDF - MONITORING HARVEST DEMOGRAPHICS

Introduction

Based on discussions with members of the IUCN SSC Boa and Python Specialist Group in 2012, to improve our NDF procedure we began collecting biological data from harvested pythons and monitoring python processing facilities. If data are collected continuously, then inferences can be drawn from the harvest itself in a similar fashion to fisheries management. Changes in the demographics of the harvest can signal potentially deleterious changes to wild python populations and allow us to take a precautionary approach by amending management protocols. Several authors have sugesst harvest monitoring to be the most useful method for assessing the sustainability of reticulated python harvests (Shine et al. 1998; Natusch pers. comm. 2012; Kasterine et al. 2012). The results of our investigations are presented here.

Methodology

Between 2012 and 2016 we visited five processing facilities to collect data from reticulated pythons harvested for trade. We evenly spaced our visits throughout the year and focused our effort on sites where the highest volumes of trade were occurring (and thus where most data could be gathered, to draw the strongest inference about the overall trade). At each processing facility we recorded snout-vent length (SVL), tail length, and body mass of pythons immediately after they were killed. After skinning, we examined the python's carcasses to determine sex and reproductive condition (by direct inspection of the gonads; Fig. 7). We classified males as mature if they had convoluted efferent ducts (indicating the presence of sperm). We classified females as mature if they had thickened muscular oviducts, vitellogenic ovarian follicles (classified based on size and colouration), and primary follicles larger than 8 mm in diameter and/or corpora albicantia from previous reproductive events.

At each site we tagged a sample of skins to determine the relationship between the SVLs of live pythons and their dried skins. We measured the length and width (at the widest point) of each skin using a steel ruler. We also measured the width of a mid-body ventral scale and an adjacent dorsal scale using digital calipers (see Figure 21 for an example).

Fig. 7. Department of Wildlife and National Parks staff conducts research and monitoring on the demographics of harvested pythons in Peninsular Malaysia (left). The thickened oviduct of a female reticulated python indicates sexual maturity has been reached.

Results

Over a period of five years we collected biological data from 8,513 reticulated python harvested for trade in Peninsular Malaysia. Our results are summarized below.

Sex ratios

In most years, more males were harvested than females, except for 2014 (when the ratios were equal; $\chi^2 = 84.1$, df = 3, $P < 0.0001$; Fig. 8). A male-skewed harvest likely aids sustainability, as males are generally less important for population persistence (a single male can mate with multiple females).

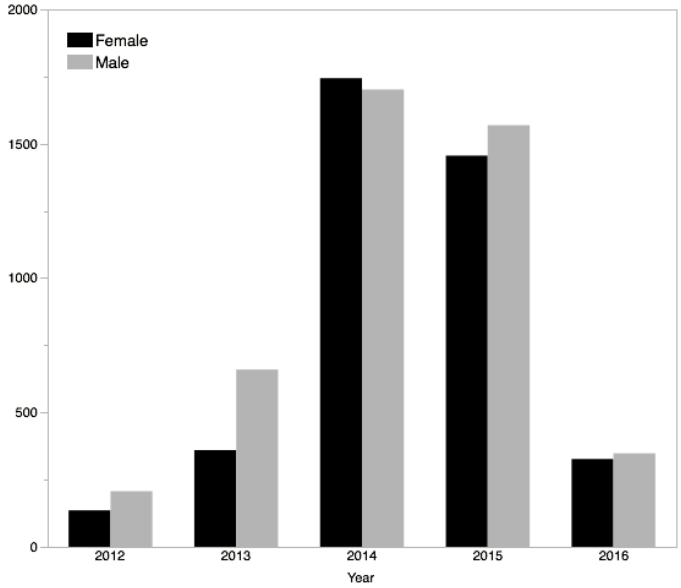


Fig. 8. Realtive number of male and female reticulated pythons brought to processing facilities in peninsular Malaysia between 2012 and 2016.

Trends in body sizes

Similar to other sites within the species range, female reticulated pythons in Peninsular Malaysia grow to larger mean adult body sizes than males (both in terms of SVL: 2.7 *vs*. 2.6 metres, and body mass: 8.0 *vs*. 7.4 kg). Females also reached greater maximum sizes than males, with all individuals larger than 4.3 m SVL being females. Over the five years of monitoring, the mean size of both male and female reticulated pythons increased slightly (in terms of SVL and body mass; Figs. 9 & 10).

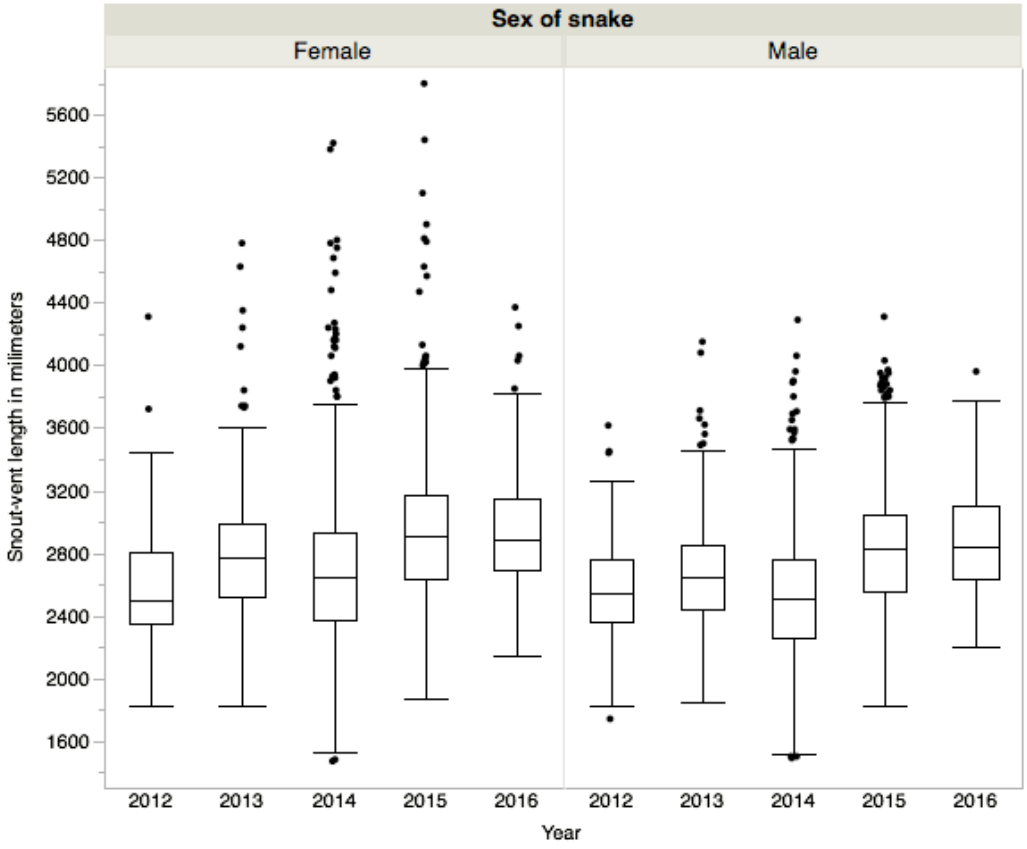


Fig. 9. Annual variability in the snout-vent lengths of reticulated pythons brought to python processing facilities in Peninsular Malaysia between 2012 and 2016.

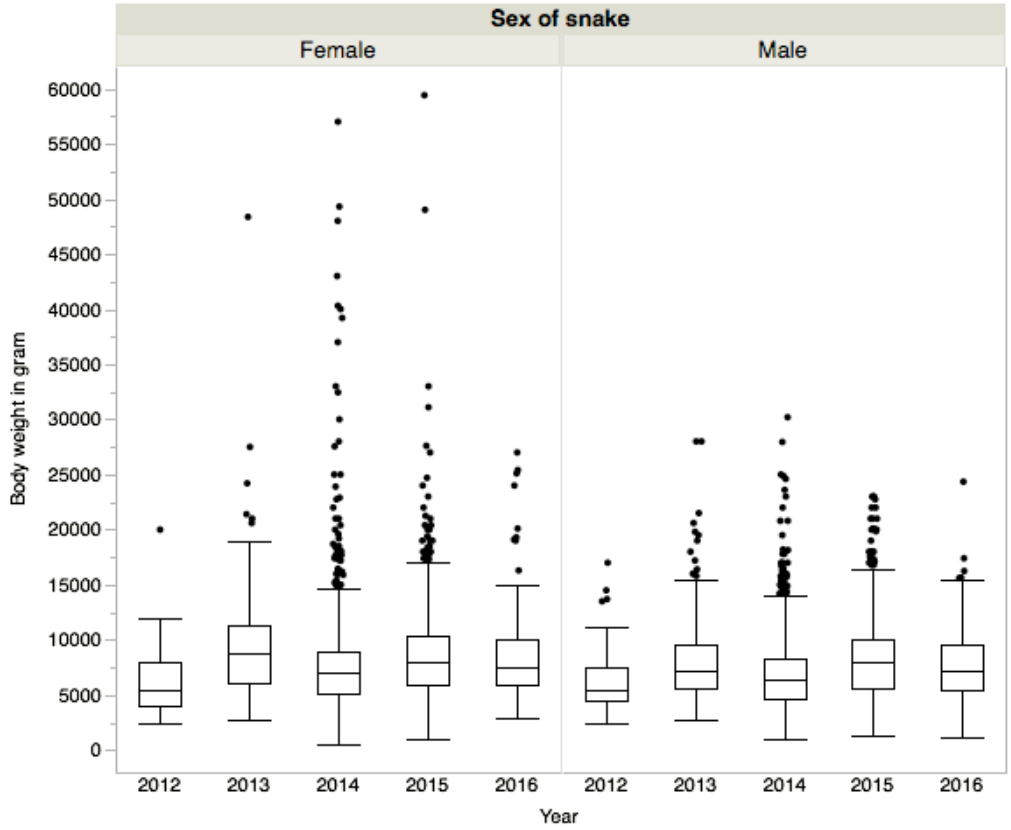


Fig. 10. Annual variability in the body mass of reticulated pythons brought to python processing facilities in Peninsular Malaysia between 2012 and 2016.

Sizes at sexual maturity

The smallest sexually reproductive snakes in our sample were 183 cm and 234 cm SVL for males and females, respectively. In fact, none of the males brought to processing facilities were immature. However, 25% of the females in our sample had not undergone a reproductive event by the time of harvest (Fig. 11). We estimated the size at which 50% of the females in our sample will undergo a reproductive event (hereafter SVL_{50}). We did this using the proportions of mature pythons that were grouped in 10 cm length cohorts, which was best described (evaluated using AiC Criterion) by a two-parameter logistic function:

$$P_M = [1 + e(-a\ (L - b))]^{-1}$$

where P_M = estimated proportion of mature pythons, L = SVL of pythons (cm) and a and b = coefficients that define the shape and position of the fitted curve. We used JMP Pro 11 (SAS Institute, Cary NC) to calculate the observed mature proportion, its predicted probability and coefficients of the logistic equation. We estimated SVL_{50} using JMP's negative ratio tool by substituting $P_M = 0.5$ into the equation above and solving for L. Our analysis revealed that SVL_{50} is reached at approximately 257.8 cm SVL (SE = 1.94; 95% confidence intervals = 254.0 – 261.6 cm SVL; Fig. 12)

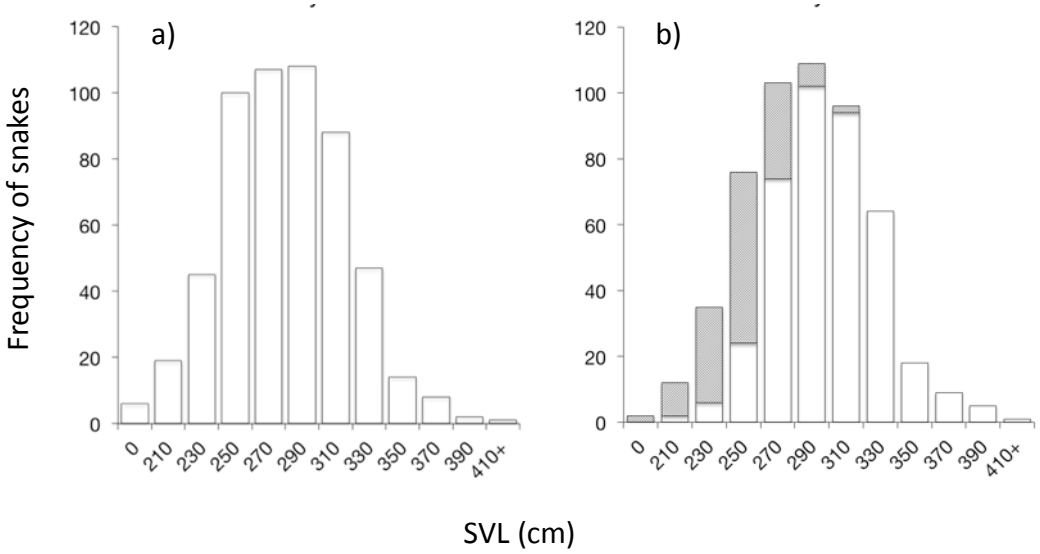


Fig. 11. Body size distributions of (a) male and (b) female reticulated pythons examined at processing facilities in Peninsular Malaysia. Grey areas of columns represent sexually immature individuals, whereas hollow columns represent reproductive adults. Note: All males in the sample were mature.

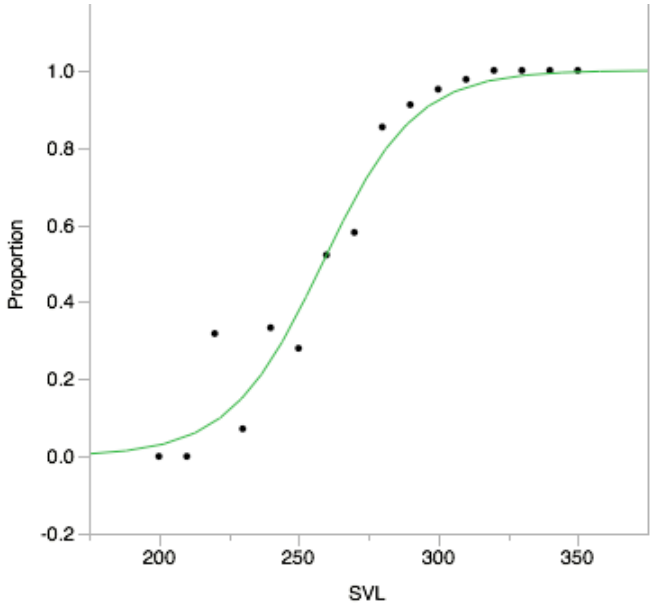


Fig. 12. Proportion of sexually mature female reticulated pythons within different size cohorts in Peninsular Malaysia.

Fecundity

Reticulated pythons are capable of producing large clutches of eggs. The mean clutch size of reticulated pythons in our sample was 20 eggs. Fecundity was strongly influenced by maternal body size, with larger females producing more eggs than smaller females (Fig. 13).

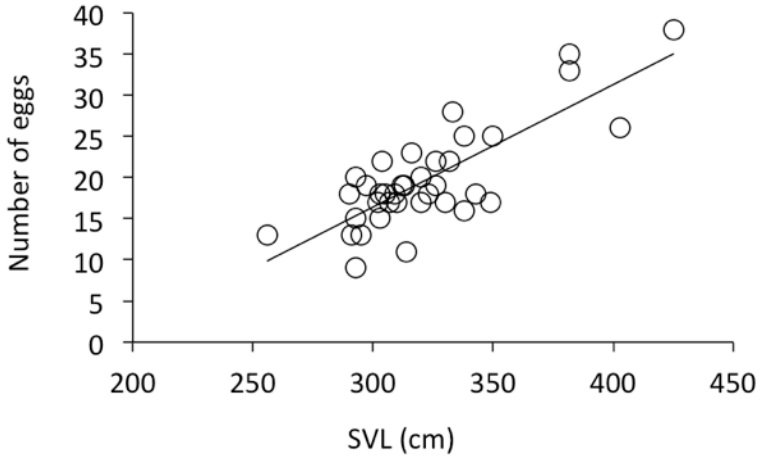


Fig. 13. Relationship between maternal snout-vent length and clutch size in reticulated pythons from Peninsular Malaysia.

Conclusion

The results of the monitoring program undertaken herein are consistent with previous work in Indonesia suggesting that reticulated pythons possess a suite of attributes that make them resilitant to harvesting (Shine et al. 1999). Malaysian pythons mature rapidly and produce large litters of large eggs. In most years, harvests favoured male snakes, which are less important than females for population persistence (a single male can mate with many females).

Over the five-year period of our study, the body sizes of pythons increased slightly. If the python population were suffering the effects of overexploitation we would expect to see a decrease in the mean body size of harvested snakes. Nevertheless, we would require data sets over a longer time period to interpret these trends with greater confidence.

By continuing this type of data collection, we can collect important information on sex ratios, numbers of snakes brought to processing facilities, fecundity, body sizes and sizes at sexual maturity. Any observed changes in these attributes allow us to rapidly implement more precautionary management protocols to limit the number of snakes being harvested (see Chapter 5). The ability to cost-effectively gather such enormous amounts of data massively increases the statistical power of our analyses in a way that cannot be achieved using population field studies.

CHAPTER 4: BASIS FOR NDF - ASSESSMENT OF SUSTAINABILITY THROUGH STAKEHOLDER INTERVIEWS

Introduction

In many parts of the world, wildlife managers are drawing upon indigenous knowledge to learn more about species bioloigy and inform management (Horowitz, 1998). To deepen our understanding about the perception of harvesting on wild populations of reticulated pythons, we carried out a livelihoods survey in 2011 and again in 2015 (in collaboration with the Python Conservation Partnership). The aim of the study was to utilise local stakeholder knowledge in an attempt to identify temporal trends in attributes of python harvesting.

Methodolgy

In 2011, we conducted a survey of households working in the python skin trade. The survey focused on collecting information to better understand the livelihoods of those participating in the trade (including hunters, processors and exporters), and asked several questions related to perceptions of sustainability and steps taken to enhance sustainable offtake. The survey was semi-structured (respondents are allowed to provide their own answers) and data collection was carried out through in-depth face-to-face interviews (Fig. 14). PERHILITAN officers led the identification of survey participants using local licence records, in addition to recommendations from processing facility owners. Responses were gathered from 32 hunters and 19 traders or processing facility owners.

In 2015, in collaboration with the IUCN-SSC Boa and Python Specialist Group and the International Trade Centre (as part of the Python Conservation Partnership), we repeated the livelihoods surveys. Surveys were conducted at 52% (12/23) of the registered processing facilities in Peninsular Malaysia and included approximately 5% (42/948) of registered python hunters. A total of 80 trade participants were surveyed. All households had a minimum of one member currently involved in the python skin trade, including those working as hunters (n=42), agents (n=3), employees (n=20) and facility owners/managers (n=15). These group can be broadly catergorised as follows:

- ***Hunters:*** People involved in collecting pythons from wild sources, including forests, palm plantations and village areas.
- ***Agents:*** People involved in collecting pythons from hunters for delivery to processing facilities. Typically employed by the facility.
- ***Employees:*** People working at python processing facilities, including processors, skin pinners (people working to pin python skins to wooden boards for drying), skin packers and office administrators.

- ***Facility Owners/Managers:*** People that own or manage python processing, tanning and/or export facilities.

Fig. 14. Interview session with a trader and hunters in Perak, Peninsular Malaysia.

Results and Discussions

In 2011, slightly more hunters claimed that python populations had remained stable over the previous five years than those who thought a decline had occurred (Fig. 15). A similar trend was evident during the 2015 survey, with approximately equal numbers claiming their catch rates had increased, decreased and remained unchanged over the past five years (Fig. 17). Many hunters probably provided answers based on their recent experiences, or did not keep accurate records of numbers captured. The opinions of processing facility owners (who deal in far greater volumes of snakes, for much longer periods), would provide more robust indicators of the trends in python populations. Of the facility owners interviewed, all but two claimed that the number of snakes harvested annually had increased (3/15) or stayed the same (10/15). The two that claimed numbers collected had decreased cited reduced demand, and thus hunting effort. However, processing facility owners may also have a vested interest in claiming harvests are sustainable, highlighting the need for ongoing and independent monitoring of the numbers and body sizes of harvested snakes.

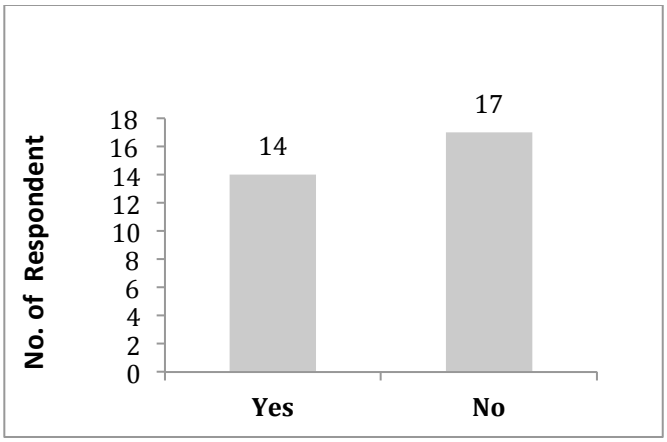


Fig. 15. Responses of hunters in Peninsular Malaysia when asked if the number of pythons captured annually had decreased over the past five years (n = 31). From surveys in 2011.

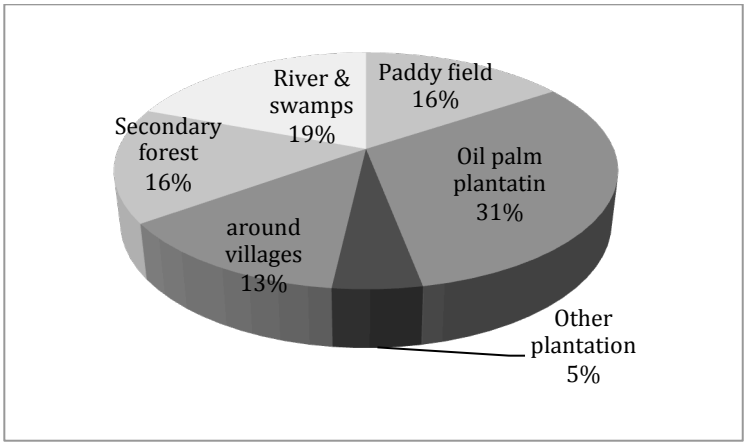


Fig. 16. Responses of reticulated python hunters in Peninsular Malaysia when asked where they primarily hunt pythons (n = 32). From surveys in 2011.

In summary, harvesting undoubtedly results in localised declines in python density at specific sites, which is probably noticed by hunters. However, the mixed result in perceptions likely reflects the seasonal changes python populations undergo, and the varying spatial dynamics of hunter harvest areas, rather than long-term population declines across Peninsular Malaysia. Available evidence suggests that the development of a large-scale palm oil industry in Malaysia has benefited pythons, which are common in artificially constructed canals on the plantations and thrive on the high abundance of rats that feed on palm kernels (Shine et al 1999; Natusch pers. comm.). Indeed, our own mark-recapture study (see Chapter 2) confirmed that pythons are abundant in oil palm habitats. In keeping with this conclusion, most hunters claimed to capture pythons primarily from oil palm plantations (or villages and swamps) rather than natural forest areas (Fig. 16). Furthermore, our data from examination of the biological attributes of harvested pythons (See Chapter 3) revealed that the stomach contents of 3,701 snakes brought

to Malaysian processing facilities consisted almost entirely of rice field rats and a range of domesticated animals (chickens, goats, dogs and cats) rather than more "exotic" prey that would be expected in snakes collected from primary forests (Natusch pers. comm. 2016).

Only 12% of hunters believed that python sizes had increased over the past five years, with most believing they had decreased (29%) or were unchanged (59%)(Fig. 17). Two long-term hunters commented, *"Over the years it has become more difficult to catch large snakes"* and believed that forest clearing had left large pythons with a reduced supply of large prey items. Others believed that large pythons were mostly found in the forest, but high numbers of smaller pythons are found in palm plantations, which offer a productive breeding ground. We suspect this interpretation is correct. The relative homogeneity of oil palm plantations compared to natural forest provides fewer hiding places for large pythons, which are detected by hunters more easily. However, this is probably only true for giant pythons (those > 4 metres). Hunters confirmed this situation when the question was clarified, with several hunters claiming that: "*the average size of snakes has remained the same, but giant snakes are less common*". As with absolute numbers of snakes, however, direct measurements of snakes brought to processing facilities will provide much more accurate estimates of body size changes than the perceptions of single hunters.

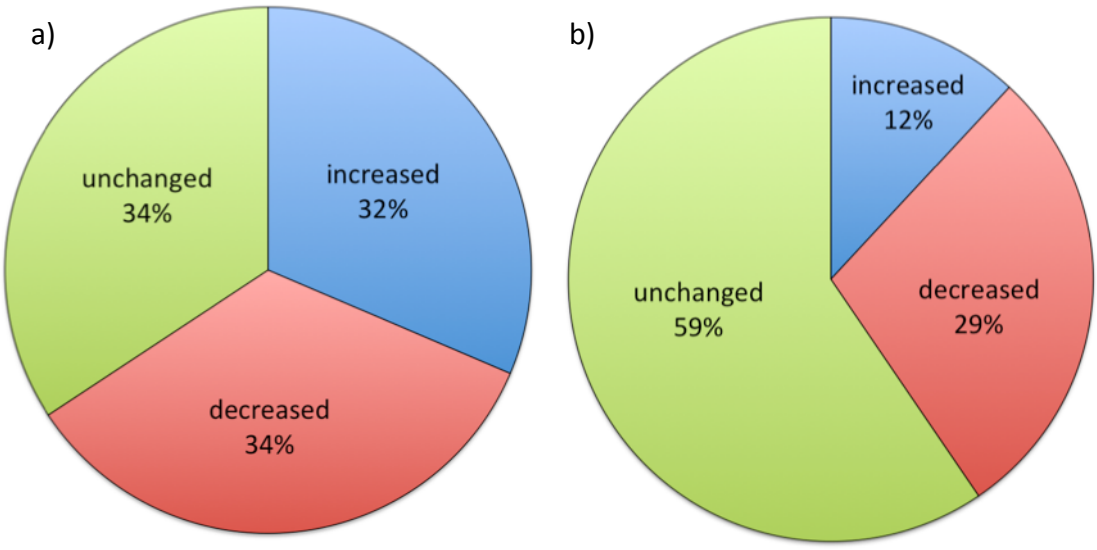


Fig. 17. Perceptions of hunters about whether the (a) number and (b) sizes of pythons collected over the past five years has changed. From surveys in 2015.

More than half of python hunters surveyed (57%) said they take specific actions towards maintaining a sustainable supply of python skins. A reported 31% rotate hunting areas and 10% only catch larger pythons. One hunter also mentioned that he does not catch gravid snakes. That being said, it is likely that many hunters have not considered the relationship between hunting and wild population levels, and consequently their livelihood security.

Processing facility owners were also conscious of maintaining healthy python populations, and many allowed gravid (pregnant) females to incubate their eggs before being processed. The resulting hatchlings are then released into nearby habitats to aid population recruitment. In addition, the two largest processing facilities refrained from buying large snakes (those greater than 5 m), preferring to focus on the more abundant (and less fecund) smaller pythons (with higher quality skins).

When asked what trade participants would do if Malaysia implemented a complete ban on python hunting, 90% (38/42) of hunters claimed that it would significantly impact their livelihoods. However, only 48% (20/42) said it would have a significant impact on their wellbeing. These individuals suggested that they would have "*nothing else to do*", or "*will not be able to survive*". The remainder simply claimed that they would need to find alternative employment. This probably reflects the somewhat opportunistic nature of their participation in the trade. By contrast, 94% (14/15) of managers and business owners claimed that it would "*ruin their lives*", as they are heavily invested in the industry. Several trade participants claimed they would continue to hunt illegally, because of the threat pythons posed to livestock and children in village areas. When asked about the likelihood of a complete ban on python hunting, responses were mixed, but most claimed that it would be unlikely (Fig. 18). When asked why they thought it was unlikely, most respondents said that python populations were still very high, while others claimed that harvesting was necessary to prevent python populations becoming too large.

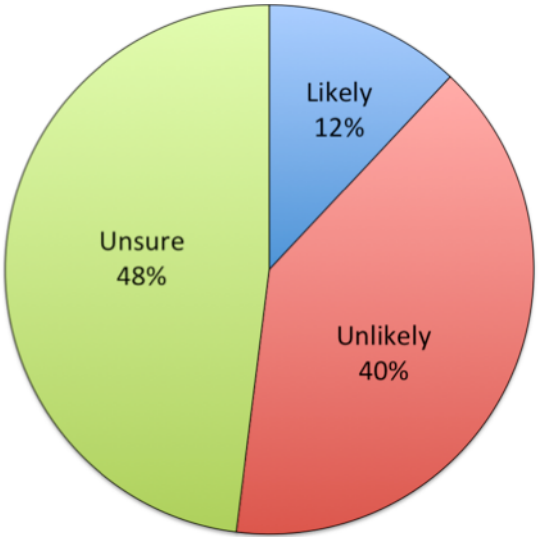


Fig. 18. Perceptions of hunters and processing facility managers about the likelihood of a complete ban on python trade in Peninsular Malaysia. From surveys in 2015.

CHAPTER 5: IMPROVING MONITORING AND MANAGEMENT

Introduction

The DWNP of Peninsular Malaysia (PERHILITAN) has worked hard to implement a robust system of management for the harvest and trade of reticulated python skins. In addition to the system currently in place, the following changes will be made to further improve the management and regulation of trade, and increase confidence that harvests continue to be non-detrimental to the survival of the species in the wild.

Modification of Harvest Management

As of 2017, a quota will no longer be the sole tool used to manage harvests of reticulated pythons in Peninsular Malaysia. In addition to a quota, a restriction will be placed on the minimum sizes of pythons that can be leglly captured. Harvests of yellow anacondas in Argentina are successfully managed in this way (Waller et al. 2011). The rationale for amending Malaysia's harvest manegement strategy is as follows:

Quotas are arbitrary unless underpinned by robust science. - Harvest quotas are a useful tool for regulating trade if set at sustainable levels. Sustainable quotas can be achieved either through knowledge of vital population input and output parameters (usually determined by field studies) or through experimentation and monitoring to ensure populations are not declining (Sutherland, 2001). However, as described in Chapter 2, Malaysia's attempts at enumerating underlying python abundances were fraught with difficulty and potential biases, making it almost impossible to determine population rates. Similarly, the difficulty in monitoring cryptic species, and the complex nature of trade, also makes setting sustainable harvest limits using trial and error problematic (Sutherland, 2001). Setting quotas too low can result in compliance problems; setting quotas too high may compromise harvest sustainability.

Quotas don't account for natural population fluctuations. - Populations of all species fluctuate for a variety of reasons, which quotas do not account for (Sutherland, 2001). When years are favorable and populations are high, quotas create incentives for traders to smuggle or launder excess skins through other countries, or keep skins for a bad year in order to "meet the quota". A fixed quota that is above the numbers easily produced during a bad year can also foster an increase in hunting effort and prices to "meet the quota", potentially rendering the harvest unsustainable (Copes, 1986; Sutherland, 2001).

Quotas do not discriminate vulnerable life-stages. - The sustainability of harvests is strongly influenced by the type of animals being captured for trade. For example, a harvest that focuses primarily on immature males is more likely to be sustainable than one that focuses on reproductive females (Shine et al. 1999). Restricting harvests to a specific subset of a

population can thus aid sustainability; however, if used in isolation, quotas do not confer these benefits.

Quotas can mask real trade levels. - Even if quotas are set at sustainable levels, it is impossible to determine actual harvest levels if they are being illegally exceeded (because of the clandestine nature of illegal trade). The consequence of such data fouling is that a harvest may be unsustainable, but that knowledge is masked (Sutherland, 2001).

Quotas cannot be easily enforced. - If illegal trade is occurring, determining whether a particular skin is "within" or "in excess of" an assigned quota is rarely possible without other measures in place. Therefore, quotas are only useful if traders abide by them and authorities can enforce them (Copes, 1986).

By contrast, implementing a minimum size restriction confers the following benefits for sustainability and trade regulation:

- Minimum size restrictions protect immature pythons, allowing a greater proportion of individuals to undergo a reproductive event before being harvested,

- Creates a natural cap on the number of pythons capable of being captured annually, because of the finite number of individuals within size cohorts,

- Accounts for natural population fluctuations, and

- Measurement of skin sizes can be used to easily enforce harvest size limits.

As a first step towards implementing a minimum size restriction, Malaysia will no longer allow the hunting and capture of reticulated pythons smaller than 240 cm snout-vent length. This is a precautionary yet practical size, which is slightly smaller than the mean size at which 50% of female reticulated pythons have undergone a reproductive event (Fig. 12). Based on our data of the demographic composition of harvested pythons (see Chapter 3), such a limit will reduce the total volume of trade by 13% (Fig. 19).

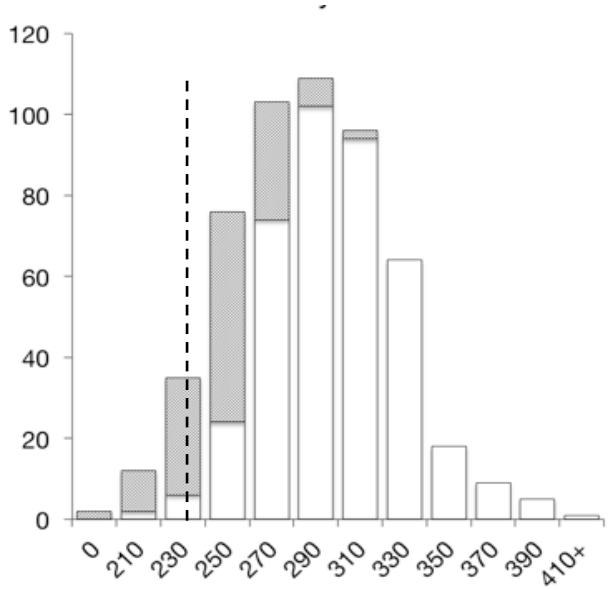


Fig. 19. Size distribution of female pythons captured for trade in Peninsular Malaysia. Grey columns represent immature snakes, while hollow columns represent reproductive snakes. The dashed line represents the proposed minimum size restriction.

Regulation and Prevention of Illegal Trade

To ensure compliance with the minimum size requirement for captures of live pythons, PERHILITAN has set a limit on the minimum size of skins allowed to be exported. This is important, because skin sizes can be measured, unlike quotas and other management tools that rely on counting numbers of skins and trying to link them to specific restrictions on absolute numbers. Measurements of skins are strongly correlated with the size of live snakes, allowing management and enforcement agencies to determine the length of a live snake from measurements made on its dry skin (Fig. 20). Multiple measurements can be compared for improving confidence that skins of interest are indeed from live pythons of a defined size (Fig. 21).

PERHILITAN will implement size limits because they can be regulated at any point within the trade chain, from the hunter to export/import. Once export has occurred, Customs authorities of the importing country can also regulate size limits. Once this system has been properly rolled-out, the Malaysian CITES Management Authorities will likely request the CITES Secretariat to issue a notification, requesting that other Parties assist Malaysia in the enforcement of these skin size limits.

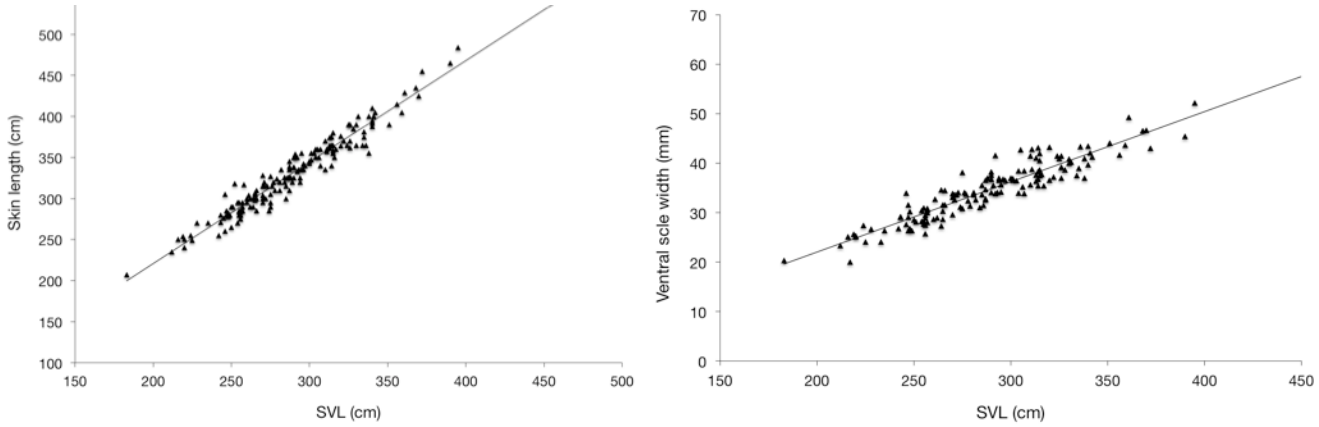


Fig. 20. Relationships between the snout-to-vent length (SVL) of live reticulated pythons and dry skin length (left), and dry skin ventral scale width (right). Measures taken on dried skins can be used to enforce minimum size limits for live pythons.

For further regulation, Malaysia is exploring the implemtation of specific skin-cutting patterns, which will indicate the origin of Malaysian skins. This system is already in use for the trade of yellow anacondas (*Eunectes notaeus*) from Argentina (Waller et al. 2011). PERHILITAN will encourage processing facilities to use a Malaysian-specific cutting pattern so skins of Malaysian pythons can be quickly and easily identified (example in Figure 21).

Fig. 21. Photographs of (a) measurements taken on python skins used to enforce minimum capture sizes, and (b) tail section of left on the skin as a country-specific skinning pattern.

Ongoing Monitoring

To ensure ongoing sustainability of this trade, PERHILITAN will implement two forms of ongoing monitoring. The first is a continuation of Malaysia's current trader record keeping system. Simple record keeping by owners of python processing facilities can provide powerful information on trends in the numbers and demographic attributes of pythons collected at different times and sites. The types of data to be collected include the date of sale, name of the

seller, approximate collection location, size classes of pythons or skins sold, and the number of pythons in each size class. To complement trader record monitoring, a second, independent, monitoring method will be implemented. PERHILITAN will continue the python demographic monitoring program it has established since 2011, the results of which can be found in Chapter 3. Harvest monitoring aims to understand changes over time and does so by examining trends in the medium (3 – 5 years) to long term (>5 years). When a database of knowledge about a harvested population has been consistently and rigorously gathered, ongoing monitoring can reveal changes in that population, which may be a direct result of harvesting pressure (Caughley and Sinclair, 1993).

Adaptive Harvest Management

If the monitoring conducted by PERHILITAN reveals potentially deleterious impacts of harvesting on wild python popualtions, the management system in place can rapidly adapt to minimize those impacts. This is achieved by adapted the sizes of pythons that can be legally captured and exported. Not only can this system ensure important life stages are protected, but it also reduces the absolute numbers of snakes capable of being harvested at one time. Such an adaptive management system is particularly important for snakes, whose populations are inherently difficult to survey in the field with accuracy (Natusch et al. 2015).

Traceability

The way python harvesting and trade in Peninsular Malaysia is structured, there is no tagging or traceability systems than can prevent the introduction of illegally sourced skins into the legal trade. Instead, Malaysia's management systems aims to incentivise traders to operate within the law by eliminating incentives to collect snakes outside the size limit. In addition, Malaysia will continue to implement its present tracebility system, whereby all shipments of skins are packaged in the presence of staff from PERHILITAN. Shipments are then closed using an official seal that, if broken, renders the shipment void.

CHAPTER 6: EVIDENCE FOR NON-DETRIMENTAL TRADE IN WILD SPECIMENS

Introduction

In the preceeding chapters we provided the information that has informed our NDF process, as well as the measures in place (and enhancements being implemented) to ensure ongoing sustainability of this trade. In the present chapter, we summarise some of that information to justify why we believe the current level of harvest and export of reticulated python skins from Peninsular Malaysia (162,000 specimens per year) is non-detrimental to the survival of the species in the wild.

Attributes That Enhance Sustainability

Reticulated pythons remain abundant. - Harvests of reticulated pythons began in the 1950's. Since that time, people in Malaysia have harvested millions of specimens for trade, and continue to do so in similar volumes. Thus, despite the ongoing harvest, reticulated pythons remain abundant in Peninsular Malaysia. This strongly suggests that a level of sustainability has been achieved. Indeed, reticulated pythons remain one of the most common animals in Peninsular Malaysia. During our field surveys (Chapter 2), we captured 45 pythons within a relatively short period, despite intense hunting continuing at those sites. Furthermore, PERHILITAN is called to attend to around 125 cases of human python conflict each year.

Reticulated pythons are only harvested in part of their range. - Pythons cannot be captured in Protected Areas, National Parks, State Parks and Permanent Forest Reserves, (which comprise approximately 45% of Peninsular Malaysia's land area). Furthermore, the entire state of Johor (15% of Peninsular Malaysia's land area) does not allow hunting of snakes anywhere in the state and no licences are issued for the state of Terengganu (10% of Peninsular Malaysia's land area). Finally, much of Peninsular Malaysia is still forested (Fig. 1). Although not all forests are protected, the difficulty in accessing remote and dense forest areas likely dissuades many hunters from capturing snakes at these sites.

Reticulated pythons thrive in modified habitats. - The results of our field studies and other studies (e.g., Shine et al. 1999) suggest that reticulated pythons thrive in oil palm plantations, which cover a significant proportion of Peninsular Malaysia's land area. Furthermore, the species remains common in other agricultural habitats, near villages, and even in Malaysia's largest city (Kuala Lumpur). This result is confirmed by our interviews with python hunters (Chapter 4). Finally, gut contents of pythons collected for trade in Peninsualr Malaysia comprised of commensal rodents and domesticated animals (chickens, cats, dogs), supporting the conclusion that many snakes are captured in semi-urban areas near human habitation (Natusch pers. comm. 2016).

Capture frequency is low. - Because of their cryptic and sedentary nature, reticulated pythons can go undetect for large proportions of time. Their biology is also such that large numbers of individuals cannot be captured at specific sites. Reproducing pythons also remain sedendary within concealed hiding places for three months while brooding clutches of eggs, which minimises captures of this important demographic group (Shine et al. 1998).

Python harvesting is seasonal. - Although reticulated pythons are harvested throughout the year, most individuals are captured during the rainy season (November to March). This is important, because reticulated pythons in Peninsular Malaysia lay eggs in May, when far fewer snakes are active and thus exposing themselves to capture.

A large proportion of pythons reproduce before being harvested. - Our research has shown that approximately 75% of female reticulated pythons have undergone a reproductive event before they are harvested. Many larger individuals have undergone two or more reproductive events. The minimum size of pythons demanded by trade corresponds broadly to the size at sexual maturity, which means many snakes are contributing to population recruitment. The results of our investigations also confirm the findings of earlier works, which show that reticulated pythons in Malaysia produce large clutches of large eggs (high fecundity).

Stakeholders actively engage in sustainable practices. - The hunters interviewed by the department indicated that they take specific actions to enhance sustainability. For example, many hunters rotated their capture locations, while others do not capture small or gravid individuals. Processing facility owners also allow gravid female pythons to incubate their eggs, before releasing the resulting hatchling back into the wild to aid population recruitment.

Monitoring is ongoing. - The two forms of monitoring (independent and trader records) undertaken by the department provide detailed and robust information on trends in wild python populations. Because these monitoring activities are continuous, any changes in the wild population of pythons can be detected and acted upon immediately.

Management of trade is robust and can be adaptive if necessary. - Regulating trade using size limits is simple and effective. If the department's ongoing monitoring does identify potentially deleterious changes to wild populations, limits on the sizes of skins permitted for exports can be rapidly adapted to be more precautionary.

No evidence of Illegal trade. - PERHILITAN has received no information that illegal trade of Malaysian reticulated python skins is taking place within the country. Furthermore, annual harvests of pythons in Peninsular Malaysia are consistently below the national quota. It is thus highly improbable that traders would engage in difficult and often-expensive illegal trade activities when a legal conduit remains open. Finally, suspicion about illegal trade activities has focused on other python skin producing range states (Kasterine et al. 2012).

CONCLUSION

Despite more than 50 years of harvesting, reticulated pythons remain abundant in Peninsular Malaysia. This fact, combined with the results of our lengthy and multifaceted NDF research program, strongly suggests that a degree of sustainability in the python skin trade has been achieved. The sustainability of this resource is undoubtedly facilitated by: (1) the unique biological and ecological attributes of this species, (2) its ability to thrive in human modified environments, and (3) the specific attributes of the harvest itself (Kasterine et al. 2012).

But even if sustainability of the python resource was compromised, it is implausible that harvesting could ever result in the extinction of pythons in Peninsular Malaysia. For example, protected areas comprise 45% of Peninsular Malaysia's land area, and are inhabited by several endangered species far more susceptible to human disturbance than pythons (e.g., Tigers *Panthera tigris* and Asian Elephants *Elephas maximus*). Furthermore, there are many parts of Peninsular Malaysia (e.g., Johor and Terengganu states) where no harvesting occurs. Thus, maintenance of healthy python populations in Malaysia relates primarily to ensuring commercial sustainability of the resource, rather than preventing biological extinction of the species.

The Malaysian CITES Scientific Authority believes the harvest quota of 162,000 specimens per year presently reflects a non-detrimental level of offtake. Rather than revise the quota, Malaysia has put in place additional levels of regulation to control harvests (size limits) and ensure non-detriment. The Malaysian CITES Management and Scientific Authorities concede that, in the past, the basis by which the annual quota for this species was establsished was not sufficient to deliver the necessary confidence to other CITES Parties about the sustainability of exports. However, the steps taken by Malaysia to address these concerns have been substantial. A robust (and most importantly, continuously operating) NDF system is in place, and management, monitoring and regulatory systems have been amended to better reflect the biology of this species and dynamic nature of its trade.

Specifically, in compliance with Article IV and the recommendations of the Animals Committee:

- Malaysia's CITES Scientific Authority is satisfied that current exports are not detrimental to the survival of reticulated pythons in the wild in Peninsular Malaysia,
- Malaysia's CITES Scientific Authority is satisfied that current and future levels of export are appropriately monitored and that the reticulated python is being maintained throughout its range at a level consistent with its role in the ecosystems in which it occurs and well above the level at which it might become eligible for inclusion in Appendix I, and
- Malaysia's CITES Scientific Authority has advised the Management Authority on suitable measures to limit the grant of exports should trade be deemed detrimental in future.

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