CITES SCIENTIFIC AUTHORITIES

CHECKLIST

TO ASSIST IN MAKING NON-DETRIMENT FINDINGS
FOR APPENDIX II EXPORTS

1.1 Introduction

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a conservation tool of major importance, numbering some 147 signatories. It aims to protect species from the detrimental effects of over-exploitation for international trade, to ensure sustainable utilization of others, and to encourage international co-operation between signatory Parties in achieving this aim. The Convention has three appendices that provide different levels of regulation for the species listed in each. The Convention is administered at the national level by Management and Scientific Authorities.

Determining when international trade (of an individual shipment or on an annual basis) is likely to prove non-detrimental to the survival of species is essential to achieving the aims of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). If species become threatened with extinction as a result of use that is incompatible with their survival, Parties to CITES face the prospect of including more species in Appendix I. Indeed, every transfer of a species from Appendix II to Appendix I as a result of a lack of appropriate regulation of trade, particularly from a scientific perspective, can be considered as a failure of the Parties to fulfil their obligations under the Convention. Clearly, action is needed to improve the situation and to assist Scientific Authorities in making non-detriment findings.

1.2 An operational definition of non-detriment

Recognising the difficulties that some Scientific Authorities have in making non-detriment findings, the elements of an operational definition can be identified by examining the relevant paragraphs of Article IV of the Convention.

CITES Article IV, paragraph 2

The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met:

Article IV, paragraph 2.a)

A Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species.

Article IV, paragraph 3

A Scientific Authority in each Party shall monitor both the export permits granted by that State for specimens of species included in Appendix II and the actual exports of such specimens. Whenever a Scientific Authority determines that the export of specimens of any such species should be limited in order to maintain that species throughout its range at a level consistent with its role in the ecosystems in which it occurs and well above the level at which that species might become eligible for inclusion in Appendix I, the Scientific Authority shall advise the appropriate Management Authority of suitable measures to be taken to limit the grant of export permits for specimens of that species.

These paragraphs of Article IV require the Scientific Authority to determine that proposed exports will not be detrimental to the survival of species. Furthermore, once exports are underway, the Scientific Authority must monitor the actual levels of export to ensure that the species is maintained throughout its

range at a level consistent with its role in the ecosystem and well above the level at which the species might become eligible for inclusion in Appendix I. In practice, the Scientific Authority must consider total national harvest levels for both new and on-going exports to make a non-detriment finding. Hence, export for international trade is not detrimental when it is part of an off-take, the sum of which is sustainable, in that it does not result in unplanned range reduction, or long-term population decline, or otherwise change the population in a way that might be expected to lead to the species being eligible for inclusion in Appendix I.

Adaptive management based on adequate monitoring and appropriate feedback is vital to ensure the sustainability of wildlife harvest. Current problems with making non-detriment findings result mainly from lack of capacity and of resources to implement monitoring schemes across the wide range of species in international commercial trade. More attention should be given to developing and promoting cost-effective and pragmatic methods of resource monitoring, and in providing Scientific Authorities with the skills and means to make these determinations. In many cases such monitoring schemes need not be complex nor too resource intensive. For example, monitoring can be carried out by wildlife personnel or community scouts while undertaking anti-poaching patrols. Information that should be considered for monitoring purposes includes: population size; distribution/range; population trends; management plans and protection of the populations from over-harvest. Monitoring of the off-take levels and trade patterns, as well as of population data, will allow establishment of the feedback loop necessary for adaptive management.

1.3 Assisting scientific authorities in making non detriment findings - Development of a checklist

A checklist of information to be monitored has been designed to help build the capacity of Scientific Authorities in advising whether exports of Appendix II-listed taxa are not-detrimental to the species' survival. This checklist also allows Scientific Authorities to compare their findings with those of other countries for similar species or similar commodities in trade. Qualitative data categories have been used purposefully at this initial stage for two reasons. Firstly, because great difficulties have been met in developing hard criteria for sustainable use across large numbers of taxa and in diverse ecosystems (Allen and Edwards, 1995). Secondly, with the wide range of species in international trade, it is very difficult to extrapolate quantitative data from those few species where harvesting has been studied. Unanswered questions in the checklist will serve to highlight areas where management schemes or information collection might be improved.

Furthermore, the checklist does not aim to be long or intimidating, although it may appear so at first reading. Initial testing of the checklist using species for which sufficient information was available shows that it can be completed quite quickly. However, a more concise format may be developed once the checklist has been fully tested through wide use. The relevance of some of the management questions will vary from region to region and from country to country. Furthermore, the checklist should be viewed as an early stage in an evolving process that will witness the increasing adoption of management schemes and of improvements in information collection. As the process for making non-detriment findings becomes more established, there should be merit in developing more quantitative categories tailored to particular species groups and derived from case studies in range States.

2. The checklist

2.1 Introduction

The checklist comprises two tables that should be followed for each species in Appendix II that is the subject of export as a result of removal of specimens from the wild. The tables and text for plants and animals have been developed together to ensure that the format and contents are as standardised as possible for both major kingdoms. However, for some parts it was necessary to develop different text parts, but the tables have a similar underlying logic, so the similarity should reduce possible confusion for those Parties where a single individual may have to deal with both plant and animal issues.

2.2 Explanation of the tables on harvest characteristics

Tables 1 - Animals and 1 - Plants encourage Scientific Authority staff to make an initial review, at the national level, of the likely effects of harvesting the target species. Information is sought on the types of harvest, the degree of control over the harvest, the segment of the population harvested, the level of

total off-take (for domestic and international use), the reason for the harvest, and the end users of the harvest. Scientific Authorities need to distinguish between regulated and illegal or unmanaged harvesting. Consideration of these data will begin or further assist the process of consultation between Scientific and Management Authorities. In the case of some types of harvest, it will also allow the Scientific Authority to advise quickly that harvest is not detrimental to survival.

Table 2 encourages Scientific Authorities to review in more depth more general biological and management information including for those species where Table 1 has raised concerns. Information is also sought on management history and planning, harvest management, status of land on which harvesting takes place, capacity for monitoring the harvest, benefits and risks of harvest, levels of strict protection, and the relationship between ranched and captive-bred specimens to those that are wild caught.

The tables have been designed to allow use of easy qualitative checks that permit a basic assessment of the confidence with which a non-detriment finding may be made by Scientific Authorities. Those regulated harvesting regimes where products are removed without killing the species, or where ranching occurs, are removed from further consideration, once Tables 1A and 1P have been completed. For all other harvesting regimes, Table 2 should also be completed. In the completion of Table 2, it should be noted that a high degree of uncertainty should lead a Scientific Authority to conclude that insufficient information exists on which to base a finding of non-detriment. In such a case most Parties should choose not to allow commercial trade until information quality is improved.

2.2.1 Table 1 - Animals

The explanation for this table is arranged according to the respective columns. For each species under consideration, each type of harvesting (#1.1 to #1.6) to which the national population of that species is subject should be checked, and there may be several options available. For example, wool may be shorn from live vicuñas in a well-regulated harvest, while poachers may kill vicuña for their wool and meat in an unmanaged harvest. Shading indicates where a box cannot be checked. For example, ranching does not allow for collection of adults or non-selective harvest.

Type of harvest

The types of harvest when regulated, are arranged according to their levels of impact on the wild population.

#1.1 Captive breeding: this row should be used to record the numbers of specimens that are derived from captive breeding operations for export. Animals removed from the wild population for establishment or augmentation of captive breeding operations are effectively lost from the wild population, and so their numbers should be recorded under #1.5, for live capture.

#1.2 Non-lethal harvesting for parts/ products: this row refers to the collection of parts and derivatives that does not require the death of the individual animal. For example, this might include the live shearing of vicuña wool or the collection of down from eider ducks (this species is not included in the appendices). The main type of product derived from the harvest should be identified. Collection of eggs does NOT fall in this category; see #1.3.

#1.3 Ranching: this row refers to the removal of eggs or live young for rearing in captivity, based on the premise that survival will be enhanced compared with the wild when this stage of the life history is being collected. Consequently, this surplus production can be harvested without detriment to the long-term survival of population. This includes both ranching of Appendix II species where any export quotas are set by the range State, as well as Appendix I species that are transferred to Appendix II pursuant to a quota approved by the Conference of the Parties. This does not include the rearing in captivity of adult or sub-adult individuals for later export, without any habitat benefit, or the holding in captivity of captured adult individuals pending eventual export. Such cases should be considered under #1.5, live capture.

#1.4 Pest or problem animal control: this row refers to specimens removed under a government-based policy of pest control. These specimens are included in trade because they would in any case be destroyed to protect human life or crops, and any potential products can be used to provide incentives to promote conservation purposes.

#1.5 Live capture and #1.6 Killing of the individual: these rows refer to removal of the live specimen from the wild population, through collection, hunting, trapping, or fishing, and may include lethally wounded, disregarded, by-catch, or incidental deaths as a result of land clearance, that do not ultimately reach international trade. Different types of collection, hunting, trapping, or fishing target different segments of the population. The main type of product derived from killing should be identified under row #1.6.

Table 1 – Animals. Summary of Harvest Regime for Animal Species (or population of an animal species)

Species: _____ **Country (if applicable State or Province):** _____
Date (of making Non-detriment Finding): _____ **Period to be covered by finding:** _____
Name: _____ **Position in Scientific Authority:** _____
Is the species endemic, found in a few countries only, or widespread? _____
Conservation status of the species (if known): IUCN Global status: _____ **National status:** _____ **Other:** _____

Type of harvest	Main product	Degree of control	Demographic segment removed from wild population					Relative level of off-take (include actual number or quantity if known)				Reason for off-take			Commercial destination(s) (numbers and percentages if known)		
			Eggs	Juvs.	Adult males	Adult females	Non-selective	Low	Medium	High	Un-known	Sub-sistence	Com-mercial	Others	Local	National	Inter-national
1.1. Captive breeding		a) Regulated															
		b) Illegal or unmanaged															
1.2. Non-lethal harvesting for parts/ products		a) Regulated															
		b) Illegal or unmanaged															
1.3. Removal for Ranching		a) Regulated															
		b) Illegal or unmanaged															
1.4. Pest or problem animal control		a) Regulated															
		b) Illegal or unmanaged															
1.5. Live capture		a) Regulated															
		b) Illegal or unmanaged															
1.6. Killing of individual		a) Regulated															
		b) Illegal or unmanaged															

2.2.2 Table 1 - Plants

The explanation for this table is arranged according to the respective columns. For each species under consideration, each type of harvesting (#1.1 to #1.6) to which the national population of that species is subject should be checked, and there may be several options available. In the case of bulbous plants, for example, *Galanthus* may be harvested under a regulated and well managed programme, while illegal collection may be conducted by specialist collectors. Shading indicates where a box cannot be checked.

N.B. Relocated wild stocks: wild plants are collected and are replanted prior to export. For example in the case of bulbs, large quantities of wild collected bulbs are frequently "stored" on agricultural fields. At time of export the bulbs are harvested from these storage fields. The assessment by the Scientific Authority should be based on the primary removal from the wild.

Type of harvest

The types of harvest when regulated, are arranged according to their levels of impact on the wild population.

#1.1 Artificial propagation: Before filling-in Table 1 - Plants, the Scientific Authority should assess whether the plants are artificially propagated or wild collected. In the case of artificial propagation the plants must fulfill the criteria laid out in Resolution Conf. 9.18 (Rev), which includes the definition of artificial propagation.

#1.2 Non-lethal harvesting of fruits/flowers/seeds/leaves: this row should be used to record the collection of parts and derivatives that does not require the death of the individual plant.

#1.3 Non-lethal harvesting of bark/roots/wood: this row should be used to record the collection of bark/roots/wood without killing the individual plant. For example, selective removal of the bark of *Prunus africana* as part of a planned management programme will ensure survival of the tree in the wild

#1.4 Removal of whole plant: this row should be used to record instances where the whole plant is collected, and is thus removed from the wild population, or killed.

#1.5 Removal of whole bulb: in the case of the collection of the bulbs from the wild, e.g. *Sternbergia*, bulbs should be treated as whole plants; however the removal of full grown specimens only may have a different impact than when all bulbs are removed.

#1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood.

Wood: row should be used to record the harvest of wood as timber, charcoal, woodchips etc., where the plant does not survive this type of harvest.

Bark: destructive removal of the complete bark or cutting down of the tree will result in the death of the tree (e.g. *Prunus africana***);**

Roots: collection of the whole root systems or significant parts of the root for medicinal use etc. almost always results in death of the plant. (e.g. *Panax quinquefolius*);

Seeds: collection of seeds from, for example, certain Cacti where the top of the plant is chopped-off is likely to result in the death of the plant.

Table 1 – Plants. Summary of Harvest Regime for Plant Species

Species: _____ **Country (if applicable State or Province):** _____
Date (of making Non-detriment Finding): _____ **Period to be covered by finding:** _____
Name: _____ **Position in Scientific Authority:** _____
Is the species endemic, found in a few countries only, or widespread? _____
Conservation status of the species (if known): IUCN Global status: _____ **National status:** _____ **Other:** _____

Type of harvest	Main product	Degree of control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	Un-known	Sub-sistence	Com-mercial	Others	Local	National	Inter-national
1.1 Artificial propagation		a) Regulated													
		b) Illegal or unmanaged													
1.2 Non-lethal harvesting of fruits/ flowers/ seeds/leaves		a) Regulated													
		b) Illegal or unmanaged													
1.3 Non-lethal harvesting of bark/roots/ wood		a) Regulated													
		b) Illegal or unmanaged													
1.4 Removal of whole plant		a) Regulated													
		b) Illegal or unmanaged													
1.5 Removal of whole bulb		a) Regulated													
		b) Illegal or unmanaged													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood		a) Regulated													
		b) Illegal or unmanaged													

2.2.3 Table 1 – Animals and Plants

Degree of control: this column has two options:

#a) Regulated: refers to a sanctioned (government-approved or otherwise official) harvest that is under the full control of the manager, set against scientifically-based quotas, with appropriate apportionment of the harvest to different end users.

#b) Illegal or unmanaged: refers to a harvest that the manager does not have full control over, and where the harvest is apportioned to different end users by the harvester. Although illegal and unmanaged harvests differ in terms of their legal sanction, they can have the same effect on the wild population, and share the common property of not being supported by a formal system of data collection. Hence, a harvest may be legally sanctioned, but unmanaged. There are also cases where a harvest takes place without any framework of local or national legislation or regulations, and such harvests should also be considered as unmanaged.

Regulated and illegal harvests of the same or different types often occur at the same time within one population. Hence for many species, information on type(s) of harvest may include checks in two or more rows and sub-rows (e.g. *Prunus africana*, where there may be both a regulated bark harvest from live trees (#1.1.4) and an illegal harvest for bark or wood that results in death of the tree (#1.1.6).

Demographic segment removed from population

This column refers to the segment of the population that is harvested. The impact of the harvest on the overall population structure will depend on the life history stage that is targeted. *Animals.* Natural mortality tends to be highest for eggs and/or for neonates and juveniles. Hence, an off-take of eggs, neonates or juveniles, managed for ranching will have less impact on the population than the removal of reproductively-active animals. In general, a harvest based on adult males will have less impact on the population than a harvest of females for polygynous species where a small proportion of the adult males is responsible for the majority of matings. However, where a larger volume and non-selective meat harvest are the ultimate aim, there will be greater impact on the population. An appropriate combination of columns within this column heading may be checked for each type of harvest. However, if the harvest is non-selective, i.e. any of the types of harvest from #1.4-#1.6, then only the column for "non-selective" should be checked. Examples of columns that could be used include: males or females; age classes; and combinations thereof. *Plants.* It is important to include the range of the plants that are subject to harvest i.e. are mature and immature plants harvested? If the plants are Cycads, are just females being targeted? For these tables, mature plants are considered to be capable of reproduction while immature plants are not considered capable of reproduction. In the case of dioecious species, indicate if male or female plants or parts are targeted, if known.

Level of off-take

Where quantitative information on **Numbers or quantity** is available for regulated harvests, this should be included to increase confidence in the assessment. Otherwise, and including for illegal and unregulated harvests, a qualitative assessment can provide some indication of the levels of off-take. The columns Low, Medium and High must be interpreted in the context of the species being harvested. For example, an annual harvest of ten giant pandas would count as high, because the wild population only numbers in the hundreds, while the panda's reproductive rate is low. In contrast, a harvest of 100 Cyclamen would be considered low, in relation to a world population numbering in the millions. Only one column should be checked for each type of harvest under this column heading.

Reason for off-take

This column heading gives an indication of forces driving the harvest. The indication of a percentage, if know, may help. Where a harvest is for subsistence purposes only, there is greater likelihood of a sustainable harvest under the management of local people. Where commercial interests prevail, there may be less incentive to harvest sustainably due to economic pressures. One or more columns should be checked, as appropriate, under this overall heading for each type of harvest.

Commercial destinations

This column heading adds to information on reasons for harvest. If the harvest is for subsistence purposes only, the end users of that harvest will be local people. If local people are using some of the harvest and selling the remainder, then both boxes should be checked. If the harvest is for commercial trade, the end users may range from local to international. Historically, the impact of trade was thought to increase from local to international uses, but this perception very much depends on the commodity. For high value items on international markets, such as some parrot species or rare orchids, international trade has certainly been the stimulus for an unsustainable harvest. Similarly, for products with local or national value, such as medicines, trade within national borders may be the driving force in stimulating an unsustainable harvest, although such national trade does not come under the purview of CITES. One or more columns should be marked, as appropriate, for each type of harvest under this column heading.

Making a Non-Detriment Finding Using Table 1 - Animals

The information collected in Table 1A can be used to advise of a high probability that exports will not be detrimental to the survival of species in three very specific situations, as follows:

- Row 1.1a, where a species is subject only to well regulated captive breeding;
- Row 1.2a, where a species is subject only to well regulated removal of products, without killing the animal and where the scale and impact of the harvest can be quantified; and,
- Row 1.3a, where a species is subject only to a well regulated ranching operation, where the scale and impact of the harvest can be quantified.

If there are checks for regulated harvests for pest control, or live capture, or killing (Rows 1.4a, 1.5a, and 1.6a), or for any type of illegal or unmanaged harvest (any of Rows 1.1b to 1.6b), or if there are checks for several types of harvest, Scientific Authorities should also complete Table 2A before proceeding with advice on whether exports are not detrimental to the survival of the species.

Making a non-detriment finding using Table 1 - Plants

The information collected in Table 1 - Plants can be used to advise of a high probability that exports will not be detrimental to the survival of species, in three very specific situations as follows:

- Row 1.1, where a population is subject only to well regulated artificial propagation;
- Row 1.2, where a population is subject only to a well regulated removal of fruits/flowers/seeds which does not kill the plants and where the scale and impact of the harvest can be quantified; and
- Row 1.3, where a population is subject only to a well regulated harvest of leaves which does not kill the plant and where the scale and impact of the harvest can be quantified

If there are marks in any type of pest control, collecting of live specimens, killing of specimens, illegal or unmanaged harvest, or if there are marks in more than two rows, Scientific Authorities should also complete Table 2 before proceeding with advice on whether exports could be detrimental to the survival of species.

2.2.4 Explanations of table 2 on "Factors Affecting Management of the Harvesting Regime"

Table 2 leads the assessor through questions arranged so as to indicate the sensitivity of the species to the impacts of harvesting and commercial use:

- the first section considers general biological characteristics of the species (these are different for animals and plants);
- the second section considers information on the status of the species at the national level;

- the third section focuses on considerations of harvest management;
- the fourth section on control of the harvest regime;
- the fifth section deals with monitoring of the harvest;
- the sixth section examines incentives and conservation benefits from harvesting; and
- the final section deals with the extent to which the species is protected from harvest.

This table is arranged such that the left hand column for each row poses a question, for which there is one of four definite answers, or a fifth answer for "uncertain" in the right hand column. Definite answers that indicate greatest confidence in sustainability of the harvest appear at the top of each numbered question. Generally, only one answer should be checked, although in some cases several answers may be relevant (e.g., see below in #2.19). However, only the most precautionary answer (i.e. worst scenario) will count when scoring information. A simple scoring system based on where ticks are placed for answers to each question will help Scientific Authorities advise whether or not that component of international trade carried out for commercial purposes is detrimental to the survival of the species (see Figure 1b for a visual representation of the scoring system).

It should be stressed that the compilation (and subsequent graphical representation) of the checklist does not necessarily in and of itself constitute a finding of non-detriment. Rather, the use of the checklist should inform the non-detriment finding, and can guide the Scientific Authority in obtaining the necessary information. When a preponderance of factors point to potential detriment, the Scientific Authority should inform the Management Authority that the proposed export should not proceed.

Biological characteristics: Animals only

#2.1 Life history: Basic life history characteristics indicate the likely sensitivity of a species to harvest. For example, r-selected species ("r-strategists") with a high intrinsic rate of increase are likely to be at less risk from harvest than K-selected species ("K-strategists"), which mature slowly and have low reproductive rates (e.g., mice versus elephants, starlings versus raptors).

#2.2 Ecological adaptability: Ecological adaptability indicates the likely sensitivity to harvest and encompasses factors such as the species' breadth of habitat use, dietary breadth, and environmental tolerance (in other words, niche breadth). These factors are divided into the broad categories of generalist or specialist. Generalists can switch prey or habitat types relatively easily and are likely to be less affected by disturbances in their range than specialists that occupy a narrow ecological niche. A specialist with a low level of ecological adaptability is somewhat more likely to be negatively impacted by harvest for trade than a generalist (though not in all cases). For example, a given predator population at the top of a food chain, is likely to be more sensitive to harvest than a given herbivore population, lower in the food chain.

#2.3 Dispersal efficiency: Species which have mechanisms that ensure a wide dispersal of individuals during some part of their life history may be less susceptible to the effects of harvest than similar species (depending on the life history of the species). Such species can more easily re-colonise areas from which they have been locally extirpated. For example, a number of marine organisms depend on the dispersal of large numbers of widely distributed planktonic larvae, and so may be able to re-colonise habitats from which the more sedentary adults have been overfished e.g. giant clams.

#2.4 Interaction with humans: The tolerance of a species to human activity may indicate its likely sensitivity to the effects of harvest. Species mostly tolerant of human intervention are also likely to be the least affected by harvest. Pests, which people have difficulty in eradicating, and commensal species that benefit from the spread of human-induced environments such as agricultural land, are likely to be least sensitive to harvest. For example modified habitats in oil palm plantations in Indonesia, support much higher populations of rodent prey and consequently of blood pythons than an equivalent area of natural habitat (although other species found in undisturbed habitats are absent from the oil palm plantations).

Biological characteristics; Plants only

#2.1 Life form: The life form of a plant species gives some indication as to its likely sensitivity to harvest. The more long-lived a perennial plant is, the greater impact harvesting that plant may have on the overall population. Basic life form types are included.

#2.2 Regeneration potential: The regeneration potential of a plant defines the capacity of the species to reproduce. Four simple basic types of regeneration potential are included. In completing this section, more than one type can be ticked. For example, Fast vegetatively & Slow or irregular from seeds would be ticked in the case of *Galanthus elwesii*, a snowdrop species subject to controlled collection in Turkey.

#2.3 Dispersal efficiency: The dispersal efficiency of a species may allow it to overcome the effects of overharvest. Consequently, species which have mechanisms that ensure a wide dispersal of individuals during some part of their life history may be less susceptible to the effects of harvest as they may be able to re-colonise areas from which they have been locally extirpated. For example, a number of plants depend on the dispersal of large numbers of widely distributed seeds or spores, and so may be able to re-colonize habitats from which the adults have been over-collected.

#2.4 Habitat: Plants occur over a very wide range of habitats which cannot all be included in this table. However, five basic types have been included. The examples range from habitats which require a short time to re-establish to potential climax forest or other climax types (e.g. Savannah) where recovery is long term or often impossible (e.g. Madagascan "Spiny bush"). This particular subject will need more extensive evaluation.

Animals and plants

National status

#2.5 National distribution: The pattern of distribution of a species provides some indication of a species' sensitivity to harvest. Widespread species with a continuous distribution at the national or regional level are likely to be less sensitive to harvest or other threatening factors than species with a widespread but fragmented distribution. Population fragmentation may produce sub-populations, adapted to a specialised or restricted habitat, that are too small to be viable. Localised endemic species adapted to specific habitats that are naturally fragmented, such as mountain chains, are more likely to be at risk from habitat change and the effects of harvest. Species that are localised nationally, i.e. only occur in a few locations at the national level, could be particularly at risk from unmanaged harvest.

#2.6 National abundance: Intuitively, species that are generally very abundant and occur at high densities are likely to be less sensitive to harvest than less common species occurring at naturally low densities. However, some species that occur at high densities are prone to major fluctuations in population size, either on a regular basis or due to stochastic events, and the impact of harvest in a climatically bad year (for the species) may result in a large population reduction from which the species cannot recover rapidly, (e.g. Saiga Antelope). For species that are already uncommon or rare, the margin of error associated with the harvest is likely to be low. For example, predators are generally less numerous than prey species, or mahogany trees are generally less numerous than daisies.

#2.7 National population trends: Trends in national population status provide some indication about a species' likely susceptibility to harvest: species with an increasing population are likely to be less sensitive to harvest than species whose population is decreasing. Ideally, trends in the national population status should be measured over a time period independent of the harvest regime, and should recognise the "shifting baseline" phenomenon, in which each manager takes the population level first encountered as the baseline level. This phenomenon is very important for a species or population that has experienced a history of harvest and commercial use. Mathematical modelling suggests an independent time period of three generations is necessary as a minimum. However, generation time is not known accurately for a number of species in trade and, in these cases generation time should be predicted, based on known biological information from closely related species. In any event, the time period over which the population trend is assessed should be indicated in the right had-box of #2.7. If data from actual population surveys are available, ideally results from a minimum of three censuses should be used to evaluate trends. As population monitoring improves, the age and sex structure of the population should also be assessed. Failing this, trends in measures or indices of relative abundance can also be

used. In the absence of such data from the field, indices of habitat loss can be used to infer whether populations are likely to be declining.

#2.8 Quality of information: The quality of data used to describe population trends is an important consideration in determining the robustness of the advice on non-detriment findings. For example, if all the data presented are recent and quantitative, then the confidence in the results of the assessment will be high. In contrast, if the majority of data are anecdotal, the chance of making a robust non-detriment finding will be lower. Consequently, more emphasis is placed on good local qualitative knowledge than on out-of-date quantitative data.

#2.9 Major threats: Assessing the severity of the impact of the major threat provides a basis to weigh-up the relative impact of the harvest. The major threat to the species at the national level should be indicated in the left-hand box and the severity of the threat recorded in the relevant right-hand box. For example, if habitat loss is the major threat and its impact on the species is severe and irreversible, then it may be difficult to justify a harvest at all from an area not affected by the habitat destruction. In contrast, if the effects of habitat loss are reversible, a well regulated harvest could possibly provide incentives to reverse the habitat loss (see also #2. 13). It is vital to any evaluation of non-detriment that the Scientific Authority assesses the impact of trade in relation to other threats to the species.

Harvest management

#2.10 Illegal off-take or trade: The total off-take to which a population is subject at the national level must be considered in assessing the impacts of a harvest. Consequently, it is necessary to try to assess the levels of both unmanaged and illegal off-take, even though reliable information is particularly difficult to collect (see also Tables 1A and 1P). Nonetheless, managers can often make an intuitive assessment of the significance of such off-take, in relation to the level of regulated legal off-take. Good local information and information from rangers and other enforcement personnel in the field is often exceedingly useful in evaluating the level of illegal off-take.

#2.11 Management history: The management history of a harvest provides a good starting point to assess the likely sustainability of the harvest. A harvest with a long history of effective management, particularly well-regulated adaptive management, is more likely to be sustainable than an unmanaged harvest. A managed harvest, with adaptive management based on reliable monitoring of how harvest affects the population is the optimum situation. A managed harvest is one in which there is some degree of oversight and feedback, whether it be under a formal or an informal process. Any harvest regime necessarily contains an element of experiment, and requires feedback and monitoring for absolute safety. An ongoing but informally managed harvest may not have a nationally approved structure, but may nonetheless have a good chance of sustainability, particularly if associated with strong local resource ownership. In contrast, the necessary feedback will not have taken place in a newly established programme of harvest, so the probability of sustainability may still be open to question. An unmanaged harvest is one in which there is no oversight and the harvest is taken in a purely opportunistic manner, giving least confidence in its sustainability.

#2.12 Management plan or equivalent: The development and adoption of a national management plan or equivalent is necessary to build the political will to establish the process of sustainable use. Furthermore, a harvest managed according to a nationally approved management plan is likely to have undergone a process of review and scrutiny before official adoption, and should thus have a higher chance of reliability. Ideally national management plans should be developed in conjunction with local inputs, because the majority of harvested species are likely to be patchily rather than uniformly distributed throughout a range State, and so any off-take should be managed at the local level to avoid local extirpations. In range States with a strong federal/state or provincial system, strong management plans at the state or provincial level would be the equivalent of strong national management plans. Consequently, the optimum harvest management situation will include approved and co-ordinated local and national management plans. In cases where there is no approved plan and informal or unplanned management takes place, there will be little confidence in the probability that the harvest is sustainable or that the export is non-detrimental.

#2.13 Aim of harvest regime in management planning: The aim of the harvest regime for a species has a considerable bearing on the probability that a harvest will be sustainable. Where the main aim is to

generate conservation benefits, particularly on a habitat or ecosystem level, the likelihood that the harvest will not be detrimental to the wild population should be higher. For example, the encouragement of butterfly farming in Irian Jaya, Indonesia, was promoted to provide an economic incentive to maintain the natural vegetation that supports the butterfly populations. Where control of the target population is the aim, the rationale is that a managed situation is better in conservation terms than an unmanaged situation. For example, people may be more likely to tolerate crocodilians, and their habitats, if there is some visible form of management and protection of human life and economic returns. Where the aim is to maximise economic yield, the sustainability of the programme will have a lower probability, depending on the long-term strategy. Whilst, maximum short-term economic yield derives from mining the resource completely, a strategy to maximise economic yield in the long-term should result in a more sustainable programme. Although this may only be true in theory, and in many cases harvesting is opportunistic and unselective, giving the low confidence in the sustainability of the harvest. Mining of the resource to commercial near-extinction is often the result, followed by exploitation of other species.

#2.14 Quotas: Quotas have been used as a means of regulating and managing harvests for some time, and export quotas have become increasingly common in CITES as questions have been raised about particular harvest regimes. As in the adoption of management plans (#2.12), the optimum situation is one in which: a) a national quota is based on local quotas that guard against local overexploitation, and b) the quota is based on knowledge of species' biology, life history, demographics, and reproductive capacity. Quotas can be based on the numbers of individuals removed from the wild, or on specific age or size classes within the population. A well managed, biologically-based harvest programme may involve harvest only of immature animals or plants, depending on the life history of the species concerned. For many species in trade detailed biological information is not readily available, so a system of "cautious" co-ordinated local and national quotas may be adopted. "Cautious" national quotas are those which are very small relative to the likely national population size. Finally, untried local quotas based a biological understanding of the species would be expected to give a higher chance of sustainability than a situation in which market driven, arbitrary or no quotas are set. "Market driven" describes the situation in some countries where the traders are able to demand a given quota, or quotas are assigned based on expected commercial demand. An arbitrary quota is one based on no apparent knowledge of the species.

Control of harvest

#2.15 Harvesting in Protected Areas (PA): Resource ownership and tenure can play an important role in determining the sustainability of harvests. If tenure and ownership are strong, the incentive for good management and regulation is likely to be greater. Protected areas have a variety of designations and purposes, depending on the national legal and political systems in place. The term, State Protected Area is here used to encompasses a variety of PAs and multiple use zones types, where sustainable use and harvest are allowed, including forest, game and marine reserves, and so called "National Parks" in China and UK. Range States may have several types of such PAs which offer different degrees of protection from harvest. In general, greater confidence can be placed in the likely sustainability of the harvest if most of it occurs either in such State PAs or in other areas with strong tenure (see also **#**2.16).

#2.16 Harvesting in areas with strong resource tenure or ownership: Strong local control over resource use may range from the local community management or private land management systems in place in southern Africa to the strong local control practised by communities surrounding oil palm plantations in Indonesia, where blood pythons are harvested. In all these cases either a local community or a private landowner are responsible for managing and regulating the harvest. In such systems, it is generally though to be in the long-term best interests of those who own the resource to ensure that it is used in a sustainable manner. Consequently, greater confidence will be placed in the likely sustainability of the harvest if most offtake occurs in areas with strong resource ownership (see also #2.15).

#2.17 Harvesting in areas with open access: When there is neither strong state, nor community, nor private tenure, a system of open access prevails. In such cases there is no local control over the resource and a danger that there will be no incentive to regulate the harvest, resulting in a "free for all". Little confidence can be placed in the sustainability of harvest if most occurs in areas with actual or *de facto* open access.

#2.18 Confidence in harvest management: This question requires a judgement on the effectiveness of harvest controls. A variety of factors such as low budgets, lack of trained staff, other capacity

deficiencies, or a lack of political will, may prevent harvest controls from being implemented adequately. A response that indicates a lack of confidence in harvest management should not be seen by the respondent as an indictment of his/her government, but rather a recognition of existing deficiencies.

Monitoring of harvest

#2.19 Methods used to monitor harvest: Monitoring of the harvest is vital and essential to ensuring the sustainability of any off-take. Direct population estimates of the harvested population or other measures of absolute density or abundance are generally considered the best methods, but may be very expensive and time consuming to implement, or may be impossible for the species concerned for biological reasons. In the absence of direct population measures, quantitative indices of population abundance and trend (measures of relative density or abundance) of the harvested population can be used. Alternatively qualitative indices may be used, which, if based on good local knowledge, can provide good indications of the effects of harvest. Under CITES, all Scientific Authorities are required to monitor exports, so that these can be halted or reduced if levels are thought to be detrimental to the survival of species, or the species is being used at a level inconsistent with its role in its ecosystem. CITES Annual Report data can play a very important role in monitoring, and better use of these data, along with better communication between Scientific Authorities of different countries, would allow Scientific Authorities to build up increasingly accurate pictures of the effects of international trade on population trends. This question could receive multiple ticks in answer, but only the most-effective/principal monitoring system should be scored.

#2.20 Confidence in harvesting monitoring: This question requires a judgement on the effectiveness of the monitoring system in use. For example a Scientific Authority may know that direct population estimates are conducted, but that budgetary, staffing and other resource constraints result in such population counts only being conducted at long intervals, insufficient to monitor the effects of an annual harvest programme. A response that indicates a lack of confidence in harvest monitoring should not be seen by the respondent as an indictment of his/her government, but rather a recognition of existing deficiencies.

Incentives and benefits from harvesting

#2.21 Use compared with other threats: The major threat to the species was identified in #2.9, and this question aims to determine how use affects the species in relation to the major threat affecting the species. In some cases, use of the species may convey conservation benefits that mitigate the effects of some other major threat such as habitat destruction. In other cases, use does not affect the species detrimentally and does not have any mitigating effects on other major threats, so any use has a neutral effect. Thereafter, the harvest may become increasingly harmful in conjunction with the major threats. In yet other cases, the use may exacerbate other threats (such as disease, invasive species, or habitat deterioration), thereby necessitating a more cautious or precautionary non-detriment finding. The non-detriment finding should never be taken out of context from other impacts and conservation benefits impinging on the species.

#2.22 Incentives for species conservation: In some rare cases the species derives a direct benefit from the harvesting programme. In many cases, the benefit may not be financial, but in such cases, the harvest programme may significantly reduce illegal collection.

#2.23 Incentives for habitat conservation: This question looks at the broader implications of harvest to support habitat conservation. Any potential benefit to habitat conservation should be known and demonstrated. If a benefit is intended but it cannot be shown, this question should be answered as "low". If no conservation benefit is intended, this question should be answered "none".

Protection from harvest

#2.24 Proportion strictly protection from harvest: Strict protection, both legally and in practice, of representative parts of a species' range, or of a portion of the population sufficient to ensure its survival, should prevent harvest threatening the whole national population of a species. This question aims to assess the percentage that is strictly protected (where strict protection is defined as a prohibition on removal from the wild). For many species, the existence of strict protected areas where harvest is not

allowed, with adequate enforcement controls, is an important assurance that core areas can provide recruitment to a population subject to harvest.

#2.25 Effectiveness of strict protection measures: This question requires an assessment of the effectiveness of protection measures. A number of factors including budgets and the resource ownership of such protected areas may have a bearing on how effective they are. A response that indicates a lack of effectiveness of strict protection measures should not be seen by the respondent as an indictment of his/her government, but rather a recognition of existing problems and challenges.

#2.26 Regulation of harvest effort: This question requires an assessment of the effectiveness of harvest restrictions. These restrictions generally comprise closed seasons, or portions of the population which cannot be targeted (based on size, for example). Much of the success of these measures will depend on the political will for enforcement and on the degree to which harvesters are law-abiding.

2.3 Making a non-detriment finding – A visual scoring system for decision-making

Once all the relevant information has been collected on Tables 1 - Plants and 2 - Animals, the Scientific Authority staff should be in a much better position to make a non-detriment finding based on their interpretation of the assembled material. Furthermore, a visual representation of the results collected can be produced using radar plots.

An example of the EXCEL worksheet that should be drawn up is presented in Figure 1a entitled: *Example of an information evaluation to Assist Scientific Authorities in Making Non-Detriment Findings – Plot of Responses to Questions in Table 2 - Plants*. A short title for each question is presented in the third column of the figure (from left hand margin) and the response, on a scale from one to five is included in the fourth column (from the left), entitled: *Response – 1 to 5.*

An electronic template has been developed to automatically produce a plot, once the correct values are entered into the worksheet. This template is available from the CITES Secretariat.

The radar plot produces a central area of colour. If the harvest is likely to be non-detrimental, most of the answers will fall in the precautionary areas of Table 2 - Plants, and will be depicted near the centre of the circle. Outlying points may indicate a low confidence in the probability that the harvest is sustainable and should prompt the Scientific Authority to look in more detail at the responses. It may be that further investigation is needed or that insufficient information exists on which to base a finding of non-detriment. Hence, this tool will not only assist with the decision making process of making a non-detriment finding, but it will also allow possible problems to be identified and rectified as soon as possible.

3. Conclusions

To determine that a harvest is not detrimental to the survival of a species, the Scientific Authority of the State of export will ideally undertake a through review of the whole harvest management system. However, in many cases comprehensive information is not available and in others, it is not even clear what is meant by the management system. This checklist aims to draw attention to the more important aspects of harvest management systems and to provide a means for compiling such information. The checklist is designed to provide the first step in a process which it is hoped will evolve in response to recommendations from field testers. Above all, the checklist must appeal to its potential users and should not be unrealistic in terms of the information needed to complete the tables, consequently it uses qualitative data categories. In time, these may usefully develop into more quantitative definite categories. A major strength of the current system, is the ability to represent visually the importance of factors that affect the probability that a harvest could be detrimental or not. The visual representation allows quick comparisons to be made between species, and perhaps even between years to identify factors at the national level that could be changed to improve the likelihood that resource management will result in a sustainable off-take.

Figure 1a – Example of an information evaluation to assist scientific authorities in making non-detriment findings – Plot of responses to questions in Figure 2a: Excel worksheet

Example of an Information Evaluation to Assist Scientific Authorities in Making Non-Detriment Findings. Plot of Responses to Questions in Figure 2			
Question Number	**Question Category**	**Question**	**Responses - 1 to 5**
2.1	Biology	BIOLOGY - Life history	1
2.2		BIOLOGY - Niche breadth	2
2.3		BIOLOGY - Dispersal	2
2.4		BIOLOGY - Human tolerance	3
2.5	Status	STATUS - National distribution	1
2.6		STATUS - National abundance	1
2.7		STATUS - National population trend	1
2.8		STATUS - Information quality	2
2.9		STATUS - Major threat	1
2.1	Management	MANAGEMENT - Illegal off-take	3
2.11		MANAGEMENT - Management history	1
2.12		MANAGEMENT - Management plan	1
2.13		MANAGEMENT - Aim of harvest	2
2.14		MANAGEMENT - Quotas	1
2.15	Control	CONTROL - Harvest in PA	2
2.16		CONTROL - Harvest in strong tenure	1
2.17		CONTROL – Open access harvest	2
2.18		CONTROL - Confidence in harvest management	1
2.19	Monitoring	MONITORING - Monitoring method	2
2.20		MONITORING - Confidence in monitoring	1
2.21	Incentives	INCENTIVES - Effect of harvest	3
2.22		INCENTIVES - Species conservation incentive	4
2.23		INCENTIVES - Habitat conservation incentive	1
2.24	Protection	PROTECTION - Proportion protected from harvest	2
2.25		PROTECTION - Effectiveness of protection	3
2.26		PROTECTION - Regulation of harvest	2

Figure 1b - Example of Scoring System to Assist Scientific Authorities in making Non-Detriment Findings - Plot of responses to questions in Table 2

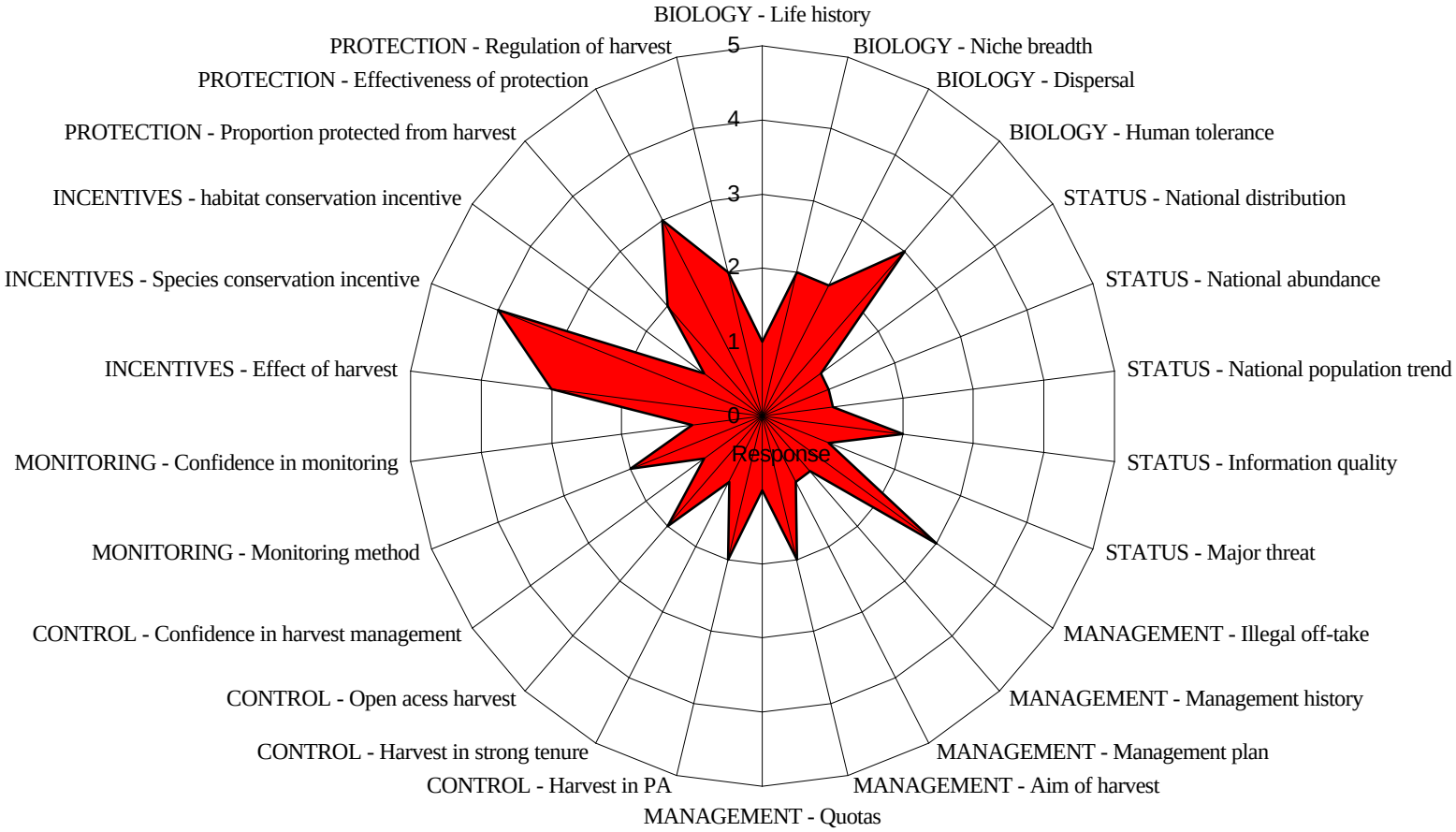

Table 2: Factors Affecting Management of the Harvesting Regime

Biological characteristics: Animals only		
2.1. Life history: What is the species' life history?	High reproductive rate, long-lived	
	High reproductive rate, short-lived	
	Low reproductive rate, long-lived	
	Low reproductive rate, short-lived	
	Uncertain	
2.2. Ecological adaptability: To what extent Is the species adaptable (habitat, diet, environmental tolerance etc)?	Extreme generalist	
	Generalist	
	Specialist	
	Extreme specialist	
	Uncertain	
2.3 Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very Good	
	Good	
	Medium	
	Poor	
	Uncertain	
2.4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	
	Pest /Commensal	
	Tolerant	
	Sensitive	
	Uncertain	
Biological characteristics: Plants only		
2.1. Life form: What is the life form of the species?	Annual	
	Biennial	
	Perennials (herbs)	
	Shrub and small trees (max. 12 m.)	
	Trees	
2.2. Regeneration potential: What is the regenerative potential of the species concerned?	Fast vegetatively	
	Slow vegetatively	
	Fast from seeds	
	Slow or irregular from seeds or spores	
	Uncertain	
2.3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very Good	
	Good	
	Medium	
	Poor	
	Uncertain	
2.4. Habitat: What is the habitat preference of the species?	Disturbed open	
	Undisturbed open	
	Pioneer	
	Disturbed forest	
	Climax	
National status: Animals and plants		
2.5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	
	Widespread, fragmented in country	
	Restricted and fragmented	
	Localised	
	Uncertain	

2.6. National abundance: What is the abundance nationally?	Very abundant	
	Common	
	Uncommon	
	Rare	
	Uncertain	
2.7. **National population trend:** What is the recent national population trend?	Increasing	
	Stable	
	Reduced, but stable	
	Reduced and still decreasing	
	Uncertain	
2.8. Quality of information: What type of information is available to describe abundance and trend in the national population?	Quantitative data, recent	
	Good local knowledge	
	Quantitative data, outdated	
	Anecdotal information	
	None	
2.9 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	
	Limited/Reversible	
	Substantial	
	Severe/Irreversible	
	Uncertain	
Harvest management: Animals and plants		
2.10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	
	Small	
	Medium	
	Large	
	Uncertain	
2.11. Management history: What is the history of harvest?	Managed harvest: ongoing with adaptive framework	
	Managed harvest: ongoing but informal	
	Managed harvest: new	
	Unmanaged harvest: ongoing or new	
	Uncertain	
2.12. 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	
	Approved national/state/provincial management plan(s)	
	Approved local management plan	
	No approved plan: informal unplanned management	
	Uncertain	
2.13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	Generate conservation benefit	
	Population management/control	
	Maximise economic yield	
	Opportunistic, unselective harvest, or none	
	Uncertain	
2.14 Quotas: Is the harvest based on a system of quotas?	Ongoing national quota: based on biologically derived local quotas	
	Ongoing quotas: “cautious” national or local	
	Untried quota: recent and based on biologically derived local quotas	
	Market-driven quota(s), arbitrary quota(s), or no quotas	
	Uncertain	

Control of harvest: Animals and plants		
2.15. Harvesting in Protected Areas: What percentage of the legal national harvest, occurs in State-controlled Protected Areas?	High	
	Medium	
	Low	
	None	
	Uncertain	
2.16. 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	
	Medium	
	Low	
	None	
	Uncertain	
2.17. 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? drw15	None	
	Low	
	Medium	
	High	
	Uncertain	
2.18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
Monitoring of harvest: Animals and plants		
2.19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	
	Quantitative indices	
	Qualitative indices	
	National monitoring of exports	
	No monitoring or uncertain	
2.20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
Incentives and benefits from harvesting: Animals and plants		
2.21. 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	
	Neutral	
	Harmful	
	Highly negative	
	Uncertain	
2.22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	
	Medium	
	Low	
	None	
	Uncertain	
2.23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	
	Medium	
	Low	
	None	
	Uncertain	

Protection from harvest: Animals and plants		
2.24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	> 15%	
	5-15%	
	< 5%	
	None	
	Uncertain	
2.25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	
	Medium confidence	
	Low confidence	
	No confidence	
	Uncertain	
2.26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse)?	Very effective	
	Effective	
	Ineffective	
	None	
	Uncertain	