Non-Detriment Findings and Trade Management for Tortoises and Freshwater Turtles - a guide for CITES Scientific and Management Authorities

Prepared by IUCN SSC's Tortoise & Freshwater Turtle Specialist Group

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Introduction

The present report results from Decision 16.109, which instructed the CITES Secretariat to commission a study, taking into account the findings of the Cancún workshop on non-detriment findings and other pertinent sources of information, to identify and discuss factors that are of particular relevance to make non-detriment findings for tortoises and freshwater turtles. These factors should include, but not be limited to, tortoise and turtle population status and dynamics, trade dynamics, production systems, and trade in parts and derivatives. This study aims to provide guidance to inform the making of non-detriment findings for tortoises and freshwater turtles. It is primarily aimed at informing Scientific Authority (SA) members, but should also be useful to Management Authorities (MAs) and others. The report assumes basic familiarity with the concept of risk assessment and the contents of the Non-Detriment Finding (NDF) module of the CITES Virtual College. It also assumes a basic understanding of biology, and of economics and trade.

The general structure of this report builds on the process proposed by the Reptile and Amphibian Working Group at the Cancún NDF Workshop (van Dijk et al., 2008). The report more or less follows the sequence of topics used in the nine-step NDF process developed for Perennial Plants (Leaman & Oldfield, 2014), as this appears to be a process format that is likely to find widespread adoption by SAs. Clearly modifications were necessary due to the inherent differences in biology and trade dynamics between turtles and plants (such as aspects dealing with artificial propagation and captive breeding, farming and ranching). Moreover, a number of issues that are quite pertinent to ensuring sustainable trade in turtles range beyond the scope of an NDF and in cases the mandate of the SA, but are discussed as an integral part of turtle trade considerations, in the expectation that this may assist the MA in its role in the process. Limitations of page space, time and resources preclude developing a comprehensive manual for turtle NDFs complete with customized worksheets; therefore the current report discusses aspects of legislation, regulation, biology, conservation, offtake and trade impacts, and management measures, that are relevant to making NDFs for turtles, and provides leads to sourcing further, detailed information for specific species. By being consistent with the processes already proposed or established in other NDF guidance documentation, the expectation is that, if desired, SAs can relatively easily adapt existing worksheets (Leaman & Oldfield, 2014; Rose, 2014) for a tortoise or freshwater turtle NDF. The report concludes with two Annexes; Annex 1 lists references and links to pertinent sources of biological information regarding tortoises and freshwater turtles, and Annex 2 presents a series of hypothetical cases to illustrate the NDF process, the types of information used, and the considerations used to conclude whether traded quantities represent a risk of being detrimental to the survival of the exploited population.

A note on the English language terms turtle, tortoise and freshwater turtle: The word 'turtle' is used to refer to any of the 327 existing species that are currently understood to be members of the Order Testudines, the shelled reptiles inhabiting terrestrial, freshwater and marine ecosystems. Tortoises are the 52 living species of the family Testudinidae, generally characterized by living on dry land and possessing a domed shell and columnar feet with short toes and no webbing. Freshwater turtles represent the great majority of all turtles, and show the widest range of body shapes, sizes and ecological traits, but are nearly always associated with fresh water bodies for much or all of their lives. A summary of the diversity of living and recently extinct (after 1500 AD) turtles can be found in the Standard Reference for turtles (Fritz & Havas, 2007) and in the annual *Checklist* of the Turtle Taxonomy Working Group (TTWG) (http://www.iucn-tftsg.org/checklist/).

The NDF Process.

Non-Detriment Findings (NDFs) are an integral part of the management of international trade in wild-collected specimens of species listed in CITES Appendix I or II, as well as specimens from some captive production systems and other sources. In recent years, the extent and quality of NDFs has come under greater scrutiny, under the Review of Significant Trade process and beyond. The NDF process and the information used in it were outlined in Res. Conf. 16.7. Guidance on how to make appropriate NDFs has been requested by the Parties on behalf of their SAs, both in general procedural terms as well as for specific groups of plants and

animals. The first comprehensive universal (i.e. not limited to a particular Party or species) methodology for making NDFs was provided by IUCN (Rosser & Haywood, 2002). This was followed by the Cancún NDF Workshop and findings in 2008 (http://www.conabio.gob.mx/institucion/cooperacion_internacional/TallerNDF/taller_ndf.html), which looked at NDFs for several different taxonomic groups, the NDF Guidance study prepared by Austria (Rose, 2014), as well as the publication of risk assessments and NDF Guidance for Perennial Plants (Leaman & Oldfield, 2014) and sharks (Sant et al., 2012; Lack et al., 2014; Mundy-Taylor et al., 2014).

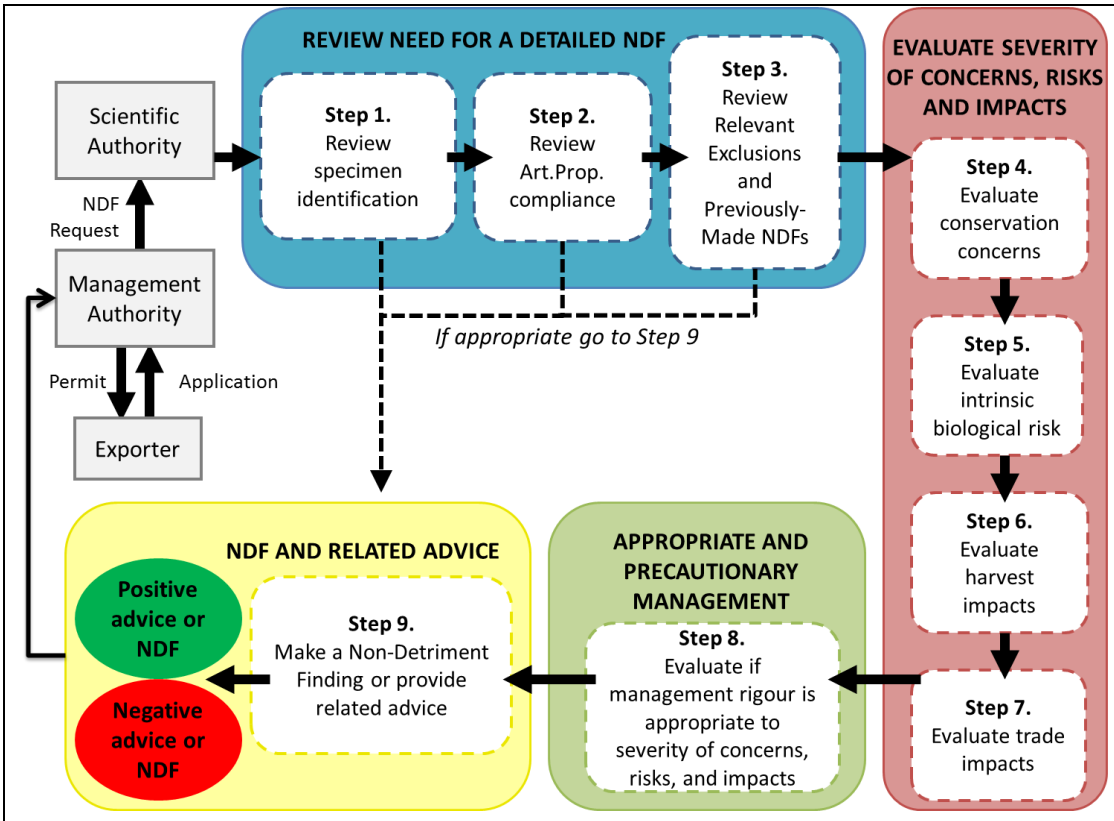

Figure 1. Nine-Step Non-Detriment Finding process developed for Perennial Plants.

From Leaman & Oldfield, 2014, BfN Skript 358, reproduced with permission from BfN.

An NDF process is effectively a **finding of sustainability**, or in other words a **risk assessment** whether a proposed export will be detrimental to the survival of the species and/or its ecological role. The advice or NDF resulting from this process is a decision on whether or not the trade is from a sustainable source or offtake from the wild whereby the management practices in use address the risk factors of the species. Where the risk is considered low, a positive NDF can be made and the documentation justifying it may be kept relatively simple. Where the risk is considered high, the NDF will likely be negative and the export may be denied, or the proposed export may be adjusted and re-submitted; adequate justification must be provided in the NDF for the negative advice provided. In cases where the risk assessment concludes that the export represents medium risk to the national population, detailed consideration of the proposed offtake and its impacts should be documented, including the findings of monitoring programs if appropriate monitoring programs are in place. Where no appropriate monitoring program is in place, preferably a monitoring program should be established to evaluate the impact of a conservative export volume (van Dijk et al., 2008, figures 2 & 3 in this report; Leaman & Oldfield, 2014), although this is not often a realistic option for most species in many countries.

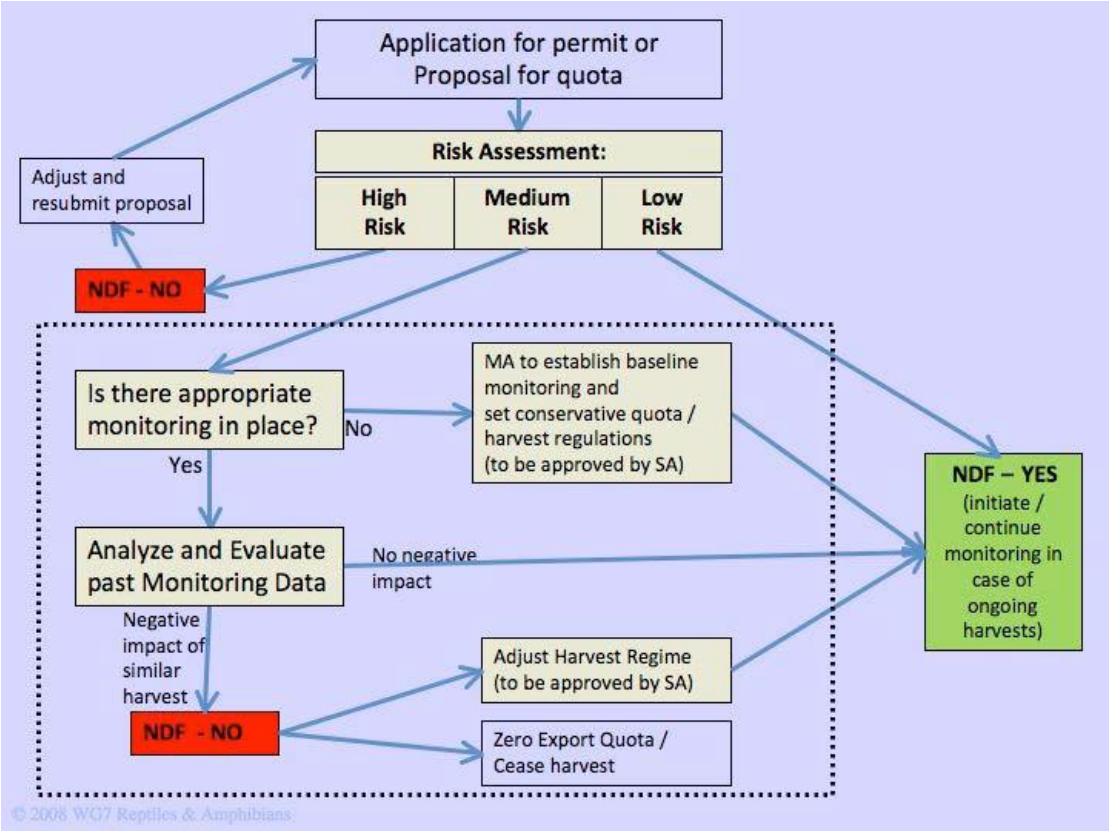

Figure 2. Flow chart of the outline NDF process as developed for reptiles and amphibians at the 2008 Cancún NDF Workshop.

Making an NDF is normally initiated by a request from the MA to the SA in anticipation of an export. This anticipation may come from the receipt of an application for an export permit, or a quota is established for a regularly traded species. NDFs may be made on a case-by-case basis in response to an export permit application, or may take the form of an annual harvest or export quota. The responsibilities of the SA to ensure that an NDF for a particular shipment takes into account earlier NDFs made for the species, and the responsibility of the MA to ensure that a diversity of permits issued under a quota do not add up to a trade volume that exceeds the quota, are beyond the scope of this guidance study. This study considers 'export' as the sum total of all export shipments approved during a particular year, irrespective of the number of shipments.

> For example, a single shipment of 1000 specimens in a given year, ten shipments of 100 specimens during a year, and an annual export quota of 1000 animals all amount to the same annual export quantity.

NDFs can also be based on harvest management plans or offtake regimes that take into account all human offtake, including including subsistence use, incidental and illegal offtake and domestic as well as international trade. Such plans may include harvest quotas or other management measures. As long as an export applicant can demonstrate that the specimens being exported originate from an offtake regime that is considered non-detrimental, then a positive NDF on the export can be made.

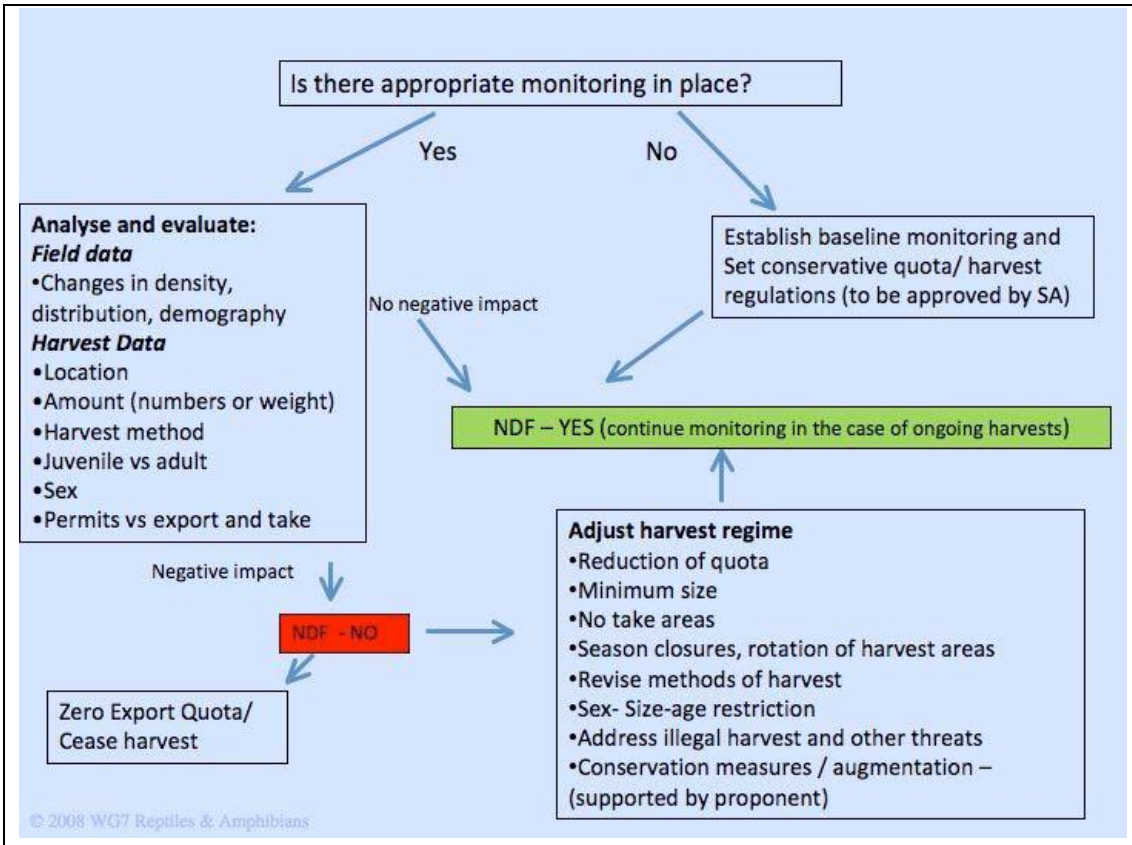

Figure 3. Flow chart providing detailed information on the second stage of the NDF process as developed for reptiles and amphibians at the 2008 Cancún NDF Workshop.

Reviewing and Confirming Specimen Identification.

The NDF must review the status, biology and trade of the species that is considered for export; verification of the export specimens as belonging to that species is therefore essential.

About 335 valid species of living turtles are generally recognized (Fritz & Havas, 2007; TTWG, 2014). Of these, 32 are listed in CITES Appendix I, about 126 in Appendix II, about 22 in Appendix III, and the remainder are not included in the CITES Appendices. Therefore, correct identification is necessary to ensure that the export is treated under the appropriate CITES procedures, that the specimens were obtained in accordance with local laws and regulations concerning the species, that the biological information collected for the NDF is applicable to the exported specimens, and that the correct CITES Nomenclature is used in all permits and documentation. This presents a practical challenge, however, as inspection and verification of shipments is normally carried out by Law Enforcement officers, while SA and MA officers rarely have the opportunity to proactively inspect or verify specimen identity. This places the onus of accurate identification of specimens entirely on the exporter. While in many cases exporters can competently identify which species is involved, certainly in turtle trade it is well known that shipments may consist of mixtures of very similar species [e.g., softshell turtles (Family Trionychidae) or Hingeback Tortoises (genus *Kinixys*)], without the exact species identity being of economic relevance or of interest to the collectors or traders.

While nearly everyone can identify a turtle as such, identifying which of the world's 335 species of turtles it is can be more challenging. In most cases, the species which are collected in and traded from a country are well known and their identities have been verified repeatedly in the past through field surveys, trade inspections and other sources of information. In those situations where some doubt exists about which species is proposed for export, a variety of resources to verify the identity of turtle specimens are available.

To identify live turtle specimens, arguably the easiest is to type in the species name in an internet image search engine; this will provide instant results, but with the caution that images on the internet are not always accurately identified, and that internet search engines may display images from an article that contains the species name, but illustrates a different species. The IUCN Red List links to a number of image libraries, which is convenient, but not all images in all these linked libraries are accurately identified.

Vetted and verified images of turtle species are presented in the CITES Identification Guide (http://citeswiki.unep-wcmc.org), in the species accounts of the *Conservation Biology of Freshwater Turtles and Tortoises* series (http://www.iucn-tftsg.org/toc/) and in a variety of printed books and identification guides; among the printed materials, the turtle volumes in the Terralog series (Vetter, 2004, 2005, 2011; Vetter & van Dijk 2006) are particularly useful, because they illustrate adults as well as juveniles, and from different angles including side view, face close-up and plastron (underside) view.

Different individuals of the same turtle species can appear rather different; hatchlings (animals that recently emerged from their egg) and juveniles may look different in colouration, shape and proportions from adults; adults tend to be less brightly coloured, and the shell tends to become proportionally longer and higher-domed as the animal grows, but this can vary by species. Many species which develop a flexible hinge in the plastron, allowing the shell to close tightly, only show this hinge as they grow. Some anatomical features remain relatively constant through life, though, and consistent among all individuals of a species. These include the number and proportions of the scutes covering the shell, and the place where the different scutes adjoin. Colouration is particularly variable, but usually the bright juvenile pattern can be recognized in adults, although it may be faded or obscured by dark pigmentation. The colouration of the plastron is usually a good character, but with the understanding that a plastron with dark spots in juveniles could fade to a uniform bony yellow in adults by loss of pigmentation in some species, or conversely that black spots or blotches can expand with growth and eventually cover the entire plastron to become uniform black.

In some cases, therefore, expert consultation may be needed to conclusively identify a live turtle specimen. Appropriate specialists can be contacted at natural history musea, university zoology departments, or global networks of turtle scientists, including the IUCN SSC Tortoise & Freshwater Turtle Specialist Group (http://www.iucn-tftsg.org/contact/).

When contacting specialists, it is extremely helpful to include several photographs of an individual turtle representative of each type of turtle proposed for export. Each turtle should ideally be photographed in 3 views: as the whole animal from the side; a view of the underside (plastron); and a close-up of the side of the head (if the animal is willing to extend its head).

Identification or verification of parts and derivatives of turtles is often highly challenging. Turtles are frequently traded as whole or partial shells (particularly plastra), shell fragments, loose individual bones, dried cartilage, dried or frozen meat on or off the bone, preserved eggs, powders, jellies, and derivatives like packaged medicines. Shipments of such materials often contain a mixture of turtle species, and may include other animal or plant groups as well. In many cases, visual identification of shells or bones is possible, but expert consultation is usually required for conclusive identification. Turtle paleontologists are particularly good at identifying bones and bone fragments and may need to be sought out at a museum or university. For unidentifiable, fragmentary bone and cartilage material, as well as meat, powders, jellies and packaged products, molecular genetic analysis is often the only method to obtain a reliable identification.

Names and Synonyms. The taxonomy of turtles is undergoing significant changes as new molecular and analytical techniques are applied, and unfortunately this results in frequent name changes for many species in the scientific literature. As a result, several names are frequently applied to the same species, and permit applications may not always use the names under which the species is listed in the CITES Appendices. The status of a name can be checked most easily using the SpeciesPlus website (http://speciesplus.net/species), which allows searching by any name (valid or synonym) and leads one to the valid name in CITES. To verify that a species name is not a synonym of a CITES-listed species one may check the name against the Standard Reference for turtles (Fritz & Havas, 2007) or do a text search for the name in the latest annual *Checklist* of the Turtle Taxonomy Working Group (TTWG) (http://www.iucn-tftsg.org/checklist/); the latter Checklist includes the CITES status of each species.

At this step in the process it will be useful to note whether a species is native to exporting country, an introduced feral species, or non-native and only kept in captivity. The SpeciesPlus website, the Fritz & Havas (2007) Standard Reference for turtles, the IUCN Red List, and the TTWG Checklist each include information on the distribution of each turtle species and are convenient sources to confirm occurrence in a particular country.

Reviewing applicable laws, regulations, exclusions and previously-made NDFs regarding acquisition and production systems

CITES export permits should only be issued for CITES-listed specimens that were acquired or produced in accordance with national laws and regulations. Determining that collection from the wild is legal, or that specimens originate from genuine captive production systems, is a shared responsibility of SA and MA.

Once the identity of specimens proposed for export has been determined, it is necessary to verify the legal acquisition of the specimens concerned. Laws, rules and regulations concerning turtles that may be traded differ by country, species and source. A review of legal acquisition will likely be led by the MA, with input from the SA in certain circumstances, such as verification of captive origin. If NDFs have been prepared for the species and population/area previously, these should provide an excellent starting point to summarize the protective, biological and trade status of the species and population concerned. If a species has been subject to a listing proposal to the CoP, or has gone through the Periodic Review or Review of Significant Trade proceses in recent years, then those documents will include valuable data on the species, its biology, risk factors, and trade trends.

The following is a simple summary of factors to keep in mind when reviewing legal acquisition; the specific conditions to be met will be detailed in the pertinent domestic laws and regulations.

Protective Status:

In what CITES Appendix is the species listed?

Is the species fully protected from offtake from wild populations under domestic laws or regulations, or are specific populations protected (e.g. in protected areas) while offtake is permitted from other populations?

Is captive breeding or aquaculture of the species permitted or regulated?

In cases where offtake from wild populations of a native turtle species is legal (Source Codes W and R):

Are there seasonal closures in force, and are the authorities reasonably satisfied that the specimens were not obtained during closed seasons?

Are the authorities reasonably satisfied that the specimens were not obtained from protected areas or designated protected populations?

Are there restrictions on the method of capture, and if so, are the authorities satisfied that no illegal capture methods were used to collect any of the specimens?

Is there a harvest quota in place, and if so, is there evidence that the specimens destined for export were obtained as part of the harvest quota?

Do the specimens comply with any size or weight limits that may be in force, and/or restrictions regarding gender of the specimens allowed for offtake?

In cases of export originating from captive facilities (Source Codes C, D, and F):

Exports of specimens with source codes C and D do not require an NDF, but do require evaluation by the responsible government authorities that the breeding stock was established and maintained in accordance with CITES and domestic laws and regulations, and in a manner not detrimental to the survival of the species in the wild, as advised by the SA (Res. Conf. 10.16 (Rev)). Concerns have been recorded over the years that these codes have unintentionally or deliberately been misapplied to specimens originating from the wild, turtles and otherwise (see AC25 Doc.19; AC27 Doc. 17 (Rev.1); AC27 Sum.3 Rev.1; SC62 Doc. 26). The incorrect use of source code C is understood as a way to avoid the scrutiny of an NDF, circumvent regulations protecting wild specimens of certain species, or marry up illegally exported specimens with export permits from a third country. Thus, careful oversight is needed of specimens that (are claimed to) originate from captive facilities. An inter-sessional working group was established by the Animals Committee to look into this matter, and in anticipation of its findings and recommendations, the following considerations should be kept in mind.

In the case of native species: Is there evidence documenting that the original founder stock were legally obtained from the wild, without detriment to the species in the wild, or alternatively, was breeding stock acquired from another, evaluated and approved, captive facility?

> This question should be answered by information from the facility, combined with the considerations regarding wild offtake in the preceding section.

In the case of non-native species: were the original founder stock legally acquired?

> In many cases, import records or possession records may exist in the Authorities' administration. In addition, the administration of the captive breeding facility concerned may contain proof of legal acquisition, and this should be made available as part of the application. If such records are not available, then general considerations will have to prevail, and Authorities should determine whether a species was present (and how prevalent) in the country, or legally in international trade, at the approximate time that the founder stock was accumulated in the captive breeding facility. An examination of the CITES Trade Database will assist to document whether a species was legally imported since its inclusion in the CITES Appendices. No such import records are universally available for specimens imported into the country before their listing in the Appendices, but in most cases their presence will become known about at the time that a listing proposal is being considered.

Is the captive breeding facility registered and approved?

> Registration registration details can be found in national or other registration systems, if such are maintained by the country. In the case of a CITES Appendix I-listed species traded for primarily commercial purposes (Source Code D), details can be found at http://www.cites.org/eng/common/reg/e_cb.html. At the time of writing, only a single species of Appendix I-listed turtle (*Astrochelys radiata*) is approved for primarily commercial trade in captive-bred offspring, from a single captive facility (in Mauritius).

Can the species be bred in captivity, and if so, is there evidence that the captive breeding facility is capable of breeding the species in a controlled environment, to at least the second captive generation, at the quantity and size consistent with exported specimens?

> In other words, the original wild-collected founder stock should have produced a first generation of offspring in a captive facility, and these first-generation offspring should have been reared to adulthood and reproduced among themselves to produce a second generation; or at least the facility should follow practices that have been documented to reliably and consistently produce a second generation in other but similar facilities (http://cites.org/eng/node/12643#bc; Res. Conf. 10.16 (Rev)). The key factor is whether the breeding lineage is reproducing to second and later generations; transfers of animals between captive breeding facilities, particularly new facilities acquiring breeding stock from older, well-established facilities, should not complicate this aspect. This is particularly pertinent for turtles, as their longevity and late maturity often results in long generation times, at the order of 10-25 years, so that a second captive generation is unlikely to be produced within a few years of establishing a facility with wild-collected founder stock. An evaluation of the ease or difficulty of breeding a particular turtle species in captivity can often be found as part of an IUCN Red List assessment, in the species accounts in the Conservation Biology of Freshwater Turtles and Tortoises series (see Annex 1: useful Resources), in aquaculture and pet keeping literature, or by contacting the Studbook keeper for the species concerned.

The MA should verify that the appropriate Source Code is used that matches the holdings, capacity and management practices of the captive breeding facility.

> Source Code C should be used for animals bred in captivity in accordance with Resolution Conf. 10.16 (Rev.) [i.e., second generation produced in captivity, with no or minimal involvement of initially gravid females in any founder breeding stock collected from the wild, and minimal addition of wild-collected animals to existing stock], as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 5.
>
> Source Code D is applied to Appendix-I animals bred in captivity for commercial purposes in operations included in the Secretariat's Register, in accordance with Resolution Conf. 12.10 (Rev. CoP15), and Appendix-I plants artificially propagated for commercial purposes, as well as parts and derivatives thereof, exported under the provisions of Article VII, paragraph 4, of the Convention.
>
> Source Code F applies to animals born in captivity (F1 or subsequent generations) that do not fulfil the definition of 'bred in captivity' in Resolution Conf. 10.16 (Rev.), as well as parts and derivatives thereof.

Captive breeding of turtles is regulated in some counties under wild or exotic animal possession, zoo or aquaculture laws or regulations, and these will provide pertinent directions in the case of an NDF involving captive facilities. Guidance has been formulated for the inspection of commercial reptile breeding facilities in Southeast Asia (TRAFFIC, 2013; available as AC27 Inf. 17), and more information will be brought to bear on

the topic in the foreseeable future (e.g., Notification 2015/016). In particular, the MA should be vigilant that the correct source codes are used in the case of facilities where wild-collected animals are held for some time before being traded onwards.

Turtles produced at genuine captive breeding facilities tend to be characterized by uniform size, shape and colouration, an absence of visible ectoparasites such as ticks or leeches, little or no incidences of injuries, scars, or physical wear and polishing of the shell. Captive-bred turtles tend to be alert, bright-eyed, relatively heavy in weight, and usually are not very shy. Limited written or pictorial guidance exists to determine whether individual turtle specimens are wild-collected or originate from a captive source (but see TRAFFIC, 2013), and experience with turtles at farms and in the wild is of great value in this regard. This aspect warrants further, more detailed, consideration in the context of captive breeding under CITES.

Special cases:

In the case of scientific specimens /samples: were the specimens/samples obtained in agreement with relevant laws and regulations regarding scientific research?

> In most cases, a copy of the pertinent research permit should adequately answer this question. The type of research and specimen collection may have a bearing on the possible detriment to the individual specimens involved: Are whole specimens collected for placement in museum colections, were blood or tissue samples taken from live specimens in captivity or in the wild and the animal released back to its original location (and if so, how if anything does capture and restraint increase the risk of mortality of the animals), or were samples collected from salvaged material (like roadkills or skeletal material found in the field after the animal died of a cause not related to the research)?

Evaluating Conservation Concern

Collection and trade of turtle species that are considered to be of conservation concern represent elevated risks to their population. Species assessed in as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD), or not included in the IUCN Red List at present (implicitly Not Evaluated, [NE]) warrant a detailed NDF evaluating the threats impacting the species, including the potential impacts of trade.

Many, though not all, species of tortoises and freshwater turtles have been assessed globally on The IUCN Red List of Threatened Species (www.iucnredlist.org), the global standard to express conservation concern. Additionally, national assessments have been made for some or all species in several countries (see http://www.nationalredlist.org/).

The tortoise and freshwater turtle assessments on the IUCN Red List are progressively being updated and completed, so a check of the Red List is warranted at regular intervals. For those species where no assessment is available, or the available assessment is old and possibly out of date, it is recommended to check with the Red List Authority for tortoises and freshwater turtles or the Red List Program of IUCN for an update on the species' assessment.

Where no global or national threat assessment is available, an approximation of the severity of conservation concern may be established by the SA for the national population of the turtle species concerned. The criteria and guidelines for Red List assessments may be useful for this, and can be accessed at http://www.iucnredlist.org/technical-documents/categories-and-criteria. In many cases for turtle assessments, the 'A' criteria documenting population declines over three generations (past, present and/or future) will be applicable. Generation times for turtles have been established for only a modest number of species, but generally range from 10 to 25 or more years, indicating that an overall population decline for the A criteria should be considered over a period of 30 to 75 years. In very few cases are population trend data available over such a long period, meaning that subjective historic estimates and trend estimates will need to be taken into account. The current Red List (version 2014.3) lists 223 non-marine turtle species, 19 separate subspecies, and 8 regional subpopulations. Of the 223 species listed, 6 are Extinct (EX), 1 Extinct in the Wild (EW), 28 Critically Endangered (CR), 24 Endangered (EN), 59 Vulnerable (VU), 36 Near Threatened (NT), 1 Conservation Dependent (LR/cd; an old category being phased out), 40 Least Concern (LC), and 10 Data Deficient (DD), meaning that 129 species (58% of those assessed) are officially regarded as Threatened (CR, EN or VU). In other words, about half the world's turtle species are threatened with extinction. For the great majority of threatened turtle species, over-exploitation for subsistence consumption and/or trade is the leading cause of decline. Therefore, appropriate consideration must be given in an NDF to the factors that lead to population decline and eventually species extinction if left unaddressed.

Species listed as Least Concern (LC) (and to a lesser extent those assessed as Near Threatened [NT]) are not considered to be at significant risk of extinction in the near future. IUCN Red List assessments, including LC, include an assessment of the impact of offtake and trade on their survival prospects, and a LC status indicates that currently known trade levels are not threatening the species' survival prospects. However, it must be kept in mind that the IUCN Red List assessments are determined at the global level, considering the species' status and imp[acts across its entire geographical range. It is possible, though, that intensive localized offtake can significantly impact a particular population, particularly if that population is at the edge of the species' natural distribution, or has historically been over-exploited. As NDFs are meant to be made at the scale of the national population, it is possible that trade in a Least Concern species can still be detrimental to a national population, and therefore could lead to a negative NDF. This consideration should be documented in the NDF report.

The Data Deficient (DD) category in the IUCN Red List is not normally included in the Threatened categories. This category, however, represent species for which too much uncertainty pervades the available information to confidently assess the species and assign it to one of the regular categories. Such uncertainty may either come from scarcity of information (a species known only from a few old records and no recent survey efforts to discover more about its biology and conservation status), or from conflicting information, or from opposite conservation trends shown by different populations, such as where one population is in steep decline while another population (in another country, river basin, mountain range, etc.) is increasing. Data Deficient species therefore can span the range from not threatened in some populations, to possibly severely threatened but with insufficient information at hand to justify a severely threatened assessment. For the purposes of an NDF, the uncertainty associated with a Data Deficient species warrants detailed examination of the status of the population subject to proposed export and adequate justification of the conclusion of the NDF. Similarly, a species that has not yet been assessed and published on the Red List (i.e. Not Evaluated [NE]) can not be assumed to be under no threat, from trade or otherwise, and warrants a detailed NDF.

Evaluating Potential Intrinsic Risks of Wild Turtle Offtake.

The NDF should indicate what proportion of the population is subject to exploitation, and the capacity of the species to recover from offtake. The offtake for export must be considered as part of the total offtake, and this total offtake should remain below the species' recovery capacity.

For the vast majority of species, wild offtake can be sustainable if the rate of targeted offtake is lower than the recovery potential of the population, in the absence other impacts on the species' populations (such as accidental mortality, habitat loss or degradation, invasive species impacts, etc.). To determine whether offtake is potentially detrimental, one should ideally understand three factors:

(i) an indication of total adult population size;

(ii) the annual rate of loss of individuals from the population as a result of natural mortality (old age, predation, etc.) and the rate at which natural recruitment is needed to maintain the wild population, as well as the rate of 'unnatural' mortality from habitat alteration or loss, invasive species effects, human-induced ecosystem changes. Note that these human-induced changes can both depress as well as facilitate a population.

(iii) an indication of the population's annual potential ability to produce and recruit additional animals into the population.

Theoretically, the 'surplus' of potential recruitment minus recruitment needed to maintain the population (in the context of ALL impacts affecting that population) can be taken without detriment. This 'surplus' is a proportion of the overall population; logically, a large wild population should be able to sustain the collection and trade of a larger number of individuals than a small population. The population parameters for the three key factors (population size, total mortality rate, recruitment potential) are poorly known for nearly all turtle species, in contrast to e.g. several crocodilian populations, where such data allow the determination of portional harvest quantities (i.e. what portion of the population, and therefore what actual number of animals, can be taken without detriment). No cases have been reported where such maximum allowable offtake quantity has been reliably determined and validated for turtles.

Turtles have evolved not only a unique body design, with a bony shell providing effective protection against many natural predators, but also a remarkable life history strategy characterized by slow growth and late maturity (usually on the order of 10-15 years), longevity (typically living for six or more decades, and generation times often at 25-30 years) and successful reproduction throughout life without senility, relatively modest annual reproductive output (one to over 100 eggs per mature female per year, depending on species), very low survivorship of eggs and juveniles, but increasingly high average annual survivorship of subadults and adults.

In short, the key to turtle life history is to reach maturity, live for a long time, and produce a modest number of eggs each year, so that over a lifetime enough eggs are produced to ensure that a few will successfully hatch and some of these will survive to adulthood. (TFTSG, 2011)

Impact of offtake of adult turtles versus of eggs or hatchlings

The NDF should indicate the life stage (age, size, etc.) of the turtles being collected and exported, and their significance for the population's capacity to recover. Offtake of eggs and hatchlings is less likely to be detrimental than removal of adults from a turtle population.

As a result of their specialized body plan and life history strategy, turtle populations can and do sustain their greatest natural losses in the egg and early juvenile stages, but experience very low natural adult mortality. Average mortality rates (from predation, weather, and in some cases lack of food, shelter or other critical factors) are very high for eggs and hatchlings (typically above 80%, and 100% in some years: Swingland & Coe, 1979; Klemens, 2000; Pike and Seigel, 2006), while annual survival rates of adult animals in stable populations are generally high (85-97%: Doroff & Keith, 1990). In other words, not all eggs hatch successfully, and few hatchlings survive to adulthood, but those who do reach adulthood normally survive for many more years, during which time they put one or more clutches of eggs into the ground each year. Thus, a typical turtle population only loses a small number of adult individuals which need to be replaced by new recruits into the reproducing adult population (ii, above), but has a proportionally high potential ability to produce eggs and hatchlings over a long time (iii); the key to survival of the population is to ensure that sufficient eggs and hatchlings survive for the very long time it takes to reach adulthood, and that adults survive sufficiently long to produce the necessary number of egg clutches in their lifetime. Few natural generation times (the time needed for one reproducing individual to be replaced by a reproducing individual of the next generation) are known with certainty for tortoise and freshwater turtle species, but available estimates and calculations include about 10-12 years for *Deirochelys reticularia* (Buhlmann et al., 2008), at least 25 years for *Chelydra serpentina* (Steyermark *et al*., 2008), about 25-30 years for *Clemmys guttata* (Litzgus, 2006) and 36-47 years for *Emydoidea blandingii* (Congdon *et al*., 2000).

From an offtake perspective, the life history strategy of turtles means that the population impact of removing eggs or hatchlings from a wild turtle population for trade is very different from the impact of collecting adults. For a population of turtles to persist, at least 85% of adults (depending on species, often a much higher percentage) need to survive to the next year, i.e. no more than 15% can be lost in any given year. That loss would be the total of natural, age-related mortality, natural and invasive species predation, and human offtake (consumption, legal and illegal trade, etc.). Thus, if human offtake were the only impact on a turtle population, no more than 15% of adults can be taken in any given year, and for some species, much less even. But natural factors continue to impact the population, therefore any human offtake that aims to be sustainable should be well below the recruitment potential of the total adult population per year. The annual percentage offtake of adults that could be sustainable differs by species and location, but is unlikely to exceed 5% for any turtle population anywhere, and probably is much lower in most cases. The effects of sustained removal of adult turtles from populations have been documented well in the Mascarene Islands (*Cylindraspis* spp., extinct: Gerlach, 2014), Seychelles (*Aldabrachelys* spp., extinct or nearly so: Gerlach, 2014), Galapagos Islands (*Chelonoidis nigra* complex), southeastern USA (*Malaclemys*, severely depleted by the 1930s: Carr, 1952; *Macrochelys* spp., depleted by 1980s: Pritchard, 2006) and tropical Asia more recently (van Dijk et al., 2000): population depletion (with very slow recovery), population extirpation, and extinction of entire species. Population collapse usually occurs within a period of years to decades from the start of exploitation, while recovery is a matter of decades to centuries.

Mortality rates are high for turtle eggs and during the first few years of a young turtle's life. Numerous natural predators can detect turtle nests by sight or smell, and nest predation rates are generally high, in extreme cases close to 100% in some years at some sites. The hatchlings that emerge from nests that escaped detection and predation are small and easily consumed by a wide range of predators in their early years, and must avoid accidental mortality from adverse weather and lack of experience ('fatal mistakes' like leaving oneself exposed in the open). Egg and hatchling predation are likely to some extent density-dependent: if a predator comes across a nest or hatchling it will consume it, but it may not dedicate its time looking for turtle eggs and hatchlings if other, more easily found prey is available.

This high initial natural mortality rate allows human offtake of eggs and hatchlings to occur as an element of natural predation (i.e. human offtake is simply one actor in a suite of predators), particularly if this offtake is accompanied by offset measures such as predator exclusion or population management, or headstarting of a proportion of the collected eggs / hatchlings (but see caveats on headstarting in the section on possible management measures, further below). In CITES terminology, this offtake approach represents ranching. It is

noteworthy that species and populations of freshwater turtles that have been subject to long-term egg collection but no offtake of adults (*Podocnemis expansa*, *Batagur baska*, *B. affinis*, *B. trivittata*, *Elusor macrurus*; Moll & Moll, 2004) have generally persisted for very long times, although in some cases showing long-term declines in adult populations - though it is extremely hard to disentangle historical causes of decline in complex suites of impacts including egg harvest, habitat loss, degradation and pollution, accidental mortality (fisheries bycatch), invasive predators and changing attitudes to offtake of adults. Nevertheless, it is safe to say that offtake focused on eggs or hatchlings, with concomitant protection of adults, is much less likely to be detrimental to a turtle population than offtake of adult turtles or subadults.

Information on life history parameters, such as age at maturity or first reproduction, longevity, number of eggs per clutch, number of clutches per year, duration of inter-nesting interval (individual females of some turtle species reproduce only every second year, or at even longer regular intervals), and indications of egg and hatchling survival rates can be found in the scientific literature for some turtle species – though this information is not or incompletely known for many species. This type of biological information, when available, can usually be found in the CBFTT accounts, in IUCN Red List Assessment text fields, and selected monographs listed in the 'Resources' section of this document.

Evaluating Impacts of Wild Offtake

Impact on individual specimen taken.

The NDF should describe the effect of offtake on the individuals traded; in the case of turtles this will be removal of the entire specimen from the population.

In most cases, wild offtake of tortoises or freshwater turtles for trade or subsistence utilisation consists of the permanent removal of the individual turtle from population. Regardless of the purpose of offtake (local consumption, trade for consumption, pet keeping or other purpose elsewhere), the individual turtle is permanently lost from the population.

If the NDF concerns the export of turtle eggs, hatchlings or ranched individuals, the impact of obtaining the eggs on the survival of the wild parent animals should be considered.

When the primary offtake for trade is in the form of eggs to be used for captive incubation, as part of a ranching program, the egg collection activities may impact the wild parent animals. It is not uncommon for egg collectors to move gravid females into controlled conditions and release them after they have laid their eggs. Examples range from penning female *Batagur affinis* on their nesting beach for the duration of the evening, ,to collecting females of *Testudo horsfieldii* after they emerge from hibernation, moving them to a central facility for several days or weeks, and returning them to the general area of collection afterwards (AC24 Doc. 8.1, pp. 18-23). While capture followed by release does not reduce the number of animals in the wild population per se, this manipulation may have impact on the fitness and survival of the females, depending on how they are collected, handled and released. Beyond the stress of physically handling and its possible long-term effects, moving and penning turtles for several days or weeks risks depriving the animals of essential feeding opportunities, as well as exposes the animals to the stresses of close proximity to numerous other turtles, which can be highly stressful in itself due to inter-individual agression, and potentially exposes the animals to any pathogens that may be carried by some individuals. In addition, releasing a batch of turtles in one location leads to possible disorientation, initial competition for food and shelter near the release site, and the need to expend significant energy to move to the previous homerange or another unoccupied area of suitable habitat. The effects of these impacts have rarely been studied, but comparison of the behavioural and home range patterns shown by undisturbed tortoises and by translocated tortoises (Seigel & Dodd, 2000), it is likely that manipulated females lose out on resources for the year, possibly resulting in lower reproductive output for the next year, and conceivably a lowered survival rate during hibernation. The risks become compounded if animals from different collection areas are mixed at holding facilities, increasing the risks of disease introduction and spread, as well as of genetic pollution. It should thus not be assumed that ranching practices have no long-term effects on the adult individuals or population dynamics, and any detrimental effects must be incorporated into the NDF .

Impact of offtake on target population:

The NDF should describe the effects of the removal of a part of the target population of tortoises or freshwater turtles on the remaining turtle population. Robust assessments of collection from the wild require detailed knowledge of offtake rates in relation to population size and recruitment potential, as well as knowledge of distribution, critical habitat availability and life history.

The impact of offtake on a turtle population is remarkably difficult to establish in most cases. Turtles are relatively difficult to survey quantitatively, and therefore it is difficult to estimate the number of individuals in a population, or density of individuals per unit area of suitable habitat. This makes it difficult to determine trade quantities as a proportion of the total population, and indirect estimates of population size and trade impact will need to be made. To determine population impact, a study needs to examine the population over the time period that recruitment occurs, which is several decades for many species, and the required historical population data, or offtake quantities, are rarely available, if at all. As a result, there are no published quantitative studies that describe the impact of wild harvesting on tortoise and freshwater turtle populations, only qualitative descriptive studies that either document a population that appears to maintain its population density steady in the presence of an offtake regime (e.g. *Chelydra serpentina* in Maryland: MD Snapping Turtle WG, unpublished data), or document a population decline or collapse soon after a period of overexploitation and very slow recovery to historic densities (Carr, 1952; Thirakhupt & van Dijk, 1995; Pritchard, 2006; Gerlach, 2014).

Because the overall size or density of a turtle population is usually difficult to survey, monitoring of turtle population trends is most effectively achieved by an indirect survey method, such as catch per unit effort, or by monitoring the average size or weight of collected animals. Due to the longevity and slow recruitment of turtles, several years of monitoring effort may be needed to demonstrate population trends. The NDF should take the results of monitoring programs into account to evaluate the risk of export. Where no monitoring results are available, establishing an appropriate monitoring program is recommended.

Ideally, turtle population monitoring should be carried out on an ongoing basis, before, during and well after an offtake episode to establish baseline indicators of population density, offtake effort and population recovery (van Dijk et al., 2008). However, with the twin challenges of turtles being generally very difficult to survey accurately and the long generation and maturity times making population recovery a matter of years to decades, the necessary resources for appropriate survey efforts, commensurate to the estimated risk, are hardly ever available. Consequently, indirect survey methods will need to be used, and although these imply substantial uncertainty for their results they have been used in previous studies and monitoring efforts for tortoises and freshwater turtles (Thirakhupt & van Dijk, 1995; Schoppe, 2008a, 2008b, 2009a, 2009c). Detailed information on survey methodology for turtles and other reptiles is provided by McDiarmid et al (2012), while survey methodologies for rare and elusive species were described in detail by Thompson (2004). It must be emphasized that the indirect survey methods described below represent pragmatic means to obtain data that in many cases is indicative of population status and trends, but that such data must always be used and interpreted with great caution.

Catch per unit effort: this is probably the simplest indirect survey method and uses collection effort (i.e. number of collection hours) as a proxy for abundance or density of the target species: if it takes a collector on average one hour to find a tortoise at site A and a similarly skilled collector requires two hours to find the same species of tortoise at site B, it is logical to conclude that the tortoise population density at site A is twice as high as at site B. Other versions of such comparative abundance assessments include the number of animals, or the combined weight of animals, collected per collector per day, per month or per year, or the distance needed to travel to encounter the species. These estimates only give a rough indication, as the collection results vary with the experience of the collector, the number of capture aids (s)he may be employing (assistants, dogs, traps, nets, drift fences), weather conditions and seasonality, and possible other target species for collection. This type of data can be obtained by accompanying collectors in the field for representative collecting trips, or can be obtained from interviews with collectors and traders (with due consideration of interviewees' tendency to exaggerate or underplay collection success, depending on circumstances). Catch per unit effort monitoring can also be used to document population trends over time at a particular site.

The price that local wholesellers pay to collectors for turtles is the simplest possible indicator of abundance or scarcity and associated catch per unit effort, but arguably also the least reliable. Price per turtle (whether by number or weight) indicates the economic value of the time and tools required to collect an animal, and tends to remain more or less stable if the exploited population remains stable, but tends to increase when turtles become scarce and more time is needed to find one. The price trend, however, may be severely complicated by changing market price trends at national and international level, by changes in transport infrastructure and freight charges, and the price-deflating effects of additional supplies from previously unexploited populations. Thus, price trends can be used as indicative of population status trends at best, but should not be accepted as primary indicators.

Visual encounter surveys: a non-invasive survey approach is to count the number of turtles that can be seen and identified reliably at a particular site or transect. The number of animals seen during a standardized time in a defined area will not be the same as the actual population size or density, but repeated visual surveys at

different times, or at different sites, will give at least an indication of relative abundance at different times or places. This is particularly useful when comparing populations at sites where the animals are protected (e.g. baseline surveys inside protected areas, where trapping and capture may not be feasible) with sites where the impact of collection is being evaluated. This method only works for species that are easily visible in habitat, such as when basking or during times when they aggregate, but has been applied successfully for Map Turtles (*Graptemys* spp.: Lindeman, 2013), Diamondback Terrapins (*Malaclemys terrapin*: Harden et al., 2009) and Giant River Turtles (*Podocnemis expansa*).

Biometric monitoring: this approach evaluates the average size or weight of turtles being collected from a particular area. As turtles take many years to grow to their normal maximum size, intensive collection is likely to remove a large proportion of animals before they reach adult size, and it will take time for juvenile animals to reach adult size. Thus, a population with on average small turtles (either measured by average carapace length, or by average weight) is indicative of a population that is subject to significant offtake. Moreover, the normal size distribution of turtles in a population tends to form a skewed bell curve: modest numbers of juveniles and small individuals, most adults at an average size, and a few very large individuals. An absence of very large individuals in a population can be indicative of long-term offtake preventing any adults from surviving long enough to reach such maximum size, while conversely the occurrence of exceptionally large individuals in trade is usually an indication that the specimens were sourced in a previously unexploited population. Size distribution is a measure that can be relatively easily established by measuring representative holdings of turtles at a collector's or wholeseller's premises, and repeated measurements over time of specimens in trade can be extremely informative. A baseline size and weight distribution for the species should be obtained from a nearby population that is not exploited, such as one in a protected area where no poaching occurs. A stable size distribution, or average weight, of collected animals from a particular area over a period of several years probably indicates that the offtake is not detrimental.

For a monitoring program to provide meaningful results to show population trends over time, it is critical that time series of catch-per-unit-effort or average size/weight data are collected from the same area every time.

In cases where collection effort moves from one target population to another, and successively depletes population after population, such time series do not measure the impact of expoitation on a target population, and instead measures the ability of collectors to access new, previously unexploited populations. Such collection practices can be identified through interviews, and are often indicated by the appearance and subsequent disappearance of particular turtle species in trade, and the occurrence of record-sized individuals in shipments comprised of turtles of varied sizes. Likewise the occurrence in a single shipment (or trader's holdings) of a mixture of different turtle species that do not inhabit the same geographic area is an indication that the shipment was sourced from a wide area. In these cases the impact on wild populations will be very difficult to determine.

Turtle populations rarely show indication that the removal of a limited number of individuals benefits the remaining individuals because more resources become available.

For some species, there are are distinct boundaries to the carrying capacity of the environment for the population. Density-dependent limitations of turtle populations have only been documented for the Aldabra Tortoise, which is limited by the availability of vegetation as food within walking distance of shady retreats from the potentially lethal midday sun (Swingland and Coe, 1979; Swingland and Lessels, 1979), and the limited availablility of basking sites has been implicated as a factor in the decline of European Pond Turtle (*Emys orbicularis*) populations in central Europe. For some turtle species, the area of nesting beach available can be a limiting factor (Bustard, 1966; Swingland and Coe, 1979; Vogt, 2008). In analogy with crocodilians, it is conceivable that density-dependent population limitation factors also operate in a number of large predatory freshwater turtles such as Alligator Snapping Turtles (*Macrochelys* spp.; App.III) and perhaps Softshelled turtles (Family Trionychidae), but such have not been documented with confidence. For the vast majority of turtle species, however, documented population densities appear to be much lower than the levels at which density-dependent factors start restraining further population recruitment – conceivably because current turtle population densities may be well below historic levels. Overall, there is no indication that removal of some turtles from a population significantly accelerates growth or recruitment rate of the remaining animals.

NDFs for tortoise and freshwater turtle species should consider whether collection efforts impact the habitat in such a way that it reduces the carrying capacity for the remaining population, precluding its recruitment and recovery to pre-impact levels.

The clearest case for tortoises has been documented for the Pancake Tortoise (*Malacochersus tornieri*; Appendix II): This species is a specialized inhabitant of rock outcrops in the East African savannah, where it

uses deep cracks and fissures in the rock to shelter from heat, desiccation and predators. Collection of the species for trade may involve the use of hydraulic jacks to lift rock slabs and allow access to the tortoises, and using boulders to prop the rock slabs open. This effectively opens the rock crevices to the point that they are no longer suitable as shelter for pancake tortoises, thus reducing the total available hiding sites and the associated foraging areas around these (Moll & Klemens 1997). Excessive disturbance of nesting beaches may lead individuals and breeding populations to shift to other nesting beaches, with the inherent risk that such alternative nesting sites are less successful for recruitment (flooding risk, exposure to predators, sub-optimal temperature profile during the incubation period, etc.).

Impact of offtake on National population

NDFs should be made on the basis of the population and area that is subject to offtake, but also need to assess whether the offtake in a particular part of the range may affect the species' occurrence in another area where offtake does not occur or is not allowed. A review of the normal reported movements of the target species should therefore be included in an NDF.

There is considerable inter- and intra-specific variation in the migratory behaviour of tortoises and freshwater turtles and some riverine species migrate dozens or hundreds of kilometers (*Batagur affinis*: Moll & Moll, 2004; *Podocnemis expansa*: Vogt, 2008; *Chelonoidis nigra*: Blake et al., 2012). Even species generally considered to spend their entire lives in small patches of specialized habitat have been documented to make long-distance movements on occasion (*Glyptemys muhlenbergii*: reference). Wild harvest in a particular part of the range may therefore affect the species' population in another area where offtake does not occur or is not allowed. Depending on the species and area of collection, the natural re-distribution of animals may contribute to the sustainability of the collection regime.

This can take the form of source-and-sink situations, where a non-exploited part of the population 'subsidizes' a nearby exploited part of a population as animals move from the 'secure' area into the exploited area, whether to take advantage of the space vacated by collected animals, or simply as a result of random movements. Given the behaviour of turtles, such re-distribution of individuals may occur fairly swiftly over a distance of many kilometers (particularly in the case of large riverine turtles), or could take years to expand a few kilometers. Long-term depletion of populations of forest tortoises (*Chelonoidis denticulata* and *C. carbonaria*) have been documented around AmerIndian villages, where tortoises have been hunted out within the day-trip walking distance of the hunters (8-10 km radius), and tortoises from the surrounding wider forest do not migrate in fast enough to re-establish observable populations (Souza-Mazurek et al., 2000; Perez & Nascimento, 2006).

Offtake impact on other species

NDFs need to consider the effect of offtake on other wild animal, plant and fungi species because tortoises and freshwater turtles can play significant ecological roles and are not always the sole target species on collection missions.

There are numerous examples where tortoises behave as scavengers, predators, grazers, and distributors of plant seeds and fungal spores. Some species also act as ecosystem engineers by opening up pathways in dense vegetation (Galapagos tortoises, *Chelonoidis nigra*), changing botanical communities (rewilding Mascarene tortoises: Griffiths et al., 2009), or creating burrows that are used by other animal species to find refuge from adverse weather conditions or predators (e.g. at least 47 commensal species have been recorded as using the burrows of the Gopher Tortoise, *Gopherus polyphemus*: Carr, 1952).

There are also examples of the indirect impact on species and ecosystems associated with bycatch from tortoises or freshwater turtle harvesting because these are often just one of several species or products that collectors look for. The high commercial value of some turtle species makes it worthwhile on balance to look for the last of these animals, as even a few animals encountered per year per hunter is profitable (*Cuora trifasciata*: Timmins et al., 20xx). In the course of the extensive time spent in habitat looking for these rare turtles, the detection and collection of other species is similarly extensive, and the collection and trade of these turtles in effect facilitates and subsidizes the exploitation of other species.

The removal of significant numbers of tortoises or freshwater turtles from an ecosystem may therefore affect other species in that ecosystem. The details will depend on the species and ecosystem concerned, and understanding this will require research and, for the purposes of NDF consideration, review of available scientific literature.

Evaluating Impacts of Trade

In general, the impacts of trade on turtle populations are primarily the impacts of offtake on the wild population. There are, however, a few aspects where established trade leverages the impacts of offtake for local subsistence purposes.

The NDF must assess the risk of export trade impacts in combination with the risks posed by subsistence collection, domestic trade, and illegal and unreported trade, including mortality during the period between capture and export, the impacts from habitat degradation and loss, invasive species and other threats, as well as factors that benefit the species' populations.

While a large part of collection efforts for wild turtles are primarily focused on those tortoises and freshwater turtles as the target species, turtles are also widely collected as coincidental or occasional 'bonus' captures in the course of other activities. Many tortoises in particular are detected and collected in the course of other activities in forests or scrublands, such as collection of mushrooms and bamboo shoots, resin and rubber tapping, herding livestock, and general hunting of larger (mammalian) game for subsistence or trade. Freshwater turtles are often caught as part of freshwater fisheries.

Turtles have been used by humans for subsistence consumption as long as turtles and humans have shared space (see review in TEWG, 2015). Subsistence collection of turtles continues world-wide, and in many regions a tortoise seen is a tortoise captured and removed, just as freshwater turtles are caught where and when possible. It is often a matter of local economics and trade networks whether that captured turtle is used for subsistence, or traded locally, domestically, or internationally. Legal international trade in turtles is therefore often intimately interwoven with subsistence use and local trade, including the bushmeat trade. This diffuse collection and trade easily incorporates illegal aspects, such as collecting protected species alongside allowed species, collecting efforts that stray into protected and closed areas or closed seasons, and undocumented movements of animals across boundaries. The export of turtles can therefore not be considered in isolation from other trade, local and domestic, legal and illegal, and the NDF should consider this wider perspective. ,

Incomplete information is available on mortality rates of turtles as a result of capture, temporary holding in captive facilities, and transport. Some capture methods for freshwater turtles, such as underwater traps, fyke nets, and hook-and-line arrays, can lead to drowning, and mortality rates can on occasion be significant. Transport and holding mortality rates of turtles tend to be low relative to those suffered by mammals or birds, but nevertheless should be considered as part of the NDF. Mortality rate data is rarely reported, and conversations with collectors and traders as well as inspection of premises and shipments provide often the best indicators.

The issue of look-alike species, and the enforcement challenges this poses, is not unique to turtles. But as turtles are often difficult to identify to species, and several species closely resemble each other, this is a significant issue for turtle trade. In the case of turtles it is complicated by the different types of turtle trade. In the high-volume trade of turtles destined for consumption, mixed-species shipments are common, often mixing rare and threatened species in among abundant species, as a cross-section of the animals captured by widespread collection efforts and traded as just another turtle. In the international pet trade, in contrast, certain species command premium prices, and on occasion such animals may be mixed in with shipments of other turtles if they can not be legally traded by themselves. While normally beyond the focus of an NDF, these are issues that should be considered by the SA during the process of formulating an NDF, and need to be born in mind by MA and Law Enforcement and other inspecting officers.

In very few cases, turtles have established self-sustaining populations far outside their native area of occurrence, as a result of escape or deliberate release of transported animals. No turtle species that are currently included in CITES Appendix II have been recorded as having established populations outside their native range, but a number of unlisted species (Trachemys scripta, Chelydra serpentina, Pelodiscus sinensis) have, and a substantial introduced population of Astrochelys radiata (App. I) occurs in Mauritius. Moreover, extensive captive holdings of many turtle species are held in institutions and private facilities around the globe, including numerous Appendix II-listed turtle species. Whereas the NDF for such animals should be relatively straightforward, as they do not originate directly from a wild population that would be impacted by their trade, such exports nevertheless warrant consideration with regard to the legal acquisition of the specimens or their parental stock, and the capacity of the facility to produce such specimens. Refer to the section on captive breeding facilities, above, for more details.

The preceding sections summarize the different risks that different offtake regimes represent to the long-term persistence of the expoited population. These risks must always be considered in the context of other impacting

and facilitating factors affecting the population. The exploited turtle population and the impacts acting on it should ideally be monitored on an ongoing basis. Any negative impacts on a turtle population should be minimized or mitigated by appropriate and precautionary management measures, as described in the next section.

Evaluating Appropriate and Precautionary Management

NDFs should consider what protective and management measures are in effect for the species and population, as effective management reduces the impact on the exploited population and effective conservation measures reduce the risk of national population decline.

Where the NDF indicates that a turtle population is at risk, the SA and MA should encourage and facilitate implementation of appropriate management and conservation measures.

Over time, a variety of offtake management measures, and population recovery measures, have been tried for over-exploited or otherwise depleted turtle populations, with mixed success. Due to the severe long-term impact that unrestrained offtake can have, the often slow recognition of decline and formulation of mitigating measures, and the long generation and recovery time of turtles, combined with the specific biological characteristics and ecological requirements of individual species, the effects of mitigation measures are rarely clearly evident. Nevertheless, a range of measures, on their own or combined, are generally understood to reduce the risk of over-exploitation or facilitate the recruitment and thus recovery of impacted populations. Ideally, the effectiveness of such measures is documented through ongoing monitoring efforts. For greater detail, the reader is encouraged to consult Klemens (2000) and Moll & Moll (2004).

Closed areas

Protected areas in which collection is prohibited, and other areas where no offtake is allowed, represent the optimal protective measure for turtle populations, provided that the area is sufficiently large and contains sufficient area of appropriate habitat for a substantial turtle population to subsist. Adequate enforcement and monitoring for possible poacher incursions are also essential. The outer perimeter area of a protected area should be considered as a buffer zone, as humans may wander in and wildlife may wander out; if offtake occurs directly outside the protected or closed area, this will affect and potentially reduce the population. The core zone, the part where the influences of humans, invasive species and habitat edge effects are minimal, and from where turtles are unlikely to wander into areas where offtake may occur, can be as far as 10 km in from the protected area boundary in the case of tortoises (see also Souza-Mazurek et al., 2000; Perez & Nascimento, 2006), while riverine freshwater turtles are likely to travel even further upstream or downstream from a protected river section. Thus, protected areas need to be quite large to adequately safeguard turtle populations. Attention must also be paid that the protected area remains appropriate for turtles (and other species) in the context of climate change, habitat change effectys outside the area (upstream impacts on rivers are particularly relevant) and the possible impacts of invasive species or diseases. A long-term secure and monitored turtle population in a protected area is probably the best safeguard for long-term protection of the species in a country, and represents an assurance population which may contribute to the reinforcement or re-establishment of (accidentally) over-exploited declining or extirpated populations. Correspondingly, some of the offspring from long-term secure and successfully reproducing turtle populations in protected areas will naturally disperse across the wider landscape, including into nearby areas where offtake may occur. Offtake of such animals should in principle be sustainable, and should be appreciated as an economic benefit of the protected area.

Closed seasons

Restricting the time of year when a species may be hunted or collected is a common wildlife management measure, which has been applied to freshwater turtles, at least, in a variety of places. The concept is that by protecting the individual animals from collection and associated disturbance during key periods, such as hibernation, mating and/or nesting seasons, survival and/or recruitment is enhanced, or over-exploitation of seasonal aggregations of animals is avoided. Seasonal closures certainly quantitatively reduce the opportunities for offtake of animals, but are not necessarily fail-safe, because targeted collection effort over a limited time can still remove significant numbers of individuals, potentially exceeding the recruitment capacity of the population (*Malaclemys* in Maryland and New Jersey, USA – MD Terrapin WG, unpublished data). Seasonal closures can also be difficult to communicate and enforce.

Rotating Closures

On occasion, management approaches have included rotating closed areas, or rotating offtake areas: a designated area is opened for one year or harvest season, then closed for one or more years, with the aim of allowing the exploited population to recover in subsequent years. As discussed in previous sections, turtle populations take several years or decades to recover, likely longer than the rotating frequency. Very little evaluation of the long-term effectiveness for turtle conservation of this approach is available, and while this may be a useful complementary measure in a suite of management measures (nearby protected areas, size restrictions), it is unlikely to be adequate in its own right.

Capture Method Regulations

In many cases, domestic regulations exist that prohibit the use of certain capture methods or fishing gear to collect turtles, or allow turtle collection only using specified methods. Such regulations primarily concern freshwater turtles, and are often related to gear restrictions for inland fisheries, both commercial or recreational. Examples of capture methods that may be prohibited or regulated include various types of nets (fyke nets, pound nets, seine nets), traps, or trotlines, but also methods like dredging, gaffing, bow and arrow hunting, and spearing and spearfishing. The rationale for various gear restrictions vary by location, but often aims to reduce injury, accidental mortality (drowning) and/or cruelty, especially if the method is non-selective and also captures other (protected/regulated) species or specimens of restricted size classes. The other rationale is that a particular method may be too effective, and allowing the capture of large quantities by one or a few fishermen, to the detriment of other fishers relying on less sophisticated equipment, and/or having historically been documented to rapidly lead to population decline.

Capture Quantity Limitations

To prevent excessive numbers of individual turtles from being removed from the wild, various forms of quantity regulations have been established in different jurisdictions that limit the number of animals a collector may take from the wild in a certain period, or may have in his/her possession at any given time. Examples are daily or bag limits (no more than x specimens to be taken per person per day), season or annual limits, and possession limits (a person may have no more than x specimens in his/her possession). Limits are often related to the type of license possessed by the collector, and the license conditions in turn may impose reporting or other requirements on the license holder. For example, a sport fishing license in a particular US State may entitle the bearer to catch and keep one snapping turtle per day, while a commercial inland fishing license holder may take substantially greater numbers of snapping turtles (often no limit at all) but must report the total number and weight of turtles taken to the wildlife authorities on a monthly or annual basis. This allows the authorities to have an indication of capture quantities and trends, and provides opportunities to impose or refine additional regulations if this is deemed appropriate.

A comparable approach is to determine an annual or seasonal harvest quota for the species for a designated area, based on effectively a non-detriment finding process to determine the quota. Safeguards that the quota is not exceeded must be built in, either by limiting the number of licensed collectors and the maxiumum quantity that each may take (compatrable to the management of white-tailed deer by issuing a limited number of hunting licenses allowing up to three deer to be taken), or by carefully monitoring capture reports in real time and informing all collectors once the quota has been reached (as occurs in a number of fisheries).

Size Restrictions

A widespread management tool, particularly in freshwater fisheries, is to restrict the size of animals that may be taken from the wild. Most frequent is to impose a minimum size limit, below which animals may not be taken; the idea being that this allows juvenile animals to grow to maturity and reproduce before they are large enough to be legally taken, thus ensuring the continuing production of offspring. In turtles this has been successfully implemented in a variety of places and for various species. For example, Maryland's 11 inch curved carapace length minimum size for Snapping Turtles (*Chelydra serpentina*) was determined as the median size for reproducing females in the State's population, thus ensuring that at least half of all mature reproducing females are safe from commercial removal, and can produce next year's clutch of eggs.

Conversely, in some cases a maximum size may be imposed. The rationale to do so would be to protect mature reproducing animals, while allowing the offtake of juvenile animals. As discussed previously, juvenile turtles have generally low annual survival rates and are the least important population segment, while at times being the most numerous population segment. A maximum size limitation for animals in trade would thus move offtake towards a population segment that is more resilient to offtake. The pertinent example for CITES is the

Pancake Tortoise (*Malacochersus tornieri*), where Tanzania permits only the export of animals with a carapace length of less than 8 cm, to ensure primarily that the animals originate from captive breeding facilities, and in the unlikely case that wild-caught animals are 'laundered' as captive-bred, such wild offtake is restricted to juveniles (which are particularly difficult to find and collect for this particular species).

The risks of offtake to wild turtle populations are minimized by focusing the trade on hatchling animals. Imposing size limits that ensure that a proportion of mature individuals achieve reproductive age and size before collection is allowed goes some way towards securing recruitment of subsequent generations.

Turtles are good candidates for offtake regulation by size limits. It is a matter of choice by the regulatory authorities concerned whether to use straight carapace length (for which a gauge, similar to those used for lobster size limit verification, may be made), curved carapace length (so that only a measuring tape is needed) or weight (mass). In practice, collectors and regulators alike prefer maximum convenience and minimal handling, which for turtles points to midline curved carapace length. Clearly, size limits only work for offtake methods where animals are captured alive, and animals that do not meet the size regulations will be returned to the habitat with no long-term negative effects to the animals.

Nest protection and Headstarting

Since on balance only two or a few more hatchlings survive and grow to adulthood out of dozens, hundreds or thousands of eggs laid by a female over her reproductive lifespan, approaches to quickly increase a turtle population should include protecting nests and/or headstarting hatchlings. Headstarting means rearing hatchling animals in captivity to adulthood, or at least a size at which they are much less at risk from predation and other dangers in the wild, and then releasing them back into the population where they came from move to footnote?. Nest protection and headstarting reduce the loss of eggs and young animals from predation, flooding, drought and other natural (and human-facilitated) factors, meaning more large animals join the population, equivalent to a much larger number of eggs than the original population produced at the time. Nest protection and headstarting for turtles have primarily been applied to recover severely depleted populations, including Galapagos tortoises (*Chelonoidis nigra*), numerous marine turtle populations (family Cheloniidae and *Dermochelys coriacea*), Amazonian and Asian River turtles (*Podocnemis expansa* and *Batagur* spp.) and the Western Swamp Turtle (*Pseudemydura umbrina*). Nest protection and headstarting are expensive measures, as they are labour-intensive, and headstarting requires construction of often large-scale infrastructure to house often large numbers of young turtles for extended periods of time, with associated high costs for staff, infrastructure maintenance, animal feed and manitenance, and veterinary care. There are additional factors that may reduce the effectiveness of nest protection and headstarting as conservation tools. Nest protection may actually impede hatchlings from leaving the nest at the optimal time, and If protected nests are transferred to secure incubation enclosures, egg mortality may be affected by handling of the eggs in transit and re-burial, and the temperature profile of the enclosure may not match that of the natural nesting site, potentially affecting the sex ratio of the hatchling cohort (many turtles have temperature-dependent sex determination, where relatively warm temperatures during inclubation result in the development of a female reproductive system in the embryo, while cool incubation conditions trigger the development of male reproductive organs). Husbandry skills for headstart facilities are fairly to very demanding. The behavioural development of hatchling turtles, when growing up in a relatively small enclosure surrounded by conspecifics and with food provided at intervals, may be very different from the behaviours that are needed to forage, migrate and avoid predators once released into the wild. Headstarting of turtles remains an experimental approach for many species in many conditions, and while much research and some successes have been reported, much additional research and evaluation is needed to fine-tune its procedures and increase its successful contribution to turtle population recovery (see detailed discussion by Seigel & Dodd, 2000). Nest protection and headstarting have on occasion been used to mitigate offtake of turtles, in ranching systems for commercial trade (*Testudo horsfieldii* - AC24 Doc. 8.1, pp 19-23) as well as to offset offtake of subadult and adult animals for subsistence consumption (*Podocnemis expansa*: IBAMA, 1989; Vogt, 2008).

Given the investments required for successful headstarting, and the uncertainties surrounding the long-term conservation contribution of such intensive manipulation of animals, nest protection and headstarting may form part of a conservation strategy to recover severely depleted populations, but its long-term effectiveness (and economic viability) to mitigate the impacts of offtake for trade remains unproven.

Alternative Production Systems

The establishment of captive breeding facilities can theoretically mitigate the impacts of offtake from wild turtle populations. Such facilities must be established and managed with the appropriate safeguards, so as not to lead to detrimental collection efforts for wild specimens as breeding stock (see Res. Conf. 10.16 (Rev)).

Similarly, well-managed ranching operations (in the sense of programs that collect eggs from the wild population for rearing in captivity, not just the specific CITES definition of ranching following Resolution Conf. 11.16 (Rev. CoP15)) can in principle supply specimens for trade without detriment to the wild population (recall earlier discussion, on pages 12-13, of the possible impact of collection and manipulation on wild adult breeding animals). The degree to which specimens from captive breeding and ranching operations are acceptable substitutes for the end consumer has a direct bearing on their ability to take the collecting pressure off the wild population; for turtle species that are in demand for their perceived medicinal properties, the perceived 'purity' of wild-sourced specimens places a premium on these, and has led to a specific demand for wild-sourced animals alongside the supply of captive-bred specimens.

Public Awareness

Outreach and education programs for collectors, hunters and fishermen have a great contribution to make to population management, in the sense that they should reduce or eliminate illegal and unsustainable practices committed in ignorance that may lead to the death or otherwise removal of specimens from the population. Effective law enforcement, including the deterrent effect of publicizing cases of successful prosecution, complements such efforts towards adherence to management measures. Anonymous tip-lines where members of the public can report instances of poaching or other wildlife-related illegal acts have proven effective in a wide range of jurisdictions, whether driven simply by a sense of ethics and compassion, or incentivised by an ability to provide rewards following successful prosecution of the offender.

Making the NDF or provide related advice

After the compilation of information on the proposed export of turtles, with consideration of the factors discussed in the preceding sections, the making of the actual non-detriment finding itself, and possible outreach to management or law enforcement authorities, is a matter of applying established process and protocols, and independent of whether it concerns turtles or another species.

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Annex 1: Useful Resources

Identification materials

CITES Identification Guide http://citeswiki.unep-wcmc.org

Species accounts of the *Conservation Biology of Freshwater Turtles and Tortoises* series http://www.iucn-tftsg.org/toc/

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Standard Reference for Nomenclature of turtles: Fritz, U., & P. Havaš. 2007. Checklist of Chelonians of the World (including Appendix). *Vertebrate Zoology*, Vol. 57 (2): 149-368.

http://www.senckenberg.de/files/content/forschung/publikationen/vertebratezoology/vz57-2/57-2_fritz_149-368.pdf

SpeciesPlus website: http://speciesplus.net/species

Turtle Taxonomy Working Group (TTWG) annual *Checklist*: http://www.iucn-tftsg.org/checklist/ [documenting recent scientific literature on turtle taxonomy, not always consistent with adopted CITES nomenclature].

Details of biology, ecology and status of tortoises and freshwater turtle species:

Species accounts in the Conservation Biology of Freshwater Turtles and Tortoises series: http://www.iucn-tftsg.org/toc-ind/ [87 species published as of February 2015].

IUCN Red List accounts [those published after 2004 usually contain detailed biological and population information]: http://www.iucnredlist.org/

Contact details for Expert consultation

CITES Nomenclature Specialist – Zoology: see the CITES Website -> Animals Committee members: http://www.cites.org/eng/com/ac/member.php

IUCN SSC Tortoise & Freshwater Turtle Specialist Group: http://www.iucn-tftsg.org/contact/

Studbook Keepers for Tortoises and Freshwater Turtles:

European Studbook Foundation (ESF): http://www.studbooks.eu. List of studbook keepers by species (click on name of species' studbook keeper to email): http://www.studbooks.eu/index.php?option=com_content&view=article&id=244&Itemid=343

American Zoo Association Animal Programs: https://www.aza.org/animal-programs/ ; email conservation[at]aza.org

Annex 2: Examples

This Annex presents a series of hypothetical cases to illustrate the NDF process, the types of information used to evaluate the intrinsic vulnerability of the species, and the considerations used to evaluate whether traded quantities are at risk of being detrimental to the survival of the exploited population. These cases are presented to indicate how CITES Authorities may draw on diverse sources of potential information to accumulate relevant case information and apply it to the export concerned; they are not meant to be templates that apply in each and every situation. The biological information presented represents the best available factual data regarding the named turtle species, whereas the trade and regulatory aspects are entirely fictitious; any similarity to existing laws or countries (including Range State Parties of the species mentioned) are entirely coincidental.

Case example 1:

The CITES MA of African Party A receives an application for the export of 200 Leopard Tortoises (*Stigmochelys pardalis*), all described as juveniles under 10 cm shell size and collected from the wild.

The MA determines that *Stigmochelys pardalis* is included in CITES Appendix II (as part of the listing of Family Testudinidae). Domestic legislation does not prohibit the collection or trade of the species. The species is widely understood to be widespread and native in the country. No exports have occurred since two years ago, when a total of 530 specimens were exported in three shipments. The MA therefore requests the SA to make a Non-Detriment Finding for the proposed export.

The SA consults available literature and double-checks with a friend who is a safari tour operator, as well as with a field researcher who has carried out extensive field surveys for snakes and other reptiles across the country, usually engaging local community members as guides and field assistants. The species is listed in both the IUCN Red List and the National Red Data Book of Country A as 'Least Concern'. Both the tour operator and the researcher confirm that the species is frequently encountered across much of the country, as it prefers the savannahs and grazing lands that cover much of the country. Cattle-ranching landowners have reduced the populations of potential tortoise predators, such as hyenas and feral dogs, and in places the species was seen to be 'so common that you had to swerve the car to avoid hitting them', according to the safario tour operator. The SA learnt that local communities have little interest in the tortoises, but occasionally a wholeseller from the city comes through, commissioning young boys to collect small tortoises ("only the specled ones!") while they herd the family's cattle, and promising to come back and buy their collections two weeks later. With several dozen boys out and effortlessly collecting several such small tortoises each during the two weeks, a wholeseller can easily leave the village with over 100 small leopard tortoises.

The SA thus concludes that the species is not of significant conservation concern, and is widespread and abundant. The proposed quantity to be exported, 200 live individuals, is deemed insignificant compared to the estimated national population. Moreover, since only small, juvenile specimens are exported (the exporter, when asked, explained that the price per animal is the same for the importer, and smaller specimens are cheaper to ship by air freight), the impact of removal of these specimens from the population represents a low risk to the population, and is thus unlikely to be detrimental. The assumption that the specimens were likely collected from an area intensively utilized for cattle grazing, and where tortoise predators have been reduced, further strengthen the evaluation that this ppopulation is at low risk. The SA therefore provides a positive advice to the MA, and the export documentation is issued.

Case example 2:

The CITES MA of African Party B receives an application for the export of 200 Leopard Tortoises (*Stigmochelys pardalis*), collected from the wild.

The MA determines that *Stigmochelys pardalis* is included in CITES Appendix II (as part of the listing of Family Testudinidae). Domestic legislation does not prohibit the collection or trade of the species. The species is native in the country but only occurs in a small area in the Northwest. No exports have occurred in recent years. The MA therefore requests the SA to make a Non-Detriment Finding for the proposed export.

The SA consults available literature and finds that little information is available about the species in the country; a few records exist from the northwestern part of the country, but no status or abundance data have been published. The species is listed in the IUCN Red List as 'Least Concern'; Country B does not have a National Red List or Red Data Book that covers reptiles.

The SA double-checks with a friend who is a safari tour operator, as well as with a field researcher who has carried out extensive field surveys for snakes and other reptiles across the country, usually engaging local community members as guides and field assistants. Both contacts independently inform the SA that they are aware of the occurrence of leopard tortoises in the northwest, but that they encounter one in the field only rarely: a few times a year at best. The tour operator also informs the SA that (s)he has heard that visiting traders have been commissioning local community members to collect tortoises for him, and the tour operator was shown a few animals kept in back yards or tethered on a string awaiting the next visit of the trader. These animals ranged from fist-sized juveniles to an old adult weighing at least 20 lbs.

Without the resources to carry out or commission independent field surveys of tortoises, the SA decides that the limited information available indicates that the leopard tortoise has a restricted range within the country, and within that area it is uncommon to rare. No population estimate can be made, and absence of population dynamics and life history data for this population preclude the calculation of a sustainable yield. Moreover, since the collection for trade is non-discriminatory and absorbs juveniles as well as adult breeding animals, the impact of removal of 200 animals from the population represent a high risk to the integrity and ecological functioning of the population. The SA therefore takes a precautionary approach and advices the MA that it made a negative NDF finding and that export permits should not be issued. Moreover the SA recommends to the National Wildlife Department that the Leopard Tortoise should be considered for inclusion in domestic regulations as either a managed game species, subject to adaptive collection quotas based on a suitable monitoring system, or be included in the list of protected species, with the option of transferring it to the managed game species category at a later date, once adequate status data are available.

Case Example 3:

The CITES MA of African Party C receives an application for the export of 300 Leopard Tortoises (*Stigmochelys pardalis*), collected from the wild.

The MA determines that *Stigmochelys pardalis* is included in CITES Appendix II (as part of the listing of Family Testudinidae). Domestic legislation does not prohibit the collection or trade of the species. The species is native in the country. Annual exports of between 80 and 450 specimens collected from the wild have occurred in recent years. The MA therefore requests the SA to make a Non-Detriment Finding for the proposed export.

The SA consults available literature and finds that limited information is available about the species in the country; the species occurs localized in both natural savannah areas in the National Parks, as well as in the extensive private ranchlands and community grazing lands, but no status or abundance data have been published. The species is listed in the IUCN Red List as 'Least Concern', while the National Red List of Country C lists the Leopard Tortoise as Vulnerable, based on its localized and fragmented occurrence.

The SA contacts the exporter, who claims that the entire shipment of 300 tortoises consists of small animals, ranging from 10 to 15 cm CL (200-500 grams). All specimens originate from a single village in the Leopardsvale District, who have for a long time collected and traded juvenile tortoises while protecting the adults on their community lands.

The SA reaches out to the Leopardsvale District Game Warden, who confirms that he had helped the community understand the concepts of ranching, sustainable offtake, and size limits, and continued to serve as an informal advisor to the community. Each year the community elders allocate a catch quota to each participating household, organize the time and area of collection, negotiate the price with the wholesellers, and ensure that a significant share of the proceeds benefit the community at large. Moreover, the community had instituted an outline monitoring program, where in the weeks before the collection period, several of the people out herding cattle reported back how many tortoises they had seen, and how large they were. Based on this feedback, the elders then agreed on a total catch quota by adjusting last year's quota up or down based on recent sightings. The elders were proud to report that the number of large adult tortoises seen each year was increasing, as were the numbers of juveniles, and told with glee how visiting elders from neighbouring villages were astounded at the size of 'their' tortoises.

Based on the information received, the SA concludes that the Leopard Tortoise is not an abundant species in country C, and offtake of 300 specimens would represent medium risk to the exploited population concerned. However, since the offtake is part of a long-term practice that has apparently led to a modest increase in the population, as indicated by the local monitoring program, the SA concludes that this particular offtake is not detrimental and provides a positive advice to the MA.

Case Example 4:

The CITES MA of a Central Asian Party receives an application for the export of 7000 *Testudo horsfieldii* collected from the wild.

The MA determines that *Testudo horsfieldii* is included in CITES Appendix II (as part of the listing of Family Testudinidae). Domestic legislation does not prohibit the collection or trade of the species. *Testudo horsfieldii* is native in the country. Annual exports of between 15,000 and 22,000 specimens collected from the wild have been declared in recent years. The MA therefore requests the SA to make a Non-Detriment Finding for the proposed export.

The SA reviews available information and concludes that the species used to be widespread and abundant throughout the country, but has declined extensively as large tracts of the country were converted to irrigation agriculture in the 1950s and 1960s; at present Horsfield's Tortoises occur mainly in the hill regions in the north and east of the country, where they continue to decline, acording to the State Biological Survey annual report. *Testudo horsfieldii* is listed in the IUCN Red List as 'Vulnerable', while the National Red List lists Horsfield's Tortoise as 'Endangered', based on its disappearance from over half of its former range within the country.

The SA contacts the State Biological Survey officers of the northern and eastern regions. One of them responds that "*Testudo horsfieldii* is considered an agricultural pest in these cotton-producing regions. In spring the animals emerge from hibernation and enter the fields to browse on cotton seedlings. In the early years they were so numerous that the villagers would fill up trucks with them, ground them up and fed them to the pigs. Nowadays, they are a much less common pest, but the villagers still collect them when they see them in their fields. In the New Economy, it is more profitable to sell them, so villagers collect and store the tortoises and several companies buy them for export. Those that are not sold alive into the pet trade are slaughtered, cleaned and the shells dried and crushed; apparently some roaming traders buy these shells."

The SA concludes that the offtake of *Testudo horsfieldii* has been the driving factor for the decline of the species, and is clearly detrimental to its continued survival. Moreover, the SA concludes that while the traditional management of an agricultural nuisance species is the leading cause for the offtake, and export volumes are only a subset of the total offtake, there are no safeguards that the collection for international trade could not extend into the non-agricultural areas where the highest population densities remain. The SA therefore conducts an extensive internal discussion about whether to provide a negative advice (as the species is clearly declining, partly because of international trade) or a positive advice (because the specimens are collected anyway; exporting them simply earns some money for the country, instead of making some pigs a bit fatter). The SA is unable to resolve this discussion, and presents the different perspectives to the MA for its consideration. The SA appends an annex of recommendations for future management and conservation of the species, which include the establishment of designated no-collection zones for tortoises in a selection of geographic locations (to ensure at least some populations persist in the country), researching the development of cheap and practical tortoise exclusion fencing to minimize the incursion of tortoises into cotton fields, and directing the Natural Resources Police and Customs to investigate how and where the tortoise bone trade links operate and whether it is properly reported and taxed upon export.

Case Example 5:

The CITES MA of a South American Party receives an application for the export of 3000 River Turtles (*Podocnemis unifilis*), being hatchlings from a managed nesting bank.

The CITES MA establishes that *Podocnemis unifilis* is included in CITES Appendix II (as part of *Podocnemis* spp.) and that the species is native to the country. It determines that the national wildlife law protects the species from commercial exploitation, but also notes that the Indigenous Peoples Act exempts indigenous communities from the wildlife law in designated Community Lands. Communication with the exported confirms that he is sourcing these turtles from a community-managed program in one of the designated Community Lands. The MA therefore requests the SA to make a Non-Detriment Finding for the proposed export.

The SA contacts the community authorities for information on this program for river turtles. The SA is informed that this riverside community has traditionally collected the eggs of this species; the turtles very predictably nest together in groups, at two sand banks after they are exposed in the middle dry season. In the past, adult turtles were also hunted by spearing from a canoe or when they were caught when fishing for peacock cichlids, but the community had realized that the adundance of adult turtles had declined noticeably after the arrival of monofilament nets. Because the number of nests and eggs had declined correspondingly, a community decision was reached not to catch adult sideneck turtles anymore, and check nets frequently enough that any

acidentally caught turtles could be released without drowning. Any visiting fishermen from nearby communities had been politely but firmly informed that taking turtles in the community's lands and rivers was unacceptable. Also, egg collection was prohibited, for the time being, at the small sandbank, and at the large sandbank the eggs could be collected only for the first three weeks after the first nest was laid, and all nests laid from the fourth week of the nesting season onwards had to be left undisturbed. Keen-eyed persons had noticed that certain recognizable females (with a distinct scar, or odd colour mark) were found to nest twice each year, and the sentiment developed of 'the first clutch to feed our babies, the second clutch to produce the turtle's babies'.

These measures apparently worked, and a gradual increase was noticed in the number of nests at the two sandbanks. Since 1996 the local schoolteacher had kept notes on the nest numbers, showing a steady increase from 341 nests in 1996 to 1256 nests last year. The numbers of eggs consumed and numbers of hatchlings successfully emerging and reaching the river were not reported initially, but in recent years 600 to 850 nests had been left undisturbed, which produced an estimated 15,000 to 20,000 hatchlings (as a nest on average contained 25 eggs at this population).

The SA concludes that the proposed export represents less than 20% of the annual production by the exploited population. Taking into account that roughly one-third of nests were collected for subsistence consumption, the SA concludes that the overall offtake is about half of all eggs produced, which it considers medium risk. Being satisfied that the track record of local conservation measures has led to a recovery of the previously depleted population, and that monitoring of annual nest numbers enables swift local responses if declines occur, the SA concludes that on balance the removal of the proposed export quantity of hatchlings is not detrimental to the population's persistence and recovery, and advises the MA accordingly.

Case Example 6:

The CITES MA of a European Party receives an application for the export of 8 Golden Coin Turtles (*Cuora trifasciata*), bred in captivity by a private hobbyist.

The MA determines that *Cuora trifasciata* was included in CITES Appendix II at CoP11 in 2000. The species is native to China and Vietnam. The applicant is not registered as an approved breeder of the species, but no such registration is required under national legislation. The breeder is unable to provide original receipts to prove the date and place of purchase, remembering only that he bought five animals at a reptile fair sometime in the 1970s and has cared for them ever since.

No recent records are available of imports of the species, but consultation with the retired Curator of Reptiles and Amphbians at the national zoo asserts that the species was traded in modest numbers, maybe a few 100 animals per year, until about 2003. Moreover, in the handful of photocopied articles about the species that the curator provides to the SA is an article from 1993, written by the private hobbyist, documenting successful captive breeding of the species.

The MA therefore is satisfied that the breeding stock were legally acquired. As the parents were presumably imported after collection from the wild, the exported specimens are presumed to represent the first generation born in captivity, and thus can not qualify for source code C in accordance with Res. Conf 10.16. They therefore must be issued permits using source code 'F' and an NDF must be made by the SA.

The SA confirms that specimens of *Cuora trifasciata* have been kept in hobbyists's collections in the country for decades, though in small numbers. Consultation with the studbook keeper for the species confirms that several individuals in the country have one or more breeding pairs and consistently produce three to five hatchlings per clutch; established females normally produce a single clutch per year, rarely a second clutch. The SA therefore concludes that there is no grounds for doubt about the veracity of claims of captive breeding of the specimens for which the application for export was made. Moreover, as the original breeding stock was collected and exported decades ago, before the species became overexploited for medicinal purposes in its native range and consequently included in the CITES Appendices, the original collection of the breeding stock did not represent a detrimental impact to the original population; the trade of these captive-bred animals might strengthen an assurance colony or commercial breeding enterprise, and might reduce the desire by prospective owners to obtain their animals from an illegal source, and thus could potentially reduce (illegal) collecting pressure on the last remaining wild animals. The SA therefore concludes that on balance the proposed export is not detrimental to the survival of the species, and provides a positive advice to the MA, who in turn issues the appropriate export documentation.

Case Example 7:

The wildlife export authority of a North American Party receives an application for the export of 1000 lbs of Snapping Turtle *(Chelydra serpentina)* meat, taken from the wild population inhabiting a particular administrative subdivision.

The MA determines that *Chelydra serpentina* is not listed in the CITES Appendices. Moreover, it determines that the stated subdivision of origin has designated the Snapping Turtle as a game species, with a minimum size limit of 27 cm shell length, that may be collected without license with a bag limit of two animals per person, as well as in unlimited quantity by persons possessing a valid commercial fishing license, of which 32 were issued for the current season, and monthly catch report cards show take per licensee of between 120 and 600 animals averaging 4.3 kg each.

The MA therefore concludes that an NDF is not needed (since the species is not CITES-listed), also concludes that the export quantity is entirely plausible considering the reported legal take quantities, and informs the subdivision's wildlife authority that they are entitled to issue an export permit for this shipment.

Case Example 8:

The CITES MA of an African Party receives an application for the export of 500 *Kinixys belliana* tortoises collected from the wild.

An initial evaluation by the MA finds that *Kinixys belliana* is included in CITES Appendix II (as part of Family Testudinidae), it is well documented as native to the country, and is not specifically protected from commercial exploitation under prevailing domestic legislation. The MA therefore requests the SA to make a Non-Detriment Finding for the proposed export.

The SA, aware that the different *Kinixys* species look quite similar, attempts to validate the identification of the specimens by checking the applicant's website. On this exporter's website, pictures of several tortoises are shown, all identified as *Kinixys belliana*, but depicting a mixture of *K. belliana*, *K. erosa* and *K. homeana*. The SA reaches out to the exporter to help him/her to accurately identify the species and quantities involved in the export application. After re-identification of animals in the holding pens, a revised export application is submitted for 300 *Kinixys belliana*, 100 *K. erosa* and 100 *K. homeana*. The SA therefore initiates three separate NDFs: one for 300 *Kinixys belliana*, another NDF for 100 *K. erosa*, and one for 100 *K. homeana*.

For *Kinixys belliana*, the SA determines that the species is not listed in the IUCN Red List, but consultation with the IUCN Red List Authority for tortoises and freshwater turtles provides the information that the species was last assessed in 1996, as Least Concern. The National Red List likewise evaluated the species as Least Concern in the country. Available literature and a consultation with the herpetologist at the national biodiversity institute indicate that *K. belliana* continues to be widespread in the country and generally common to abundant in degraded scrubland used for grazing cattle – a habitat type that represents about 60% of the country. No systematic monitoring program exists for the species, but casual field observations by the herpetologist suggest that one can usually encounter two or three tortoises per hour of searching in suitable habitat, covering an area of less than a hectare.

The SA therefore concludes that *Kinixys belliana* is not domestically protected from exploitation, that it can reach densities of several animals per hectare across large areas, and therefore likely has a large national population, from which the removal of 300 animals is unlikely to be detrimental. The SA therefore provides a positive advice on the proposed export.

For *Kinixys erosa*, the SA determines that the species was assessed as Data Deficient (DD) in the IUCN Red List in 1996, and that it is currently in the process of being assessed as Endangered (EN) globally. The National Red List, however, does not mention the species, and consultation with the herpetologist at the national biodiversity institute informs the SA that *K. erosa* has not been documented to occur in the country. The species is known, however, to be part of the regional bushmeat trade. An examination of the national wildlife import-export database and the CITES Trade database show no records of recent declared imports of *K. erosa* into the country, thus eliminating the possibility that this could be considered a re-export. The SA therefore concludes that these specimens were unlikely to be collected legally within the country (since there is no known native population), and considering that if there were a small population somewhere, it would be highly unlikely that the removal of 100 specimens would not be detrimental, the SA issues a negative NDF. The SA also recommends to the MA and wildlife law enforcement authorities to engage with the exporter to elucidate how

these specimens entered the country, and take measures to reduce future unregistered imports in the upcountry border region.

Regarding *Kinixys homeana*, the SA notes that the IUCN Red List records the species as globally Vulnerable in 2006, and that the National Red List assessed the species as Critically Endangered in 2012. According to the assessment information, the species was historically widespread in the rainforest region of the country, but logging, charcoal production, and agricultural conversion have eliminated most of this vegetation type from the country, which is now only present in the core areas of two National Parks. Consultation with the herpetologist at the national biodiversity institute confirms that *K. homeana* now only occurs as scattered individuals deep inside these protected areas, where no collection or other forms of exploitation are allowed. Like *K. erosa, K. homeana* does occur in neighbouring countries and is part of the regional bushmeat trade. The SA concludes that the *homeana* specimens proposed for export are either inappropriately imported into the country (like the K. erosa), or were illegally collected from inside a protected area. The SA therefore provides a negative NDF advice to the MA. It also recommends to the MA and wildlife law enforcement authorities to include discussion of this species in their engagement with the exporter. Furthermore, it recommends to the National Parks Authority that it would be desirable to include information about this tortoise, and the illegality of collection, in the awareness and outreach campaign that the NPA is conducting around the two rainforest protected areas.