Draft Review of Production Systems Report to CITES Secretariat

Prepared by
IUCN/SSC Wildlife Trade Programme

Review of Production Systems

Report to CITES Secretariat

CONTENTS

TERMS Of REFERENCE

IUCN/SSC shall, in close cooperation with the CITES Secretariat, carry out the following activities:

a) Critically review the current definitions and descriptions of production systems for Appendix-listed animal and plant species used in CITES, taking account of work already undertaken by the Animals Committee at its 16th and 17th meetings.

b) Conduct a literature review and/or consult with appropriate experts to determine which other forms of production systems are being used, or could be expected to be used for CITES-listed species. Consult with the AC and PC working groups on this issue to ensure that production systems in mariculture, aquaculture and sylviculture are fully incorporated.

c) Prepare, in tabulated format along with descriptive text, proposed definitions and categories of production systems for Appendix-listed species for circulation by the Secretariat to Parties for testing and comment against existing systems, proposed production systems.

d) Receive and coordinate comments and other inputs from Parties, consulting where necessary with respondents and collaborators.

e) On the basis of comments received, prepare a revised classification of production systems for Appendix-II species on the basis of their relationship with, and relative impact that such systems may have on wild populations, for consideration by the Animals and Plants Committees. Provide recommendations, where necessary, to amend existing conference resolutions.

f) Identify key parameters that Management Authorities can use to identify, monitor and regulate production systems and their likely impact on wild populations, thus facilitate the making of non-detriment findings or not, based on consultation with relevant experts, the Secretariat and Management Authorities.

g) Make recommendations on incorporating production system categorisation in NDF guidelines when they are next revised.

REVIEW OF PRODUCTION SYSTEMS

EXECUTIVE SUMMARY

The Convention on International Trade of Wild Fauna and Flora (CITES) regulates trade in specimens from a variety of production systems. Difficulties in categorising production systems and in regulating trade in their products have been highlighted by a range of CITES initiatives.

The Parties have recognized however, that the conservation benefits of different production systems may vary. When the survival of the species is threatened by demands for trade, it is argued that captive breeding and artificial propagation can reduce the imapct on wild stocks and may replace traditional agriculture (Resolution Conf 9.19). On the other hand, it is also recognised that wild production and manipulations of wild systems such as ranching may provide more incentives for conservation than captive breeding (Resolution Conf 8.3 and Resolution Conf 11.16).

The Animals and Plants Committees have been asked to analyse the relationship between in situ conservation and ex situ production of animals and plants (Decision11.102 (rev. Cop12) directed to the Animals Committee and Decision 12.12 paragraph l) directed to the Plants Committee).

IUCN's was asked to review production systems involving CITES-Listed species and their impact on wild populations. Specifically the TOR included:

- a review of current and future production systems for CITES and non-CITES listed species,
- development of a rationale for grouping such systems;
- identification of production systems that might not be covered by current CITES definitions;
- classification of production systems for Appendix-II species on the basis of their relationship with, and relative impact that such systems may have on wild populations, and
- identification of key parameters that CITES Authorities can use to identify, monitor and regulate production systems and their likely impact on wild populations to assist the making of non-detriment findings.

Section A of the report reviews the variety of production systems in use for CITES and non-CITES listed species. As CITES embraces a broader range of marine and timber species in large scale commercial production and as production technologies improve, it is clear that the Parties are encountering a wider range of production systems than before. The technical Committees will have to assess how these less-familiar production systems fit into the current CITES categories and what guidance to provide Parties.

In Section B the report introduces a rationale for dividing production systems, based on their biological features into the following three broad categories: captive breeding /artificial propagation systems virtually de-linked from wild populations; rearing systems that depend on wild specimens, but enhance the survival of such specimens through rearing; wild production systems that incorporate a variety of manipulations of the wild habitat to increase productivity of the target taxa (See Tables 1a. 1b, 1c.).

Section C of the report considers the relative impacts of different production systems, noting that if trade is regulated appropriately then production from different systems should not be detrimental to the survival of species. However in practice cost and benefits of different systems are likely to vary on a case by case basis, underlining the need for risk assessments that take biological and socio-economic factors into account.

Section D attempts to summarise the permiting requirements for the different CITES recognised production systems to identify where CITES authorities might benefit from further guidance regarding monitoring and regulation of production systems.

The recommendations from each section which can be summarised as follows:

Ranching:

- Refine the definition of ranching to restrict the life history stage that can be collected and ensure specimens are reared for a sufficient period to enhance survival. An amendment of Resolution Conf 11.16. would be required. Suggested amendment - the term 'ranching' means the rearing in a controlled environment of specimens such as eggs or hatchlings which suffer high mortality rates in the wild that are taken from the wild through controlled collection and reared for sufficient time to enhance their survival.
- Clarify the use of Code R for Appendix II specimens as well as for those transferred from Appendix I - Amend Resolution Conf 11.16 on ranching or Resolution Conf 12.3 on permits.
- Provide informal guidance on the monitoring of ranching operations for Appendix II specimens. Either by incorporation in Resolution Conf 11.16 on ranching; or additions to Resolution Conf. 10.3 on the Role of Scientific Authorities or through the Secretariat's training manual.

Taken from the Wild:

- Consider how to deal with forms of production that have negligible direct conservation impact or provide incentives for conservation such as specimens from nationally sanctioned pest and alien species reductions and products from land clearance; specimens from established introduced populations and specimens born in captivity in closed-cycle systems; and specimens from wild enhanced production. Remembering that systems that significantly enhance production above natural levels, by manipulating the habitat may alter the genetic composition of the population and affect the ecosystem.
- Adoption of an additional production system, namely "wild enhanced production" has been suggested, but was not popular with either the Plants or Animals Committee at PC13 or AC 19.
- Consider developing further advice on use of expedited procedures - Resolution Conf. 12.3 recommends expediting procedures to issue permits and certificates for captive breeding and artificial propagation operations when the conservation impact of the transaction is likely to be negligible. The Committee might consider developing advice on expediting procedures for the certain forms of production of Appendix-II listed species.

Captive breeding/ artificial propagation:

- Resolutions Conf 12.10 and Resolution Conf. 9.19 on registration of operations breeding and artificially propagating Appendix I specimens for commercial purposes, provide some guidance on monitoring such operations. The Committees might consider using this as a basis to develop informal advice for Scientific Authorities in monitoring operations captive breeding and artificially propagating Appendix I specimens for non-commercial purposes and Appendix II specimens.
- Resolution Conf 12.10 on registration of captive breeding operations urges Parties to conduct an ecological risk assessment for establishment of operations breeding exotic species. Such an assessment should also take into account socio-economic factors in assessing the conservation impacts.
- CITES Authorities should be encouraged to undertake risk assessments for establishment of operations breeding native species too and examine how they contribute to *in situ* conservation.

General Guidance:

- The Committee is asked to consider and refine criteria for grouping production systems and provide guidance on how some forms of mariculture and game farming be incorporated into CITES recognised production systems in a standardised manner.
- Noting that production that relies on extensive systems may offset more damaging agricultural practice, the Committee might consider encouraging production in extensive systems that contribute to *in situ* conservation.
- CITES Authorities should be encouraged to consider the relative impacts of different production systems on in situ conservation. The Animals Committee collection of case studies on the impacts of production systems may assist in developing general guidance on this issue, although it is clear that impacts will vary on a case by case basis. An amendment to Resolution Conf. 10.3 on the role of Scientific Authorities may assist in this regard Or additions to the Secretariat's training manual may be sufficient to raise further awareness of the issues involved.
- Guidance on monitoring certain production systems for production of Appendix I species and for species transferred from Appendix I to Appendix II for ranching purposes and on marking of such specimens is provided in resolutions of the COP. However, little guidance is available on monitoring operations producing Appendix II specimens and whilst not legally required, the development of such guidance as a priority could assist Parties in managing such operations.
- If changes are not made to the recording of export and import data, such as adoption of additional source codes, the Committee might consider developing guidance for the Reviews of Significant Trade and other processes that rely on Annual Report data to identify species that may be traded at significant levels. It had been intended that suggestions for recognition of an additional production system, could help to indicate where production has been enhanced above natural levels and indicate in the Annual Report data, the basis for making the non-detriment finding.

REVIEW OF PRODUCTION SYSTEMS

INTRODUCTION

The Convention on International Trade of Wild Fauna and Flora (CITES) regulates trade in specimens from a variety of production systems. This reports reviews the variety of production systems in use for CITES and non-CITES listed species and introduces a rationale for grouping production systems. It then reviews the relative impacts associated with different production systems. Finally, the report examines the current CITES categorisation of production systems to identify key parameters and control measures for CITES Authorities to use in regulating trade. The term production system has not been formally defined, but throughout this report is taken to refer to the different management systems used to produce specimens of wild species for trade.

Difficulties in defining production systems and in regulating trade in their products have been highlighted by a range of CITES initiatives. The Animals Committee has discussed this issue at its 15th, 16th and 17th, 18th and 19th Meetings and in relation to means to deal with coral mariculture (Doc. AC 16.12.2). The Plants Committee has discussed the issue in relation to trade in transplanted *Galanthus* spp. bulbs (10th and 11th PC meetings + 12th) and the classification of timber produced from Sylviculture systems (Doc. PC10.8.1). In response to Committee requests, the Secretariat has also looked into the issue (Doc. AC 17.4 and Doc. PC 11.3.Inf.). (See also references in AC18 and PC12).

Describing and defining production systems is important to CITES in its role in the regulation of international trade that may be detrimental to the survival of CITES-listed wild species. To fulfil this role CITES Authorities must be able to clearly define and control production systems that are used to produce CITES-listed species for trade. In particular, Authorities must be able to:

a) ensure that specimens from a particular system fit into the overall CITES legal framework;
b) assess the impact of that trade on the survival of the species; and
c) rationalise levels of management and scientific input; increase transparency; share management programmes and develop targeted capacity building programmes.

For example, where the Convention makes legal exemptions for trade in captive bred and artificially propagated specimens (see Article VII) the Management Authority needs clear criteria and definitions to determine whether a particular production strategy is in accordance with these legal requirements. Furthermore, according to Resolution Conf. 12.3 (on Permits and Certificates), the Management Authority must also report all CITES trade in its Annual Reports, stating amongst other things, the source or broad category of production system from which the specimens derive.

Non-detriment findings are generally required before exports of CITES-listed specimens derived from sources other than captive breeding or artificial propagation or populations transferred to Appendix II for ranching purposes with a quota, can go ahead (see Article IV) and to make these findings it is important that Scientific Authorities can gauge the impacts of the export on a) the wild population and b) the role of the taxon in the ecosystem. Scientific Authorities are also required to monitor exports and if it appears that export levels are likely to be detrimental to the survival of the species then, to limit exports. Knowledge of the source or method of production of the specimens will be key to the work of the Scientific Authority because the impact of the export is likely to be affected by the method of production. For example, the preamble of Resolution Conf. 11.16 on Ranching and trade in ranched specimens of species transferred from Appendix I to Appendix notes the following:

AWARE that ranching of crocodilians on the basis of controlled collection of eggs or hatchlings can be potentially a valuable and positive conservation tool, whereas taking of wild adult animals needs stricter control;

CONSCIOUS of the danger of providing greater incentives for the establishment of captive-breeding operations, which may damage efforts to conserve wild populations, than for ranching operations, which in principle are more beneficial to crocodilian conservation;

EMPHASIZING that the overriding objective of the Convention is to conserve wild populations of the species listed in the Appendices and that positive incentives must be offered to programmes designed to achieve this aim. In addition Resolution Conf 9.19 on nursery registration also notes benefits of artificial propagation to in situ conservation.

It is important that the means of production and source of specimens in trade should be recorded accurately in quota allocations, on permits and in CITES annual reports to allow harvest impacts to be monitored through annual report data. The significant trade review process also examines CITES annual report data to assess whether or not non-detriment findings are being made appropriately, so it is important that the source code data accurately reflect the production system and its impact on the wild population. The variety of sources of specimens recognised by CITES are indicated in Table 2. These source codes do not equate strictly to production systems. The source codes mix information on the biological means of production of specimens with certain legal requirements regarding exports from particular systems.

Developing capacity to implement the Convention in a transparent fashion is a major task for the Secretariat and Parties, and clarifying how production systems fit into the categories recognised by CITES will greatly assist this process.

SECTION A: TYPES OF PRODUCTION SYSTEM IN USE

There is a great variety of systems used to produce animal and plant specimens for domestic and international trade. But there is no single framework for classifying these production systems although organisations ranging from FAO to IUCN have recognised that some standardisation would be useful. CITES has progressed furthest in this arena, with a number of legally robust definitions of captive bred/ artificially propagated and ranched individuals, by default treating all specimens that do not meet the aforementioned definitions as wild produced (see Table 2 for CITES definitions - although animals born in captivity are indicated by source code F; Notification to the Parties No. 1998/14 notes that they should be treated the same as individuals with source code W and traded under the provisions of Article III or Article IV). Production systems are difficult to classify because the different systems form a continuum from the harvest of truly wild individuals from pristine habitats via production of semi-wild/semi domesticated individuals to multi-generation closed-cycle systems that produce domesticated individuals in agricultural or man-made habitats (see Figure 1 and Box 1).

Figure 1. A diagram to illustrate the inter-gradation of production systems

Wild	**Collection of introduced wild individuals**	**Semi-wild** → **Semi-domesticated**	**Captive Bred/ Artificially propagated**
The range of productions systems forms a continuum, systems can 'evolve' →			
Reproduces without human assistance in naturally regenerating habitats to which it is native.	Reproduces without human assistance in naturally regenerating habitats to which it is not native i.e. from introduced populations.	Human assistance needed to regenerate \ provide nutrients \ remove predators in natural/ semi-natural habitats e.g. enrichment planting to wild-transplanting.	Micro-propagation / mono-culture crop plantations in controlled environment.

Production systems generally intervene at a particular life history stage of organisms. They also make varying modifications to the natural habitat either to enhance productivity above wild levels, or to ensure a constant supply of product unconstrained by seasonal factors. The great variety of production systems is illustrated by the selected examples in Box 2 where the life stage collected and the environment of the production system are briefly described. The challenges involved in grouping production systems are obvious in terms such as mariculture or aquaculture (see Box 2) that can include several of the production systems recognised by CITES such as ranching; production of first generation offspring and closed-cycle captive breeding (see Table 2 for summary of CITES-recognised production systems). Production systems for plants are succinctly laid out in PC14 Doc. Inf. 17, recently discussed by the Plants Committee.

A non-exhaustive catalogue of production systems currently in use for CITES and non-CITES listed species is provided in Table 1a, b, c. In line with currently recognised CITES systems, the systems have been broadly grouped into those that breed or propagate individuals in captive / artificial conditions (Table 1a); those that collect certain life history stages from the wild and rear them within some sort of enclosure or boundary, to enhance their survival (Table 1b); and finally those that collect individuals for trade directly from the wild (Table 1c) even though the wild population may have been enhanced by head-starting, re-stocking or

enrichment planting etc. Table 1 includes the main characteristics of the system, a brief description of the production operation, and some species examples. The final column of Table 1a, b, c attempts to summarise the likely conservation implications of the different categories of systems on the assumption that the system is well managed and that there are no problems in implementing the regulations controlling wild harvest, these will of course vary from case to case depending on the real world situation.

BOX 1 DEFINITIONS OF WILD and SEMI-WILD Prescott-Allen and Prescott-Allen, 1996

- **Wild population:** A population that reproduces without human assistance in naturally regenerating habitats to which it is native.
- **Semi-wild population:** A population that reproduces with human assistance but otherwise lives freely in naturally regenerating habitats to which it is not native. For example, trees from non local seed that are planted on forest land that is not otherwise tended.
- NB. A semi-wild population intergrades with a semi-domesticated population.
- **Semi domesticated population:** A population that reproduces with human assistance but otherwise lives freely in naturally regenerating habitats to which it is not native; or that reproduces without human assistance but requires supplementary feeding to ensure survival because its habitat can not support it throughout the year.

TEXT BOX 2 – A SELECTION OF PRODUCTION SYSTEMS *See also PC 14 Doc. Inf. 17* **d**

Plants and Animals

Mariculture is a broad term generally applied to the production of marine organisms. It includes the collection of wild adults of clams and other sessile shell fish to produce gametes for artificial fertilisation and subsequent raising of the resulting offspring in either land-based tanks, or placed out in sheltered wild habitats, or in cages in the wild before final collection for market. It can also include the rearing in natural habitats of vegetatively produced pieces of coral, to the rearing in sea based cages of wild collected juvenile wrasse and tuna. Plants such as seaweeds too can be raised through mariculture.

Aquaculture, generally refers to production of freshwater organisms. It too may involve collection of gametes from wild adults, or the collection of wild fry or larger juveniles or the use of captive produced eggs and fry and subsequent rearing in land-based tanks, or in cages in natural freshwater areas. Freshwater plants too can be produced in a variety of ways.

Re-stocking is another variant on aquaculture, depending generally on the rearing of gametes collected from wild or captive stock, to produce fry in land-based facilities that can then be returned to enhance the wild population in the wild habitat and subsequently re-caught at a larger size for trade.

Farming too, is a term that has many uses and refers to production of both plants and animal crops. In the plant context, it can range from highly industrialised production of domesticated species in man-made habitats through the production of wild species in large agricultural field systems to the production of domesticated and wild species in forest clearings, with relatively little impact on wild habitats. In the context of animals, farming can be used interchangeably with ranching of domestic and game species or introductions of non-native species, although farming normally signifies a smaller field system and a greater degree of habitat manipulation than ranching.

Enhanced wild harvests can also be taken from populations, that are essentially wild but may undergo different levels of population or habitat management that enhance the production of the target taxon, such as predator/ competitor control; addition of nutrients or limiting habitat niches etc. Such manipulations whilst enhancing poroduction of the target species may adversely affect the ecosystem, and are classified as wild harvests by CITES.

Salvage/ pest harvests of wild individuals occur where either the specimens would be lost through nationally approved/planned land clearance, or where there is a national policy of reduction/ eradication of pest/ invasive species. CITES regards these as wild harvests.

Harvest of introduced species may range from the harvest of exotic wild populations that have been introduced accidentally; to harvest from populations introduced specifically to support a harvest once the population becomes stabilised in non-range States; to domesticated populations which may have lost much of their genetic diversity and generally occur in non-range States.

Plants

Enrichment planting or seeding is the plant equivalent of re-stocking, in which the wild population numbers are enhanced through the planting of additional individual seedlings or the scattering of extra seeds. The seeds and seedlings may either be collected from the wild or produced through cultivation/ artificial propagation in non- natural habitat.

Sylviculture refers to the management of natural forests and plantations to enhance the production of particular species that have a high economic importance. The management actions may include weeding out competitive species and thus changing the balance of the natural ecosystem. This could be viewed as a form of enhanced wild harvest and is currently regarded by CITES as a wild harvest.

Plantations are generally regarded like an agricultural crop in that the land is cleared and planted with even aged individuals sown at regular intervals. Seedlings may have been produced from wild collected seed or from artificially propagated seed. Plantations are often established outside the natural range of the species.

TEXT BOX 2 Cont'd

Wildcrafting/ wild collection or harvest refers to the collection of individuals from the wild, leaving sufficient individuals to re-seed and replenish the population.

Artificial propagation according to Resolution Conf. 11.11 Regarding the definition of 'artificially propagated' determines that:

a) the term 'artificially propagated' shall be interpreted to refer only to live plants grown from seeds, cuttings, divisions, callus tissues or other plant tissues, spores or other propagules under controlled conditions; and that 'under controlled conditions' means in a non-natural environment that is intensively manipulated by human intervention for the purpose of producing selected species or hybrids. General characteristics of controlled conditions may include but are not limited to tillage, fertilisation, weed control, irrigation, or nursery operations such as potting, bedding or protection from weather;

b) the cultivated parental stock used for artificial propagation must be, to the satisfaction of the competent government authorities of the exporting country:

i) established in accordance with the provisions of CITES and relevant national laws and in a manner not detrimental to the survival of the species in the wild; and

ii) managed in such a way that long-term maintenance of this cultivated stock is guaranteed;

c) seeds shall be regarded as artificially propagated only if they are taken from specimens acquired in accordance with the provisions of paragraph b) above and grown under controlled conditions, or from parental stock artificially propagated in accordance with paragraph a) above;

d) all other parts and derivatives shall be regarded as being artificially propagated only if they are taken from specimens that have been artificially propagated in accordance with the provisions of paragraph a) above; and

e) grafted plants shall be recognised as artificially propagated only when both the root-stock and the graft have been artificially propagated.

Tissue culture/micropropagation includes Growth of specimens in sterile nutrient medium from plant parts (such as stem tips, nodes, meristems, embryos, or seeds).

Layering includes all types of propagation in which roots are formed while the stem is still attached to the mother plant. Only after the root formation, the layer is detached and planted as a separated plant. Layering is often used in species that are particularly difficult to root from cuttings, as the intact stems allow a continuous supply of water, nutrients and plant hormones to the place of root development.

Animals

Game farming may also involve re-stocking, whereby populations in extensive areas of natural habitat may be enhanced through the introduction of additional animals raised in captivity or translocated from areas where there is a surplus.

Ranching is another term used in a variety of contexts, in CITES terms, it applies to the rearing of animals in a ranching operation and was originally introduced to apply to populations of crocodilians transferred from Appendix I to Appendix II for ranching purposes. Since then it has been used for a variety of species, to indicate cases where specimens, (normally high mortality life stages such as eggs or juveniles), have been collected from the wild and then reared in a ranching operation for some time before subsequent trade. However, in popular usage, particularly in the Americas, ranching more generally refers to a system whereby agricultural animals range freely over extensive areas of natural or improved rangeland. In southern Africa the term ranching applies not only to the husbandry of traditional agricultural species such as cows but also to the production of game animals. In many parts of southern Africa, extensive areas of wild habitat together with natural or re-located populations of indigenous species have been enclosed and the animals are harvested for meat and other products.

Rearing production systems operate on the basis of collecting high mortality life stages from the wild and enhancing their survival under controlled conditions so that the ultimate production is greater than it would have been in the wild. CITES uses the term ranching to apply to such animal production systems and is considering how to deal with such plant production systems. Ranching is defined by CITES as "the rearing in controlled conditions of specimens taken from the wild", with no direct reference to the life history stage that is to be covered. Although the resolution pertaining to transfer to Appendix II for ranching purposes notes that harvest of adults should be avoided.

Table 1a Catalogue of production systems that produce CITES and non-CITES listed species, showing how systems can be grouped into major categories - Production in Captivity

Category and Some Characteristics of production system	**Brief description of Production System**	**Species Examples**	**Likely Direct Effect on wild population**
Captive bred/ Artificial propagation -Closed-cycle *ex situ* • Minimal take of adults from the wild for breeding stock • Demonstration of F2 generation for CITES purposes • Fenced/ contained production operation *ex situ* • May reduce pressure on wild stocks • No obvious direct contribution to habitat conservation, • Rare conservation benefit from taxing the products **Captive bred/ Artificial propagation -Closed-cycle** in range • Minimal take of adults from the wild for breeding stock • Demonstration of F2 generation for CITES purpose • Fenced/ contained production operation established *in situ*, by enclosing portions of natural habitat • May reduce pressure on wild stocks • Possible benefit to habitat but also damage	Closed-cycle captive breeding second generation animal offspring F2	Birds of Prey; Parrots; Primates; Crocodilians; *Scleropages* spp; (Potentially - *Chelonia mydas*- Cayman turtle farm.)	No/ minimal wild take beyond initial collection. Reduce pressure on wild ?
	Micropropagation and tissue culture	Orchids; Cacti	No/ minimal wild take Reduce pressure on wild ?
	Artificial Propagation in nursery/fields	Orchids; Cacti; Galanthus spp.; Cyclamen spp.; Succulents etc Medicinal plants; *Dione edule*	No/ minimal wild take Reduce pressure on wild ?
	Artificial Propagation – Plantations	*Swientenia macrophylla* in Indonesia; *Tecta grandis; Camptotheca acuminata* Happy tree in Brazil; *Aquilaria malacennsis*	No/ minimal wild take Reduce pressure on wild ?
	Artificial Propagation – Plantations in Range State	*Terminalia amazonia*, Platymiscium pinnatum Costa Rica, *Camptotheca acuminata*	No/ minimal wild take Reduce pressure on wild ?
	Fish aqua/ mariculture - Closed-cycle breeding of captive adults in land tanks or sea/lake cages	Salmon, Carp, Trout, ?WhiteSturgeon in USA	No/ minimal wild take Reduce pressure on wild ?
	Captive breeding in semi-natural habitat	*Macaca fasicularis* introduced to Tiwai island Indonesia – natural habitat.	No/ minimal wild take beyond initial collection Reduce pressure on wild ?
Production in captivity/ - minimal wild collection • Minimal take of adults from the wild for breeding stock • Production of first generation offspring • Same balance of conservation risks and benefits as described for the closed-cycle production systems. **Production in captivity – in range** – in enclosed natural habitat, may provide incentives for habitat conservation.	Animals conceived & born in captivity (does not meet CITES F2 criterion) + single collection of adult	Birds and reptiles- for pet trade; *Chelonia mydas* Cayman turtle farm; *Ceratotherium simum* other African game produced in non-range States	No/ minimal wild take beyond initial collection Reduce pressure on wild ?
	Born in captivity in a restricted portion of natural environment	Game farming/ranching – *Ceratotherium simum*; Deer farming	No/ minimal wild take beyond initial collection Reduce pressure on wild ?
Production in captivity/ artificial propagation – repeated wild collection • Annual collection of wild adults for gametes for artificial insemination and rearing of progeny. • Dependant on wild breeding stock & may provide incentives for habitat conservation. • Conducted in / or outside natural range. If adult collection is non-detrimental, this system is similar to a "rearing system" as level of production is greater than possible from a wild harvest alone.	Born in captivity + repeated regular wild collection of few low mortality life stages (fecund males and females) to provide spawn that is reared for export sale	Clams; Fish aquaculture – sturgeon salmon in land-based facilities or sea cages	Annual/ regular collections of adults to provide gametes. Reduce pressure on wild ?
	Born in captivity + wild collection of low mortality life stage (gravid adults) followed by export of adults and rearing and export of progeny.	*Python regius.* *Chameleo* spp., *Geochelone sulcata;*	Regular collections of females trade offset by raising of young from gravid females. Reduce pressure on wild ?

Table 1b. Catalogue of production systems in use to produce CITES and non-CITES listed species - Rearing production systems

Major category of production system	**Brief description of Production System**	**Species Examples**	**Direct Effect on wild population -numbers removed**
Rearing production systems • Collect high mortality life stages from the wild. • Enhance survival under controlled conditions. • The ultimate production level is greater than in the wild. • Ranching of animals is defined by CITES as "the rearing in controlled conditions of specimens taken from the wild". The direct impact depends on the • Life history stage collected, • numbers collected, • extent to which enhancing survival can meet demand and reduce overall wild take. • In theory incentives for habitat conservation accrue, as the system is dependent on maintaining a supply of eggs/bulbs etc from the wild population. • Animals rearing operations are generally outside the natural habitat, • Plants rearing operations may contribute more directly to habitat conservation.	Rearing *ex situ* of wild collected high mortality life stage (young/ juv or vegetative reproduction cuttings).	Crocodilians; seed collection - Mexican Cacti; *Aloe thorncroftii*; Grouper aquaculture; *Prunus africana* - agroforestry Tuna ranching; Parrot- collection of econd egg/juvenile to rear *ex-situ; Hippocampus* spp.	Collection of young/juvs/ vegetative cuttings or "buds" (Ranching for crocodiles)
	Wild transplanting Collection of bulbs from wild and replanting and rearing of small bulbs in agricultural fields in former range.	*Galanthus* spp	Collection of high mortality stage
	Rearing of vegetative cuttings and Enrichment planting in natural habitat-May be Classed as wild harvest with habitat manipulation.	Ginseng; *Galanthus* spp; Coral mariculture	Collection of low mortality stage, young/ juveniles also provides some habitat protection.

Table 1c. Catalogue of production systems in use to produce CITES and non-CITES listed species -Wild collection

Major category of production system	Brief description of Production System	Species Examples	Direct Effect on wild population -numbers removed
Wild Collection - consumptive use population management for harvest so that a sustained harvest can be collected- Collection of annual production of population, ensuring sufficient individuals remain to reproduce/ grow for subsequent collection **Wild collection - consumptive use** • Planned pest reduction or land clearance; • Collection from re-introduced population in enclosed natural range **Wild collection – non- lethal consumptive use** Collection of plant/ animal parts, individual survives in wild or areas enclosed natural habitat	Removal of individuals from wild – either lethal collection or live removal plants/ animals.	Medicinal plant harvest; fish harvest; plains game harvests	Collection of annual production of population, requires management and monitoring
	Specimens produced through planned pest reduction or land clearance where those individuals will be lost to the population, irrespective of trade.	Carnivores –Crocodilians; Primates; Suids; Elephants; etc Plants salvaged from land clearance - Tree ferns; Orchids	No additional effect on wild population, as these individuals already "planned" for removal
	Collection from re-introduced population in enclosed natural range	*Ceratotherium simum*	Positive impact establish new population
	Collection of parts without removal of individual from population; Wildcrafting of plants. Live shearing/ feathers/fur/ nests/antlers; leaf/bark/seed collection.	*Vicuna vicuna; Prunus africana* bark; cacti seeds; medicinal plants leaves; fruits/ nuts	
Wild collection with population/habitat manipulation – Enhanced wild collection systems designed to enhance productivity of the target population including: Headstarting/ re-stocking/ Enrichment planting/ Sylviculture/. involve manipulation of either population or habitat may have ecosystem consequences, other than from harvest of the target population e.g. from predator removal or removal of competitive plants. **Wild collection from individuals stimulated to increase production in the wild – Enhanced wild collection**	Headstarting- rearing of eggs, release of juveniles to supplement wild population, later removal wild adults.	Crocodilians; (Marine turtles – only for conservation purposes?/ domestic trade)	Collection of eggs/ seeds, return of juveniles, whose survival is greater
	Fish re-stocking/ Mariculture – Wild collected adults provide gametes for artificial insemination. The resulting juveniles are grown on in land- based tanks then re-introduced to the wild to supplement the wild population for harvest	Sturgeon; clams salmon?	Collection of small numbers adults, return of greater number of juveniles whose wild survival enhanced
	Enhancing survival and production of target spp. in habitat predator/ competitor control. Increasing availability of limiting resource: Fertilizer/ supplemental feeding; nest box/ egg deposition site	Reduction of predators in game farming. Parrot, swiftlet "ranching"/ frog "ranching"- involves enhancing availability of nest/oviposition sites.	Wild offtake offset by increased productivity of target species.
	Increasing natural densities by seeding /planting vegetatively produced individuals	Medicinal plants e.g. Ginseng	Wild offtake offset by >productivity of target spp.
	Sylviculture managing forests to reduce competitors etc		Wild offtake offset by >productivity of target spp.

Major category of production system	Brief description of Production System	Species Examples	Direct Effect on wild population -numbers removed
	Artificial inoculation of wild *Aquilaria* trees to increase production of agarwood	Agarwood	By ensuring a tree contains the fungus, could reduce wild collection if managed
Wild collection from introduced populations outside the range State, where, unless the species is critically endangered, the individuals are arguably not part of the natural population, and the only detrimental effect of trade would be the possible laundering of truly wild specimens. **Wild collection from commensal populations** – concerns over levels of offtake from these populations will depend on the extent to which the natural population is endangered.	Collection from naturalised population - outside range State	*Chameleon jacksonii*; *Dendrobates aureus* Tropical tree species; *Aloe vera;Pickly pear cactus*. Brown tree snake in Guam Nile Perch fisheries E. African Lakes.	Provided species not threatened in wild habitat, little impact on wild population if offtake managed
	Collection from commensal population in agricultural/urban habitat	*P. regius* in oil palm; *Agapornis canus* in agricultural lands;	Provided species not threatened in wild habitat, little impact on wild population if offtake managed
Wild collection from wild individuals held in captivity/	Collection of products from wild animals held in captivity Not meeting CITES definitions	Collection of bear bile Bones from Tiger farms	Impacts dependant on need for supplementation with wild individuals

Table 1c Cont'd

SECTION B: CLASSIFICATION OF PRODUCTION SYSTEMS

The method used to classify production systems will depend on the reason for grouping the systems. For CITES purposes production systems can be grouped on the basis of three main characteristics:
a) the level of wild collection and its potential impact on population survival;
b) the extent that wild collection maybe offset by enhancing productivity through rearing;
c) the extent that the production potentially contributes economic incentives to encourage conservation of the population and its habitat. The importance of incentives to encourage conservation was indicated by the recent adoption of the CBD Principles of Sustainable Use and is referenced in the *Guidance for CITES Scientific Authorities, a checklist to assist in making non-detriment findings for Appendix II exports*.

Based on these factors, the following paragraphs indicate that production systems can be separated into three broad categories producing respectively: Wild Collected Specimens; Reared Wild Specimens; and Closed-cycle Captive Bred Specimens. These broad categories, are similar to the categories already recognised by CITES (see Table 2), but incorporate some differences which may or may not be of relevance to CITES . Each of these major categories in turn comprises a number of further subdivisions and the CITES authorities will need to determine what level of detail to recognise. Although a summary report of the 19th meeting of the Animals Committee was not available at the time of writing, the deliberations of the working group on this issue suggested that the majority of the group did not want to see major changes to the production systems already recognised by CITES. However, it was noted that the issue of coral mariculture (where specimens are produced through vegetative reproduction and reared in non-controlled conditions) did not not seem to fit conveniently in any of the extant categories.

The major categories and their sub-divisions are described in the following paragraphs (The Animals Committee may chose to ignore the detail of the subdivisions presented here, focussing on the major categories, however, the detail may be useful in future capacity building for Scientific Authorities to explain the range of production operations that are encompassed by each CITES category of production):

a) **Wild Collected Specimens** - where production is based on a high reliance on WILD individuals[1] for trade with frequent removal of individuals from the wild. Wild collection involves the collection and removal of either complete individuals or parts of individuals such as fur, feathers or glandular secretions. Intuitively, this type of production should only occur in the range State, however, current CITES practice reports the source of specimens from introduced populations established in non- range States as wild collected e.g. *Chameleo jacksonii* from Hawaii; *Araucaria arucana* from Europe. Forms of wild collection include:

i) Direct take from the wild - involves harvesting wild individuals that have not been subject to any form of management aimed at enhancing productivity of the population, other than through managing the level of harvest. Such harvests will generally be from natural ecosystems. This is the generally recognised form of direct wild harvest (e.g. *Chlorocebus aethiops* from Tanzania; *Swietenia macrophylla* from Brazil).

ii) Planned wild harvest for pest control or as salvage harvest – involves harvest of specimens taken during planned pest control measures or from land that is to be cleared of natural vegetation under some form of accepted national planning policy. For example collection of *Papio anubis* and *Crocodilus niloticus* from various African range States, or the collection of cycads and orchids from natural habitat that will undergo land clearance. Although this is a wild harvest, some would argue that a planned control or salvage harvest merits a separate identification on permits and in trade statistics as some economic benefit may be derived from trade in specimens that would anyway be lost to the population. Others argue that no separate identification on permits is required as the basis for making the non-detriment finding will include an understanding that these specimens derive from planned population reductions.

[1] This type of production system is captured in the current source code: W - Specimens taken from the wild. There is no definition of 'wild' in the text of the Convention or Resolutions. By default "W" must currently be applied to all specimens that are not produced through captive breeding/artificial propagation; ranching of species transferred from Appendix I to II; or more general ranching.

iii) Managed and unmanaged introduced populations - involves production of non-native species that have become established and self-sustaining in extensive systems outside the range State. Establishment of the production system requires an initial introduction from the wild, which after the initial establishment then requires no/minimal further augmentation of individuals from the wild population. In effect, these are essentially closed-cycle systems except that they do not occur in "controlled conditions" (see Resolution Conf. 10.16 (Rev.) for the CITES definition of controlled conditions); nor does the establishment of the breeding stock necessarily meet CITES requirements to be classed as captive bred/ artificially propagated (see Resolution Conf. 10.16 (Rev.) and Resolution Conf. 11.11). For example, the harvesting of unintentionally introduced species such as *Chameleo jacksonii* from Hawaii, *Macaca fasicularis* from Mauritius or *Opuntia* spp. From many non-range States could be classified in this category. However, this form of production is not physically constrained in controlled-conditions *sensu* CITES. Specimens produced in such a way would not be readily distinguishable from wild caught specimens and this might lead to enforcement problems (unless isotope or DNA analysis becomes more generally available).

iv) Enhanced wild production from manipulated ecosystems - involves either the harvest of wild individuals from an ecosystem that is essentially wild but has undergone some intentional modification to increase production of the target taxa. Or the harvest of wild individuals that have adapted to a modified ecosystem, such as species that are commensal with man e.g. *Ptyas mucosus* from oil palm plantations in Indonesia). Intentional ecosystem manipulation may enhance either the carrying capacity of the environment or directly increase the size of the population. Ecosystem manipulation may include:

- providing specialised habitat niches (e.g. reducing bush cover and encouraging grassland to support greater grazer density);
- removing competitors or artificially increasing the supply of nutrients (e.g. predator removal on game farms or collection of trees/ medicinal plants from silviculture systems where competitors are weeded out); and
- directly increasing the size of the population or assisting the population to reproduce (e.g. re-stocking of lakes with fish fry; provision of nest boxes for parrots, or egg deposition sites for frogs (often termed parrot/frog ranching).

Enhanced wild collection is not currently recognised by CITES, but is practised in many range States.

b) **Reared Wild Specimens** – where production is also based on a high reliance on wild individuals that are then maintained in some form of enclosure or modified habitat to enhance their survival through REARING[2]. This includes production systems in which individuals are regularly taken from the wild to be reared, generally in non-natural conditions before being traded. CITES has recognised this form of production for ranching of animals, restricting collection to the taking of high mortality life stages such as eggs or juveniles for subsequent rearing. There is disagreement whether collection and rearing of reproductive life stages such as adult animals and bulbs (low mortality life stages) might also be classified under this system. Due to the potentially greater impacts of collecting reproductive life stages such as adults, this report argues that the REARING/ Ranching system should be restricted to the collection of high mortality life stages. Currently CITES does not recognise a rearing system for plants. Rearing differs from artificial propagation in that it depends on repeated collections of seed etc from the wild, whereas the definition of artificial propagation requires that the parental stock be maintained in long term cultivation.

i) Rearing of high mortality life stages in non-natural conditions – involves production from specimens that have high mortality levels in the wild. The production system relies on enhancing survival of the wild collected individuals through investment in rearing and thus offsetting the natural high mortality. Specimens are regularly and repeatedly taken from the wild for rearing in non-natural conditions in the range State (e.g. species transferred from Appendix I to II for

[2] This type of production system is partially captured in the current source code: R -Specimens originating from a ranching operation (N.B. the Plants Committee has addressed this issue and PC Doc. 9.1a considered the establishment of a code for wild transplanted specimens (Wt) particularly for the production of *Galanthus* spp. in Turkey).

ranching purposes and Appendix II species such as *Python regius* eggs). Because of the dependence on a high level of input of wild individuals, rearing systems for animals often occur in the range State and specimens are generally maintained in intensive conditions i.e. outside the natural ecosystem. But, by linking the production system with the wild habitat and perhaps even maintaining the stock in enclosed semi-natutal conditions, economic incentives may be generated to maintain the ecosystem. Currently, CITES does not recognise such a system for Plants. According to CITES the term 'ranching' means the rearing in a controlled environment of specimens taken from the wild (see Resolution Conf. 11.16) but this is a very broad definition.

ii) Rearing of high mortality life stages in natural ecosystems e.g. Game rearing/ and restocking – involves production from populations of animals maintained in captivity in extensive areas of natural habitat in the range State. These populations are supplemented by the repeated introduction of wild stock/ seed/ juveniles (e.g. forms of antelope rearing in southern Africa and forms of clam mariculture, turtle headstarting and fry release). Depending on the degree to which the rearing environment can be classed as "controlled" *sensu* CITES, and the degree of separation from the wild, for CITES purposes, such systems, may more appropriately be considered as forms of *enhanced wild production*. However, in time, these systems may evolve into either closely monitored rearing systems or closed-cycle systems.

iii) Rearing of low mortality life stages – involves collection of specimens that have low mortality levels (generally adults) in the wild and are repeatedly taken from the wild to rear subsequent progeny in non-natural or enclosed semi-natural conditions in the range State (e.g. gravid *P. regius* or *Malacochersus tornieri* and rearing of juvenile fish e.g. Tuna ranching). Unless there is confidence in the reliability of management control, the removal of adults and other low mortality life stages can be a cause of concern. Due to the dangers associated with removal of low mortality life stages, although arguably compensated by the rearing programme, this production system might be viewed as a transitional system between wild capture and rearing systems. Because of these concerns, it is proposed that this type of production, even though it is a form of rearing, is more akin to the category of *enhanced wild production*.

iv) **Closed-cycle production** - where production is based on a low reliance on wild individuals for CLOSED-CYCLE Propagation [3]. This generally involves the breeding or propagation of individuals in controlled conditions, with a minimal input of individuals from the wild and hence low direct impact on the wild populations. To qualify as captive bred, CITES requires for animals that production of second generation offspring of the taxon be demonstrated.

i) Closed-cycle captive breeding and and artificial propagation *ex situ* – involves production *ex situ* (i.e. in non-natural ecosystems) either in the range State or outside the range States. Establishment of the production system requires an initial take from the wild, which must be non-detrimental to the survival of the wild population. But after the initial establishment the system then requires no/minimal further removal from the wild population. This system provides little opportunity to generate direct economic incentives to conserve the wild species and its habitat, but may reduce pressure on wild stocks.

ii) Closed-cycle production in natural ecosystem - Game Farming involves production *in situ* in extensive natural ecosystems in the range State, these are generally in fenced areas in private ownership. Establishment of the production system requires an initial take from the wild, but after the initial establishment then requires no/minimal removal from the wild population (e.g. game farming for animals such as white rhinos in South Africa; the introduction of *Macaca fasicularis* to

[3] This type of production system is currently captured in the following source codes: D – Appendix_I animals bred in captivity for commercial purposes 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; A - Plants artificially propagated in accordance with Resolution Conf. 11.11, exported under the provisions of Article VII paragraph 5 of the Convention (species included in Appendix I that have been propagated artificially for non-commercial purposes and species included in Appendices II and III); C - Animals bred captivity in accordance with Resolution Conf. 10.16 (Rev.), as well as parts and products thereof, exported under the provisions of Article VII, paragraph 5, of the Convention (specimens of species included in Appendix I that have been bred in captivity for non-commercial purposes and specimens included in Appendices II and III).

Tiwai island in Indonesia). Such systems may meet the CITES definitions of bred in captivity, depending on the circumstances of establishment and the interpretation of "controlled conditions".

iii) Born in captivity with either a low reliance or a high reliance on the wild population for adults to provide gametes etc. For animals that are born in captivity, CITES uses the source code F. Code F signifies animals born in captivity (F1 or subsequent generations) that do not fulfil the definition of "bred in captivity" in Resolution Conf. 10.16 (Rev.). Notification to the Parties No. 1998/14 indicates that the code "F" is to be used for animals (or specimens derived therefrom) BORN in a controlled environment (as a result of a mating that occurred in a controlled environment). Furthermore, the procedure to be implemented for specimens of source "F" is exactly the same as that for specimens of source "W". This is valid for species included in Appendix I, II or III. The challenge is to ensure adequate control of such systems, so that the collection of adults does not impact the wild population. Such systems are more akin to a form of *enhanced wild production* if repeated wild collections are likely to significantly impact the wild population. Alternatively, where there is a single collection to establish the breeding stock and the production unit can be adequately monitored, then the impacts are likely to be more akin to those of a closed-cycle captive breeding facility.

Conclusions from the review of production systems

From this grouping of production systems, the report suggests that the Committee considers:

- Developing alternative criteria and means for grouping production systems;
- Clarify whether the definition of "controlled conditions" can be applied to game farming and game ranching conducted in extensive conditions;
- Defining an additional category of production system – *Wild enhanced production*; OR provides further guidance on the making of non-detriment findings, so that Scientific Authorities can easily characterise in CITES terms, the range of production systems they encounter; and
- Refining the current CITES definition of ranching.

SECTION C: THE RELATIVE IMPACT OF PRODUCTION SYSTEMS

Much of the debate around production systems concerns the impacts of *ex situ* production on *in situ* conservation (see Decision 11.102 (Rev. COP 12) and BOX 3 for definitions). In theory, neither *ex situ* nor *in situ* production for international trade, if effectively managed with appropriate non-detriment findings being made, should adversely affect population survival in the wild (this is the condition on which non-detriment findings are made). Although wild harvest may reduce population size to a planned level, this reduction should not be irreversible provided that the correct management assumptions are made and that trade and management controls are properly implemented.

In practice, management and trade regulation may not always be able to maintain collection from the wild for trade purposes at non-detrimental levels due to a lack of information on species status and biology, unpredicted stochastic events and illegal trade. To complicate matters further, certain forms of trade and production will be more difficult to regulate than others due to both the nature of market demands driving the trade and the resources available to develop management and to regulate that trade. In training presentations, the Secretariat note that mis-representation of specimens as either captive–bred or artificially propagated is a common source of fraud.

Trade regulation can be achieved through either a command and control structure or through the provision of incentives to implement regulations. Often State sponsored enforcement activities have to compete with many other calls on the national treasury for funding and so lack resources. Incentive schemes are increasingly portrayed as a possible means to encourage greater adherence to regulations, but have yet to be proven extensively.

BOX 3 DEFINITIONS OF *EX SITU* AND *IN SITU* PRODUCTION

E*x situ* or "off-site" production happens away from the organism's habitat and is self contained with no links to the wild populations. Similarly ex situ conservation occurs away from the natural habitat, but can none the less contribute to conservation, by for example maintaining a gene pool through preservation in seed banks etc.

In situ or "on-site" production occurs either in the organism's habitat or linked to the organism's habitat. For example ranching is dependant on inputs of wild stock (), although the facility may be outside the natural habitat. Similarly, *in situ* conservation is habitat based.

In terms of the relative impacts of different production systems, conservation costs and benefits will vary on a case by case basis. On the one hand, production systems linked to wild populations such as wild collection, ranching, enhanced wild management and regulated collection of wild individuals for captive breeding purposes are theoretically potentially more likely to provide direct economic incentives for conservation than *ex situ* closed-cycle production, provided that a benefit sharing system is in place. On the other hand, whilst *ex situ* production for commercial purposes may compete for market share with wild production, and in some cases even stimulate wild collection it may also reduce pressure on wild stocks and provide individuals for re-introduction. Indeed the procedure for registering operations that breed Appendix I specimens for commercial purposes requires that a conservation benefit should be demonstrated (Resolution Conf 12.10 - Guidelines for a procedure to register and monitor operations that breed Appendix-I Animal species for commercial purposes).

Clearly the impacts of *ex situ* production on *in situ* conservation will vary on a case by case basis depending on a number of factors, such as:

The Appendix that the species is listed in;
The level of demand for specimens;

The conservation status of the species and the extent to which wild populations can support the demand for specimens;
The likelihood that trade can be regulated and illegal trade prevented;
The price differential between wild and *ex situ* produced specimens;
The likelihood of disease or alien species introductions;
The infrastructure in place for benefit sharing and generating local conservation incentives;
The feasibility of implementing a conservation levy on international trade that reaches the appropriate target;
The level of dependence of *ex situ* production units on the wild population for additional genetic stock;
The extent that *ex situ* domestic production competes with CITES imports to an internal domestic market;

Although simplistic, Figure 3 highlights the importance of socio-economic factors as well as biological factors in determining the conservation impacts of different production systems. When considering proposals to license or register captive breeding or artificial propagation facilities Resolution Conf 12.10 only urges that Parties, undertake an assessment of the ecological risks, prior to the establishment of captive-breeding operations for exotic species. The socio-economic risks are not mentioned, but it seems that Management Authorities should take these into account when assessing the conservation impacts of establishing operations to breed both exotic and non-exotic species. Resolution Conf 12.10 could be amended to include the need for risk-assessments (assessing ecological and socio-economic factors) for establishment of operations to breed both both native and exotic species.

Another possible amendment concerns Resolution Conf . 10.3, which provides some guidance on the making of non-detriment findings. Non-detriment findings are required for exports of wild produced specimens and to indicate that captive breeding and artificial propagation operations were established and are maintained with no detriment to the wild population. Resolution Conf 10.3 could usefully summarise comments on the differing impacts of various production systems as evidenced in the Preambles to Resolutions Conf. 9.19[1] and Resolution Conf. 11.16[2].

[1] Recognizing that the artificial propagation of specimens of species included in Appendix I could form an economic alternative to traditional agriculture in countries of origin, and could also increase conservation interest in the areas of natural distribution; Recognizing that the artificial propagation of specimens of species included in Appendix I, by making specimens readily available to all those interested, has a positive effect on the conservation status of the wild populations because it reduces the collecting pressure

[2] Aware that ranching of crocodilians on the basis of controlled collection of eggs or hatchlings can be potentially a valuable and positive conservation tool, whereas taking of wild adult animals needs stricter control; Conscious of the danger of providing greater incentives for the establishment of captive-breeding operations, which may damage efforts to conserve wild populations, than for ranching operations, which in principle are more beneficial to crocodilian conservation; Emphasizing that the overriding objective of the Convention is to conserve wild populations of the species listed in the Appendices and that positive incentives must be offered to programmes designed to achieve this aim.

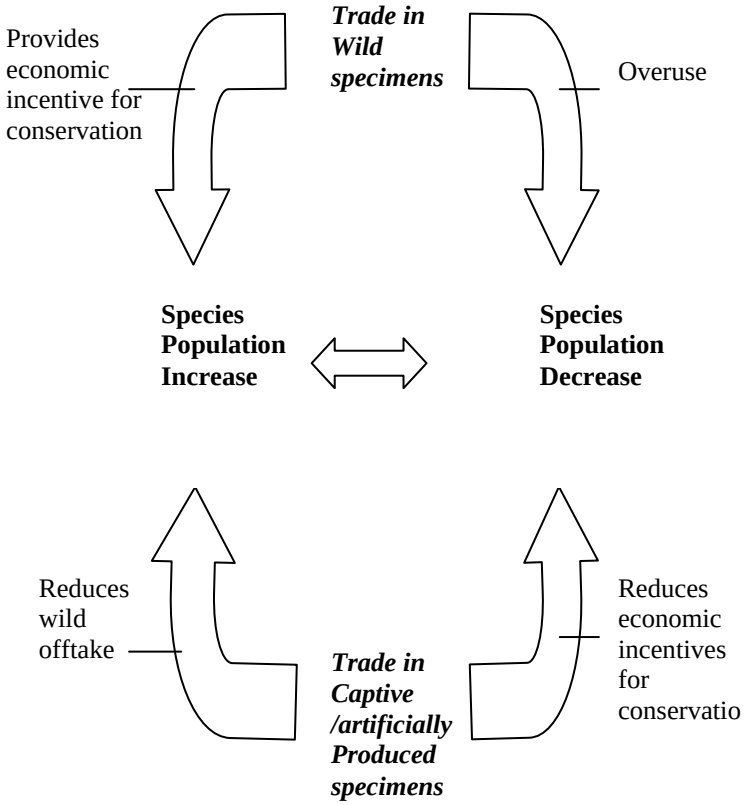

Figure 3. Diagram to show the simplified relationship between the impacts of trade in wild produced specimens and captive or artificially produced specimens

Table 2a CITES recognised production systems for Animals

Implementation		Definition	Article	Res Conf.	Permit	On basis of	Source CODE
Trade in App I	Wild caught	Currently no definition - default	ART III-non-commercial		Export &import	NDF, legal acquisition; humane transport and import for non-commercial purposes	W
	App I Captive breeding for commercial purposes	Produced for commercial purposes in a controlled environment where the breeding stock was established with no detriment to the wild population and is maintained with minimal introduction of specimens from the wild. The system is capable of producing an F2 generation for animals and the operation is registered with the Secretariat.	ART VIIp4	10.16 (Rev.) 12.16 9.19	EXPORT only	Treat as App II if defined as Res. Conf 10.16 (Rev.) and registered with Secretariat. Marking system.	D/
	Captive bred Non-Comm App I	Produced in a controlled environment (Appendix I specimens for non-commercial purposes) where the breeding stock was established with no detriment to the wild population and is maintained withminimal introduction of specimens from the wild; the system is capable of producing an F2 generation for animals.	ART VIIp5	10.16 (Rev.) 9.19	Captive breeding certificate	Res Conf 10. 16 (Rev.) (NDF for establishment of Breeding stock; F2 demonstrated)- Captive breeding certificate. . Marking system.	C
	Captive born, but does not meet Definition of 10.16	Animals born in captivity that do not fulfil the definition of 10.16 rev (exchanged gametes in controlled conditions etc)		12.3	IMPORT & EXPORT	Res. Conf. 12.3 on permits. NO Exemptions. NDF; legal acquisition; humane transport and import for non-commercial purposes	F
Trade in App II	Wild caught	Currently no definition - default	ART IV		Export	NDF; legal acquisition; humane transport	W
	Captive Bred	Produced in a controlled environment (where the breeding stock was established with no detriment to the wild population and is maintained withminimal introduction of specimens from the wild; the system is capable of producing an F2 generation for animals.	ART VIIp5	10.16 (Rev.)	Captive breeding certificate	Res. Conf. 10.16 (Rev.) (NDF for establishment of Breeding stock; F2 demonstrated)- Captive breeding certificate. Marking system.	C
	Captive Born	Animals born in captivity that do not fulfil the definition of Res. Conf. 10.16 Rev (but exchanged gametes in controlled conditions etc.)		12.3	EXPORT	Res. Conf. 12.3 on permits. NO Exemptions. NDF; legal acquisition; humane transport.	F
	Transfer from App I to II for ranching	'Ranching' means the rearing in a controlled environment of specimens taken from the wild.	Res. Conf. 11.16	Res. Conf. 11.16	EXPORT	NDF made by COP for Export quota. Marking system.	R
Trade in App III	Wild caught		ART V		EXPORT or Cert. of origin	Legal acquisition; humane transport.	W
	Captive bred App III		ART VIIp5	10.16	Captive breeding certificate .	Res. Conf. 10.16 (Rev.)- Captive breeding certificate.	C

Table 2b CITES recognised production systems for plants- See also PC 14 Doc. Inf. 17

Implementation		Definition	Article	Res. Conf.	Permit	On basis of	Source CODE
Trade in App I	Wild collected	Currently no definition - default	ART III-non-commercial		Export/ import	NDF, legal acquisition, import for non-commercial purposes	W
	App I - Artificial propagation for commercial purposes	Artificially propagated' refers to live plants grown from seeds, cuttings, divisions, callus tissues or other plant tissues, spores or other propagules under controlled conditions; where the cultivated parental stock must be established non-detrimentally, in accordance with national laws and managed for the long-term maintenance of the cultivated stock. Seeds are artificially propagated only if taken from specimens acquired in accordance with the provisions above and grown under controlled conditions, or from parental stock artificially propagated from propagules or vegetative cuttings etc. Grafted plants shall be recognised as artificially propagated only when both the root-stock and the graft have been artificially propagated. Nurseries should be registered with the Secretariat.	ART VIIp4	11.11 & 9.19	Export/	Treat as App II if defined as Res. Conf. 11.11 (see alsoRes. Conf. 9.19)	D
	App I - Artificial propagation Non-Commercial	As Above	ART VIIp5	11.11	Art. Prop Phytosanitory certificate	Res. Conf. 11.11	A
Trade in App II	Wild collected	Currently no definition - default	ART IV		Export	NDF, legal acquisition,	W
	Artificial propagation	As Above	ART VIIp5	11.11	Art. Prop./Phytos anitory certificate	Res. Conf. 11.11	A
Trade in App III	Wild collected		ART V		EXPORT/Cert. of origin		W
	Art Prop. App III		ART VIIp5	11.11		Res. Conf. 11.11	A

N.B. Regarding flasked seedlings Resolution Conf. 11.11 RECOMMENDS that flasked seedlings of orchid species listed in Appendix I be interpreted as being exempt from CITES control, taking into account the provisions of Article VII, paragraph 4, and Article I, paragraph (b) (iii), and agreeing to a derogation from Resolution Conf. 9.6 (Rev.) for this exemption;

SECTION D: KEY FACTORS FOR USE IN REGULATING PRODUCTION SYSTEMS

This section reviews the current CITES permitting and monitoring requirements for trade from different production systems to identify key parameters that CITES Authorities might use in regulating production systems. A summary of trade regulations provided for in Articles III, IV, V and VII of the Convention, together with guidance on making non-detriment findings and on monitoring and inspection regimes for captive breeding and ranching facilities and nurseries is compiled in Table 3.

The production systems recognised by CITES are listed along the horizontal axis of Table 3. Table 3 records the two main components of ranching and five components of wild collection. Along the vertical axis, the table lists the main factors to consider in issuing the appropriate permits or certificates. The vertical axis also lists the main characteristics which might be used to categorise production systems and finally lists additional control measures that the CITES Authorities might establish to assist them to implement the provisions of the Convention for the various production systems.

Further Guidance for Scientific Authorities

For the export of any wild collected specimen, a non-detriment finding is required. Guidance on making a non-detriment finding is provided in Resolution Conf 10.3. The resolution recommends that the Scientific Authority "base its advice on the scientific review of available information on the population status, distribution, population trend, harvest and other biological and ecological factors as appropriate, and trade information relating to the species concerned".

Whilst biological factors ultimately determine whether a species can sustain certain harvest levels, it is increasingly recognised that socio-economic factors and economic incentives are also important (See Resolution Conf 8.3). Parties may want to consider whether Resolution Conf 10.3 on the role of Scientific Authorities should be made more explicit in relation to the need to weigh the conservation costs and benefits of different production systems producing specimens that are classified by CITES as wild collected.

Furthermore, the Committee might consider whether they can provide guidance that could help CITES Authorities to expedite exports under certain conditions. Resolution Conf 12.3 section XII regarding the use of simplified procedures to issue permits and certificates recommends that Parties facilitate and expedite trade that will have a negligible impact on the conservation of the species concerned such as trade under the exemptions of Article VII paragraph 4 and 5. Processes to expedite trade in certain forms of production of Appendix II specimens might be considered for trade in captive born specimens, where the captive breeding establishment is maintained with no detriment to the wild population and the specimens are marked; for trade in specimens that result from nationally planned control or management procedures; and for trade in specimens from introduced populations. Guidance on expedited procedures could be developed in the Secretariat's training manual or possibly added to Resolution Conf 10.3 on the Role of Scientific Authorities.

Captive bred/ artificially propagated specimens

Trade in captive bred/ artificially propagated CITES-listed specimens is regulated through different permitting requirements described in two separate exemptions:

For captive bred and artificially propagated specimens traded under the provisions of Article VII para. 4 and para. 5, non-detriment findings are only required in relation to establishment and maintenance of the breeding stock. Resolution Conf. 12.10 provides some guidance on how the CITES Authorities might undertake checks and monitoring to verify that the breeding stock is maintained with minimal input from the wild. However no guidance is provided in relation to monitoring of captive breeding/ artificial propagation operations producing Appendix II, III or non-commercial specimens of Appendix I species. The Animals Committee could consider developing such guidance to be incorporated into Resolution Conf. 10.3 on the role of Scientific Authorities or in the Secretariat training manual.

The definition of *controlled conditions* is rarely interpreted to recognise the possibility of production in extensive semi-natural surroundings (see Resolution Conf. 10.16 and 1.11). Given the contributions that breeding and rearing for commercial purposes in virtually wild conditions in the range States can make to conservation, it is recommended that further guidance be provided to encourage rearing and captive breeding/ artificial propagation to be carried out in extensive "controlled" conditions (Resolution Conf 9.19 already refers

to the possibility that artificial propagation could replace traditional agriculture). This would require either that the progeny or reared individuals can be marked and traceable in extensive situations or that the operation is carried out within a perimeter enclosure. Such extensive systems would occur in the range State.

Ranched specimens

The CITES definition of ranching and regulations for oversight of ranching operations apparently only apply to instances where species are transferred from Appendix I to Appendix II for ranching purposes (see title of Resolution Conf. 11.16 Ranching and trade in ranched specimens of species transferred from Appendix I to Appendix II). However, in addition Resolution Conf. 12.3 on permits and certificates notes that source code R refers to "specimens produced in a ranching operation" and thus many Appendix II specimens are now traded as originating from a ranching operation and many countries establish export quotas for ranched specimens.

There has been confusion over what constitutes ranching of Appendix II species and a clear definition that applies to Appendix II species as well as to those transferred from Appendix I to Appendix II is needed. This definition should restrict ranching to the collection of high mortality stages, where rearing in a controlled environment can significantly increase survival and specify either the length of time that individuals should be maintained in the rearing facility or the average proportion of overall growth that the specimens must achieve before being traded. A possible definition: the term 'ranching' means the rearing in a controlled environment of specimens such as eggs or hatchlings which suffer high mortality rates in the wild and that are taken from the wild through controlled collection.

In addition, to support non-detriment findings for such rearing operations, regular monitoring should be undertaken to ensure that:

a) egg/juvenile collection etc is non-detrimental to the wild population; and
b) that the reared individuals are grown/maintained in the rearing environment for a specific time period (species-specific) or whilst an average percentage increase in size is attained.

Detailed recommendations on monitoring a ranching operation for specimens transferred from Appendix I to Appendix II are laid out in Resolution Conf. 11.16 and could provide a useful framework to guide Management Authorities in monitoring ranching operations for Appendix-II listed species.

Specimens taken from the wild

Acknowledging *enhanced wild production* as a form of production could have two benefits. Firstly, it could encourage recognition of the potential economic incentives for conservation. Secondly, it could help to avoid instances of over-collection being inferred from reviews of the trade data even when the non-detriment finding was made on the basis that the harvest is rendered sustainable by the increased productivity. The Scientific Authority would need to assess whether the manipulation is non-detrimental to the survival of both species and habitat/ ecosystem.

Specimens collected from introduced populations are treated by CITES as wild collected specimens, but the balance of costs and benefits of trade in such specimens may be very different from costs and benefits associated with trade in specimens from range State populations. Whilst regulation of trade from introduced populations maybe needed to control trade from wild populations, non-detriment findings for the introduced population, particularly of Appendix II-listed specimens could be expedited.

Finally, to clarify the permitting and monitoring requirements for trade in specimens from different production systems it is suggested that a manual that describes the requirements for each possible scenario would assist Scientific and Management Authorities. For example, the use of source codes by CITES can be confusing. Some codes indicate the legal provisions for Trade (Codes A, D, C, W, I, O, U). In contrast, code F does not signify the legal trade requirements, but does indicate that the specimens are not taken directly from the wild; and arguably helps to indicate in the trade data and on the export permit the basis for a non-detriment finding. Code R has a mixed application. Code R can be used either for ranching of specimens transferred from Appendix I to Appendix II for ranching purposes, for which the Parties have laid out monitoring and other requirements. Alternatively, code R can be used to signify the source of other ranched Appendix II specimens, for which there are no specific requirements. Table 3 provides an initial attempt compile the relevant provisions of CITES from the text of the Convention and subsequent Resolutions. Using the table prepared at the 17th meeting of the Animals Committee Hanoi by a small working group as a basis, Table 3 includes some suggestions for developing control measures and national monitoring systems.