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

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PRODUCTION SYSTEMS INVOLVING CITES-LISTED SPECIES AND THEIR IMPACT ON WILD POPULATIONS

This document has been prepared by the IUCN/SSC Wildlife Trade Programme and is based on work contracted by the Secretariat to encourage further examination of the conservation benefits of *ex situ* and *in situ* production of CITES-listed species.

Why distinguish between *ex situ* production and *in situ* production of plants?

1. The Plants Committee has been examining whether CITES definitions of production systems e.g. artificial propagation are being used appropriately (see Doc PC 11.9.1a regarding *Harvesting techniques of* Galanthus *in Georgia*). Other documents related to this discussion include: Doc. PC 12.23.1 *CITES Plant production systems;* Doc. PC11.9.2 *Decision 11.155,* discussing how to characterise sylviculture production systems; and Doc. PC12.20.3 *Relationship between* in situ *conservation and* ex situ *production of plants*.

2. The role of CITES is to regulate international trade where it may be detrimental to the survival of CITES-listed wild species. To fulfil this role, it is important that CITES Authorities can clearly define systems used to produce CITES-listed species for trade to a) ensure that a particular system fits into the overall CITES legal framework and b) to assess the impact of that trade on the survival of the species.

3. For example, where the Convention makes legal exemptions for trade in artificially propagated specimens (see Article VII) it is important that the Management Authority has clear criteria to determine whether a particular production strategy is in accordance with these legal requirements of the Convention and subsequent resolutions. 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.

4. Before exports of CITES-listed specimens can occur, the CITES Scientific Authority must first determine that the export will not be detrimental to the survival of the species. To make these non-detriment 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. The impact of the export will depend on the method of production. For example, export of specimens produced *ex situ* through artificial propagation may be expected to have little direct positive or negative impact on the wild population, in contrast to specimens collected directly from the wild population (see later paragraphs for more detail on impacts of production systems). In addition 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. For these reasons the means of production of specimens in trade

should be recorded accurately in quota allocations, on permits and in CITES annual reports to allow harvest impacts to be assessed through the monitoring of annual report data.

5. In addition, CITES annual report data are often examined in the significant trade review process, 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 relationship between *ex situ* production and *in situ* conservation of plants

6. For plants the forms of production recognised by CITES, are artificial propagation, (including tissue culture) and wild collection. Wild collection, by default includes any source of specimens other than those obtained through artificial propagation.

7. 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.

8. In practice, management and trade regulation are often not able to maintain collection from the wild for trade purposes at non-detrimental levels due to a lack of information on status and biology, illegal trade and unpredicted stochastic events. To complicate matters further, certain forms of trade 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. For example demand by the individual consumer for wild collected medicinal plants is often greater than for artificially propagated medicinal plants, on the other hand for commercial production of medicinal compounds, a constant supply of the active ingredient is more likely to be available from artificially propagated plants.

9. In terms of providing direct economic incentives to conserve species and their habitats, many conservationists would argue that trade from wild collection is potentially more likely to provide such economic incentives than *ex situ* production, providing that a benefit sharing infrastructure is in place. In general *ex situ* production facilities, particularly closed-cycle operations, no longer require input of wild stock and may be far from the natural areas where the species that they propagate originate. In such cases, opportunities to directly link *ex situ* production with local conservation efforts are likely to be limited.

10. Many artificial propagation operations for CITES species are established in non-range States supplying exotic specimens for a domestic trade as well as the international trade. In order to contribute to conservation such distant *ex situ* operations could make indirect contributions to species conservation by: paying conservation levies; making donations to support *in situ* conservation projects; and donating specimens or genetic material to support recovery projects. However, the practicality of and incentive for doing so is uncertain.

11. It is often argued that *ex situ* production is beneficial to species conservation by reducing incentives to collect specimens from the wild populations, so for example the large trade in “bulbs” produced through artificial propagation is considered to reduce pressure on wild stocks, particularly for Appendix-I listed species. But it has also been argued that *ex situ* production can stimulate increased demand for wild products, when such products are deemed more efficacious than *ex situ* produced specimens or when they are produced more cheaply or simply mislabelled. For example, there has been concern that the large trade in certain species of orchid produced through artificial propagation might mask trade in rare species collected from the wild. The balance point of these opposite forces will depend on the level of demand for the product, the availability/ conservation status of the product and the resources available to regulate trade.

12. By competing for market share with products from wild sources it has also been argued that *ex situ* production may reduce the opportunities for trade in wild products to provide economic incentives to encourage *in situ* conservation. In addition, competition for market share can also drive down prices for wild collected specimens (particularly where there is no premium on wild collected specimens), again reducing possible economic incentives for *in situ* conservation.

13. However, when trade from the wild is prohibited, as is the case for many Appendix-I taxa, there are few opportunities for wild collection for international trade to contribute economic incentives for conservation, as trade is allowed only in exceptional circumstances. In this case, the conservation impacts of the *ex situ* production on *in situ* conservation will depend on whether or not the trade in artificially propagated specimens stimulates or reduces pressures for illegal trade. For Appendix-I plant species, there will be little danger of *ex situ* production competing with *in situ* production for market share (as there should be no in situ production of Appendix-I specimens) and thus reducing the opportunities for wild harvest to provide economic incentives to encourage conservation. [In the case of animal species, trophy hunts of wild Appendix-I listed species can provide considerable economic benefits for *in situ* conservation, which could arguably in future be jeopardised by *ex situ* captive breeding for so called "canned" trophy hunts]. The situation for Appendix-II listed species is likely to be less clear-cut.

14. 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 its products.

    – 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 and of ensuring that it reaches the appropriate target.

    – The level of dependence of *ex situ* production units on the wild population for additional genetic stock.

15. In general, current conservation thinking suggests that production *in situ* will be more likely than *ex situ* production to generate economic incentives for local conservation, provided that the trade can be adequately managed, that a benefit sharing infrastructure is in place, and that the population can sustain a given level of harvest. In contrast, *ex situ* production is often effectively de-linked from the wild population and rarely provides any direct economic incentives for conservation of the species in the wild because it takes place in non-natural, controlled conditions, often outside the range State. A certain amount of wild collection for international trade still takes place under an open access system, in such cases there may be no opportunities for economic incentives to support species or habitat conservation.

16. However, certain benefits of artificial propagation of plants are enumerated in two paragraphs of the preamble to Resolution Conf. 9.19 *On Guidelines for the registration of nurseries exporting artificially propagated specimens of Appendix-I species*:

    Recognizing that the artificial propagation of specimens of Appendix-I species 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 collecting pressure.

17. The argument in Resolution Conf. 9.19 suggests that artificial propagation of Appendix-I specimens reduces collecting pressure, but, as already indicated, this may not always be so, particularly where

Appendix-II specimens are concerned. Furthermore suggesting that artificial propagation could form an economic alternative to traditional agriculture and increase conservation interest in the areas of natural distribution is potentially contentious. Examining the conservation status of major crop wild relatives shows that many are endangered in the wild and that there is danger of losing genetic material that could be potentially vital to breeding other forms of disease resistance into major crop species.

18. The volume of trade in artificially propagated specimens of plants is very large and, concerned at the burden that this places on Management Authorities for low conservation benefit, Resolution Conf 9.19 recalls that a number of resolutions have been adopted to facilitate trade in artificially propagated plants. At the 12th meeting of the Conference of Parties (Santiago, 2002) a proposal was put forward to annotate the listing of Orchidaceae such that artificially propagated specimens of six genera were to be treated as not subject to the Convention when certain conditions were met. However, in the event, the proposal was deemed to be difficult to implement and its scope was reduced.

19. Clearly the conservation impacts of *ex situ* and *in situ* production are still poorly understood and vary on a case-by-case basis. By examining a series of case studies that investigate the conservation impacts of *ex situ* and *in situ* production for a variety of Appendix I and II species under different conditions, the Plants Committee may be able to develop more specific advice on the relative merits of *in situ* and *ex situ* production.

Variety and grouping of production systems - need for guidance for Scientific Authorities?

20. In reality, there are numerous other means of producing "wild" specimens as demonstrated in documents Doc. AC.16.15 and Doc. PC 11.9.1a, Doc. PC11.19.2 and Doc. PC 12.32. Many specimens produced for trade may not be collected directly from a pristine wild habitat, but may be produced through a variety of methods of managing the wild habitat such as sylviculture, enrichment planting and artificial seeding in natural ecosystems and *ex situ* rearing of wild collected bulbs. Production in natural ecosystems can also be enhanced through fertilization and or weeding/thinning or competitor control. Such management is designed to enhance individual survival or productivity above unmanaged natural levels. In reality, production systems form a continuum ranging from the collection of wild individuals from wild habitats through production of semi-wild/semi-domesticated individuals to multi-generation closed cycle systems that produce virtually "domesticated" individuals. Differentiating between these overlapping systems can be extremely difficult. Production operations may even "evolve" through the different 'categories' as they become more established.

21. Some would argue that the current CITES source code provisions, which simply recognise, specimens taken from the wild (W); and two forms of artificially propagated specimens (A,D); do not adequately recognise the potential of other production systems to enhance productivity and to provide economic incentives to encourage *in situ* conservation. Others argue that by manipulating the wild habitat to increase production of a target species, non-target species may be detrimentally affected, and the Scientific Authority should judge the relative impacts in making its non-detriment findings. This raises the question: Should CITES Parties develop guidance for Scientific Authorities on distinguishing between production from a pristine wild habitat and production from a managed wild habitat, and can differences in the conservation benefits between the systems be accurately described?

Grouping of Production systems

22. In terms of conservation impacts, production systems can be grouped on the basis of three main characteristics:

    a) the level of wild collection and its impact on population survival;

    b) the extent to which wild collection is offset, by enhancing productivity through rearing;

    c)the extent to which the production contributes economic incentives to encourage conservation.

23. Based on these factors, the following paragraphs argue that production systems can be separated into three broad categories producing: Wild Collected Specimens; Reared Wild Specimens; and

Closed-cycle Artificially Propagated Specimens. Each of these major categories in turn comprises a number of further subdivisions. To encourage dialogue on whether there is any benefit in recognising and defining further production systems under CITES, a range of different production systems are described in the following paragraphs:

1. **Wild Collected Specimens** - where production 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 leaves, bark, or flowers from the wild population. 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 *Araucaria arucana*. (Provided that a benefit sharing system is in place, wild collection, is theoretically the production system most likely to generate economic incentives to encourage conservation). Forms of wild collection include:

   1a. **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. *Swietenia macrophylla* from Brazil).

   1b. **Planned wild harvest for pest control or as salvage harvest** – involves harvest from land that is to be cleared of natural vegetation under some form of accepted planning policy e.g. the collection of cycads and orchids from natural habitat that will undergo planned land clearance for farming and road building etc. Although this is a wild harvest, some would argue that a planned salvage harvest merits a separate identification on permits and in trade statistics as some benefit may be derived from trade in specimens that would otherwise be lost to the population.

   1c. **Enhanced wild production from manipulated ecosystems** - involves the harvest of wild individuals from an ecosystem that is essentially wild, but has undergone some manipulation to enhance either the carrying capacity of the environment or to directly increase the size of the population. Ecosystem manipulation may include:

   - providing specialised habitat niches e.g addition of substrate for the growth of additional epiphytes;
   - removing competitors or artificially increasing the supply of nutrients (e.g 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 enrichment planting or seeding of medicinal plants such as wild ginseng production in North America).

   The Plants Committee has recently considered the case where individuals of high reproductive value to the population such as bulbs are grown on in agricultural fields. Given the risks associated with harvest of reproductive stages, it seems appropriate to classify the bulb transplanting as harvest from the wild, but also to recognise that there has been intervention to increase the size and number of bulbs. To recognise the conservation potential of such systems at the same time as maintaining management oversight to ensure that the ecosystem is not adversely affected by production of the target species, one solution would be to propose the creation of a new category, termed *enhanced wild production*. The responsibility for assessing the potential benefits and adverse effects of such systems would fall to the Scientific Authority responsible for making the non-detriment finding.

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[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.*

1d. **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. For example, the harvesting of unintentionally introduced species such as *Opuntia* spp. that occurs in the wild in many non-range States could be classified in this category. However, this form of production is not physically constrained in controlled-conditions *sensu* CITES, nor would specimens produced in such a way be readily distinguishable from wild caught specimens (unless isotope or DNA analysis becomes more generally available).

2. **Reared Wild Specimens** – where production is also based on a high reliance on wild individuals, but in this case to enhance their survival through REARING[2] – this includes production systems in which individuals are regularly taken from the wild to be reared/cultivated, 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 for subsequent rearing. There is disagreement whether collection and rearing of reproductive life stages (low mortality life stages) might also be classified under this system. This paper recommends that due to the potentially greater impacts of collecting reproductive life stages such as adults, that a REARING system be restricted to the collection of high mortality life stages.

2a. **Rearing of high mortality life stages in non-natural conditions** – involves production from specimens that have high mortality levels in the wild. Currently, CITES does not recognise such a system for Plants – would such a designation be useful in relation to the control of plant trade? This "rearing" system differs from artificial propagation for plants 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. 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. To maintain adequate control of this system it must be possible to follow the individuals collected from the wild through the rearing process generally by maintaining the reared individuals within established boundaries.

3. **Closed-cycle Artificially propagated specimens** – where production is based on a low reliance on wild individuals for CLOSED CYCLE Propagation [3]. This includes production systems in which there is a minimal removal of individuals from the wild to form a relatively self-sustaining non-wild population (and this can include introduced populations outside the range State), from which individuals are removed for trade.

3a. **Artificial propagation and tissue culture *ex situ*** – involves production *ex situ* (i.e. in non-natural ecosystems) either in or outside the range State. 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 which after the initial establishment then requires no/minimal removal from the wild population (includes operations producing plants from *artificial cultivation, tissue culture, micropropagation* etc.). This system provides little opportunity to generate direct economic incentives to conserve the wild species and its habitat.

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[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 is addressing this issue and PC Doc. 9.1a considers the establishment of a code for wild transplanted specimens (Wt) particularly for the production of* Galanthus *spp. in Turkey).*

[3] *This type of production system is currently captured in the following source codes: A - Appendix I species artificially propagated for commercial purposes; C - Appendix I plant species propagated for non-commercial purposes and propagated species included in Appendix II and Appendix III. C - Animals bred captivity in accordance with Resolution Conf. 10.16, 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). F - First generation (F1) animals born in captivity, but which do not fulfil the definition of "bred in captivity" in Resolution Conf. 10.16, as well as parts and products thereof.*

Concerns regarding the current CITES definitions of productions systems

24. Provisions regarding artificial propagation of plants and captive production for animals:

    - differ in the level of restriction between plants and animals, requiring demonstration of F2 production for Appendix I, II and II animals, but not for plants;

    - involve three different forms of trade regulation (Article VII para 4 and para 5; and Article IV provisions for commercially produced Appendix-I specimens; and

    - the definition of *controlled environment* does not apparently recognise the possibility of production in extensive semi-natural surroundings.

25. The provisions concerning ranching of animals have no counterpart for production of plants for trade. Would such "rearing" of wild collected plant parts have any utility in the conservation and trade of plants? For example to cover cases where there is repeated collection of seed from the wild.

26. The term "wild collected" refers to all specimens that do not meet the definition of artificially propagated. Would it be useful to refine the provisions regarding specimens taken from the wild to recognise the potential economic incentives for conservation and to avoid over-collection being inferred from the trade data, when the harvest is rendered sustainable by the increased productivity? For example two new additional forms of wild production might be recognised:

    - "Planned Salvage/pest control harvest" to indicate where wild specimens are removed through planned eradication or population control measures such as salvage harvest; and

    - "Enhanced wild production' to indicate cases where the level of wild harvest is enhanced through a variety of production systems that rely either on manipulating the wild habitat or on manipulating wild individuals. In such cases the Scientific Authority would be expected to indicate whether the manipulation is non-detrimental to the survival of both species and habitat/ ecosystem.