All Species are not Equal--Conservation Breeding Guidelines - Part IV

Last month, in our ongoing discussion of the need for Conservation Breeding Guidelines, I had quoted the following from the World Zoo Conservation Strategy Chapter Seven: "Not all zoos are equal". Not all animal collections calling themselves 'zoos' meet the standards necessary for effective conservation work in today's world; ... yet some of them may have good intentions and may even be close to being accreditable."

In the featured document it is suggested that "all species are not equal" also, at least when being considered for a conservation breeding programme is concerned. This statement is not a slight to any species but only to point out that not all species are appropriate for captive breeding at a given zoo. It may be because they are too closely related genetically to others of their species in the zoo; or, because there are already too many of that species even in the wild as well as the zoo so not necessary for conservation, education or entertainment; or, because the zoo should not be holding that species in the first place for some environmental reason, such wrong altitude, climate, etc. which would not prove optimal for the comfort and survival of that species, etc.

That, among other reasons is why modern zoo theory recommends an exercise in prioritisation of species before and as an aid to evolving a collection plan.

The article featured in this issue describes a prioritisation process to be taken up by any zoo and any zoo community ... national, regional or global before they embark on any systematic, scientific and sustained effort of collecting, keeping and breeding ampibians. Prioritisation is necessary for any species and for many reasons. However, looming large among them are the following reasons:
. we don't want to take animals from the wild for captive breeding unless it is for the sake of its own species survival,
. or unless we are reasonably sure that we have the capacity to keep them alive, healthy and demographically and genetically diverse,
. and that it will be worthwhile to do so in view of the enormous cost of running a national, regional or global programme.

With all those things and others in mind, the conservation biologists of the Amphibian Ark, AArk, have created a very reasoned set of initial guidelines for prioritising, authorising and implementing *ex situ* programmes for Amphibians. These guidelines have been reproduced in the next pages of this issue as our featured article of the month on conservation breeding. This protocol provides a model for other taxon groups even. Most of these principles should be observed for any programme. Their document was prepared from a draft by the Taxon Selection and Prioritisation Working Group of CBSG and WAZA during an Amphibian *Ex Situ* Conservation Planning workshop in February 2006. The document is updated from time to time, last time being April 2009.

I recall, early in my zoo avocation, being quite tormented by the notion that most of the zoo personnel in our part of the world at that time either had no concept of zoos being related to wildlife conservation, or that they thought captivity - in and of itself - was sufficient to qualify as conservation, e.g., that conservation was synonymous with preservation, as if an animal was a pickle or taxidermy model.

Today, still, many zoos of our region (South Asia) seem to think any breeding ***is*** conservation, whether it is attached to a programme which can sustain genetic diversity, or whether the species needs breeding to survive for the long term, or whether sufficient knowledge even exists to keep much less breed the animal.

Some of our zoos use the concept of "conservation" to solve their surplus animal problem by releasing these extra animals into wild areas without planning, study of the area, or appropriateness. This goes on, endorsed by forest and wildlife departments in almost every country of South Asia, along with the numerous "welfare" releases of confiscated or injured animals by individuals and institutions. These releases normally do not involve any scientific study of the implications, or possible threats, no Reintroduction Specialist Group Guidelines ... no anything except the need to get rid of the animals and feel good about themselves.

This month's document on conservation breeding (in the following 9 pages) is unique in the sense that its focus is one taxon group, e.g. amphibians, and that it goes into exacting detail about the first step towards conservation breeding, that is Prioritisation, and then to Authorisation for the proposed breeding programme and whether founders exist. These sections prepare the way for selection of species for their appropriate conservation role to help decide next step. Finally the third section takes up implementation, considering practical feasibility of the programme and a check list of essential elements before beginning a captive breeding programme.

We hope that zoo directors, vets, curators, policy makers, educators, etc. will read and adopt the appropriate aspects of this excellent protocol to make their breeding more "programmatic", systematic, scientific, and safe for the species for which they target. ***Sally Walker, Editor Emeritus.***

AArk process for prioritising conservation activities and implementing *ex situ* programmes for Amphibians

Based upon draft prepared by: Taxon selection and prioritisation working group – CBSG / WAZA Amphibian Ex situ Conservation Planning Workshop, El Vallee, February 2006. *April 2009 version*

Rationale

Conservation resources are limited, more so for amphibians than may other taxa, and with around 2000 threatened species in need of help the process outlined below seeks to objectively and consistently identify priority species and their immediate conservation needs.

The mission of the AARK is "facilitating partnerships that ensure the global survival of amphibians, focusing on those that **cannot *currently* be safeguarded in nature**".

Ex situ conservation of a threatened amphibian species should be considered a necessity when the imperative of *in situ* conservation cannot by itself ensure the survival of a species and its ecosystem.

When *ex situ* management of an amphibian species is considered necessary and appropriate, the priority should be to establish the initiative within the range State of ecological origin. Emphasis should therefore be placed on developing appropriate capacity within the range State where this does not exist. However, if the perceived urgency of the situation requires it, *ex situ* programmes will be set up outside of range State wherever expertise and other resources are forthcoming. Data derived from *ex situ* management of amphibians should be made openly available to workers involved in the *in situ* conservation of the species (or similar species) and *vice versa*.

An *ex situ* initiative should be viewed as just one of the tools that can help in the overall conservation of a species. It therefore follows that strong links between *ex situ* and *in situ* components are fundamental to the long-term success of species conservation. Full integration between *ex situ* and *in situ* conservation approaches should be sought wherever possible. This is normally best highlighted through the establishment of a formal Taxon Management Plan that explicitly states the short, medium and long term goals of each component of the conservation initiative.

In cases where an *ex situ* conservation initiative has been established prior to, or in the absence of, a concurrent *in situ* initiative (e.g. where a political situation currently prohibits *in situ* conservation measures, or where a disease problem currently invalidates measures to protect wild populations), emphasis should be placed on establishing the appropriate *in situ* links as soon as it becomes possible to do so.

This prioritisation tool has been structured in three sections:

The first section concerns **Prioritisation** of species for conservation actions both *in situ* and *ex situ* -i.e. with limited resources (space, staff, money etc.) which species should have *ex situ* programmes established ahead of others, which species urgently need field research or protection, etc. It takes the form of a series of questions with weighted scores. The total score for a species is derived via a number of relevant questions with weighted answers. Some questions may not be straightforward to answer and will require consultation with colleagues, taxonomic experts and other individuals/groups working with the species.

The second section includes questions ensuring that there is **Authorisation** for any proposed *ex situ* conservation programme, and that founder animals are available.

The information provided in sections one and two is then used to categorize each species into one or more **Conservation Roles**. These roles are then used to generate a series of prioritized lists which can then be used to determine the next steps required for the conservation of each species.

The third and final section represents **Implementation** of an *ex situ* programme and considers the practical feasibility of initiating and maintaining a programme – a sort of check list of essential elements prior to initiation. This prioritisation tool should be an evolving protocol. The criteria and their rankings will be adjusted as we gain experience with the process and continue to work with the broader amphibian conservation community to identify goals, threats, and conservation options. In addition, the selection and prioritisation of individual species will be revised as we gain knowledge and as the threats to the species change. Thus, there will be a need to constantly assess species status and monitor threats, so that emerging critical situations are responded to sufficiently quickly.

Section One – Taxon Prioritization

1. Extinction risk: What is the current IUCN Red List category for the taxon? (modified accordingly if new/additional information is available)

Extinct in wild	**Score 20**
Critically endangered	**Score 16**
Endangered	**Score 12**
Vulnerable	**Score 8**
Data deficient*	**Score 8**
Near threatened	**Score 4**
Least concern	**Score 0**
Extinct	**Score 0**

(*taxon has been regionally or nationally recognised as 'at risk' despite data deficiency)

If the Red List category is modified by the workshop participants, a note should be added explaining the rationale for the change.

2. Phylogenetic significance: What is the taxon's Evolutionary Distinctiveness (ED) score, as generated by the ZSL EDGE programme?

ED value >100	**Score 10**
ED value 50-100	**Score 7**
ED value 20-50	**Score 3**
ED value <20	**Score 0**

EDGE score
Using a scientific framework to identify the world's most Evolutionarily Distinct and Globally Endangered (EDGE) species, the EDGE of Existence programme highlights and protects some of the weirdest and most wonderful species on the planet. EDGE species have few close relatives on the tree of life and are often extremely unusual in the way they look, live and behave, as well as in their genetic make-up. They represent a unique and irreplaceable part of the world's natural heritage, yet an alarmingly large proportion are currently sliding silently towards extinction unnoticed. (Additional information about the EDGE scoring process can be found at **http://www.edgeofexistence.org/about/edge_methods.php)**

3.Protected habitat: Is a population of at least 100 individuals of the taxon included within a reliably protected area or areas?
Yes **No** **Unknown**
The status of protected habitat is used to calculate Conservation Roles, and is not scored. Data from recent Global Amphibian Assessments are included.

4. Threat mitigation: Are the threats facing the taxon, including any new and emerging threats not considered in the GAA, potentially reversible?

Threats cannot/will not be reversed in time to prevent likely species extinction	**Score 20**
Threats are being managed - conservation dependant	**Score 10**
Threats unknown	**Score 8**
Threats are potentially reversible in time frame that will prevent further decline/extinction	**Score 2**
Species is effectively protected	**Score 0**
Species does not require conservation action at this time	**Score 0**

Threats cannot/will not be reversed in time to prevent likely species extinction
The species will very likely go extinct in the wild before anything can or will be done to save it, but in principle the threats to the species could be reversed and the animals in *ex situ* colonies could be used to re-stock the wild if/when the threats are reversed.
Threats are being managed - conservation dependant

Without the current management of the threat, the species would disappear in the wild. Examples of this sort of management include actions such as filling temporary ponds each year for breeding, diverting a dam to create a torrent, or harvesting predatory species.

Threats unknown
Either no knowledge about the threats to this species exists, or there is so little information known about the distribution of the species in the wild, that the threats cannot be determined.

Threats are potentially reversible in time frame that will prevent further decline / extinction
The threats to the species can, or will likely be removed or reversed, in a time frame that will prevent further decline of the species in the wild.

Species is effectively protected
All, or the majority of the population of the species in the wild is sufficiently protected to prevent further decline in numbers (e.g. the bulk of the population occurs in protected areas).

Species does not require conservation action at this time
This species is not currently facing any threats in the wild, and no conservation action is currently required to safeguard this species in the wild.

5. Population recovery: Is the known population of this species in the wild large enough to recover naturally, without *ex situ* intervention if threats are mitigated?
Yes **No** **Unknown**

The size of the population in the wild is used to calculate Conservation Roles, and is not scored.

6. Biological distinctiveness: Does the taxon exhibit, for example, a distinctive reproductive mode, behaviour, aspect of morphology or physiology, among the Class Amphibia?

Aspect of biology identified that is unique to species	**Score 10**
Aspect of biology shared with <6 other species	**Score 5**
No aspect of biology known to be exceptional	**Score 0**

If the species is identified as being biologically distinct, a note should be included to explain this.

7. Cultural / socio-economic importance: Does the taxon have a special human cultural value (e.g. as a national or regional symbol, in a historic context, featuring in traditional stories) or economic value (e.g. food, traditional medicine, tourism) within its natural range or in a wider global context?

Yes	**Score 5**
No	**Score 0**

Socio-economic – are the benefits from the economic activity likely to influence the conservation of the species?

If the species is identified as being of cultural or socio-economic importance, a note should be included to explain this.

8. Scientific importance: Is the species vital to current or planned research other than species-specific ecology/biology/conservation? (e.g. human medicine, climate change, environmental pollutants and conservation-science)

Research dependent upon species	**Score 5**
Research dependent upon <6 species (incl. this taxon)	**Score 3**
Research not dependent upon species	**Score 0**

If the species is identified as being of scientific importance, a note should be included to explain this.

9. *Ex situ* research: Does conserving this species (or closely related species) *in situ* depend upon research that can be most easily carried out *ex situ*?
Yes **No**
Information about *ex situ* research is used to calculate Conservation Roles, and is not scored.

10. Captive breeding: Has this species been successfully maintained and bred in captivity?
Yes **No**
Information about captive breeding is used to calculate Conservation Roles, and is not scored.

11. Over-collection from the wild: Is the taxon suffering from unsustainable collection within its natural range, either for food, for the pet trade or for any other reason, which threatens the species' continued persistence in the wild?
Yes **No** **Unknown**
Information about collection from the wild is used to calculate Conservation Roles, and is not scored.

12. Husbandry analogue: Do the biological and ecological attributes of the species make it suitable for developing husbandry regimes for more threatened related species?
Yes **No** **Unknown**
Information about husbandry analogues is used to calculate Conservation Roles, and is not scored.

13. Educational potential: Is the species especially diurnal/active/colourful and therefore suited to be a an educational ambassador for amphibian conservation?
Yes **No** **Unknown**
Information about education potential is used to calculate Conservation Roles, and is not scored.

Section Two* – Ex situ *Programme Authorization / Availability of animals

14. Mandate: Is there an existing conservation mandate (see Appendix 2) recommending the *ex situ* conservation of this taxon?
Yes **No**
If the answer is **No**, there is insufficient authorisation for an *ex situ* initiative at this time.
SEEK MANDATE FROM ASG / AARK OR OTHER AUTHORITY

15. Range State approval: Is the proposed *ex situ* initiative supported by the range State (either within the range State or out-of-country *ex situ*)?
Yes **No**
If the answer is **No**, there is insufficient authorisation for an *ex situ* initiative at this time.
SEEK APPROVAL FROM RANGE COUNTRY (WITH HELP FROM AARK / ASG AS REQUIRED) BEFORE PROCEEDING

16. Founder specimens: Are sufficient animals of the taxon available or potentially available (from wild or captive sources) to initiate the **specified** *ex situ* program?
Yes **No**
If the answer is **No**, there are insufficient potential founder specimens to initiate the *ex situ* program.
EVALUATE OPTIONS FOR ALTERNATIVE CONSERVATION STRATEGY INCLUDING GAMETE
CRYOPRESERVATION

Section Three – Programme Implementation

Section Three considers the feasibility of undertaking an ex situ *programme for priority, authorised species. It functions as a form of evaluation/planning with respect to readiness to implement a programme.*

PROGRAMME STABILITY

17. Financial security: Is there sufficient financial support for the anticipated life of the *ex situ* initiative? Or is there good reason to believe that further financial support is realistically

achievable?
Yes: Go to question 13
No: Inadequate resources. **EXPLORE POSSIBILITIES FOR FINANCIAL SUPPORT BEFORE INITIATING PROGRAMME (WITH HELP FROM AARK AS APPROPRIATE)**

18. Organisational and political security: Is the stability of the institution/region/State etc. sufficient to ensure a continued commitment to the *ex situ* program over its anticipated lifespan?
Yes: Go to question 14
No: Insufficient stability. **CONSIDER ALTERNATIVE LOCATION / INSTITUTIONS AND PARTNERSHIPS**

TAXON KNOWLEDGE
19. Background *ex situ* species knowledge: Is there a history of keeping and breeding this taxon successfully in captivity?
Yes: Go to question 17
No: Go to question 15

20. Background *in situ* species knowledge: Is there sufficient understanding of the ecology, behaviour and reproductive mode of the taxon to infer the likely *ex situ* requirements?
Yes: Go to question 17
No: Go to question 16

21. Analogous species: Despite a lack of direct knowledge of the *ex situ* requirements of the target taxon, can they be inferred with a reasonable degree of confidence from similar/ related taxa?
Yes: Go to question 17
No: Insufficient knowledge of the taxon and its requirements at this time. ***EX SITU* PROGRAMME SHOULD BE DELAYED, WHERE POSSIBLE, WHILE RELEVANT EXPERIENCE / INFORMATION IS GATHERED – E.G. BY WORKING WITH ANALOGUE SPECIES**

ACCOMMODATION
22. Current facilities: Is the appropriate quality and quantity of facilities (in country or out of country) currently available? Not just for founder animals, but also for captive bred offspring of all life-stages/sizes (consider space; heating & cooling; water supply, quality, treatment & disposal; lighting; ventilation etc).
Yes: Go to question 19
No: Go to question 18

23. Planned facilities: Are there confirmed plans – within a specified time frame - to develop the appropriate quality and quantity of facilities to permit the full development of the planned *ex situ* program (in country or out of country)?
Yes: Go to question 19
No: Insufficient infrastructure available or planned to permit the likely successful development of the *ex situ* program for this taxon. **CONTACT AARK WITH RESPECT TO POSSIBLE IMPLEMENTATION OF RAPID RESPONSE WHERE URGENT ACTION IS NECESSARY AND / OR WITH RESPECT TO IDENTIFYING SUITABLE PARTNERS / SUPPORTERS**

HUSBANDRY & MANAGEMENT
24. Personnel: Are adequate numbers of skilled staff available with the appropriate *ex situ* amphibian experience?
Yes: Go to question 21
No: Go to question 20

25. Training: Can adequate numbers of skilled staff be made available for training in the appropriate *ex situ* amphibian skills?
Yes: Go to Question 21 CONTACT AARK TRAINING OR PROGRAMME OFFICER FOR HELP

No: Suitable personnel not available. **CONTACT AARK WITH RESPECT TO POSSIBLE IMPLEMENTATION OF RAPID RESPONSE WHERE URGENT ACTION IS NECESSARY AND/OR WITH RESPECT TO IDENTIFYING SUITABLE PARTNERS/SUPPORTERS**

26. Food supply: Is there a reliable food supply – in both quality and quantity – for adult, immature and larval stages of the taxon?
Yes: Go to question 22
No: Inadequate resources. **EXPLORE FOOD SUPPLY OPPORTUNITIES BEFORE PROCEEDING**

27. Management: Is the appropriate standard of record-keeping and knowledge of small population management available to help minimise the risk of potential deleterious effects such as loss of genetic diversity, artificial selection, pathogen transfer, hybridisation etc. (This expertise does not necessarily have to be held at the facility itself, but access to these skills is essential).
Yes: Go to question 23
No: Shortage of skills to support the *ex situ* programme. **SEEK SUPPORT FROM AARK AND/OR REGIONAL ZOO AND AQUARIUM ASSOCIATIONS BEFORE, OR SOON AFTER, PROCEEDING**

28. Veterinary care and health screening: Has provision been made for the routine health monitoring of the population and is the appropriate level of veterinary care available?
Yes: Go to question 24
No: Inadequate resources. **SEEK VETERINARY SUPPORT THROUGH UNIVERSITIES, ZOOS AND AQUARIUMS OR OTHERS BEFORE PROCEEDING**

QUARANTINE & BIOSECURITY
29. Escapes: Are measures in place to minimise the risk of animal escapes and introduction of an invasive species?
Yes: Go to question 25
No: Animal security measures not sufficient. **REVIEW AND IMPROVE BIOSECURITY – REFER TO AARK GUIDELINES – BEFORE PROCEEDING**

30. Species isolation: Are appropriate measures in place at the proposed *ex situ* facility to minimise the risk of possible disease transfer to or from other *ex situ* or wild amphibian populations?
Yes: Go to question 26
No: Insufficient measures currently in place to prevent disease transfer. **REVIEW AND IMPROVE BIOSECURITY – REFER TO AARK GUIDELINES – BEFORE PROCEEDING**

31. Water treatment: Are the appropriate waste water treatment regimes in place to eliminate the possibility of disease transfer from the *ex situ* population to the external environment?

Yes: *Ex situ conservation programme currently feasible and ready for implementation*
No: Bio-security measures inadequate. **REVIEW AND IMPROVE BIOSECURITY – REFER TO AARK GUIDELINES – BEFORE PROCEEDING**

If you have answered 'Yes' to questions 17 through 31 you are ready to implement your AARK *ex situ* conservation breeding programme. Good luck.

Appendix One – Conservation Roles

Simply keeping and breeding threatened amphibian species in captivity does not in itself equate to conservation. As part of a genuine amphibian conservation initiative, *ex situ* captive management must have a clearly defined role in the conservation of the species or its habitat.

Eight Conservation Roles have been defined, and these are calculated for each species, based on the data provided during the prioritization workshop.

Ark
A species that is extinct in the wild (locally or globally) and which would become completely extinct without *ex situ* management.
Triggers for Ark species are:
• IUCN Red List category = Extinct in the Wild (EW)

Rescue
A species that is in imminent danger of extinction (locally or globally) and requires *ex situ* management, as part of an integrated program, to ensure its survival.

Triggers for Rescue species are:
• Threat Mitigation = Threats cannot/will not be reversed in time to prevent likely species extinction.

Note: Threats that constitute imminent danger of extinction include:
• Threats for which we currently have no remedy:
    o Bd, including any species known or suspected to be susceptible
    o Climate change, including any species documented to be drastically contracting its range, e.g., mountaintop salamanders in Central America (per Wake et al.) and mountaintop frogs in Madagascar (per Raxworthy et al.)

• Threats for which we have a remedy but not the resources or will to intervene
    o Imminent destruction of more than 50% of habitat, e.g., dam construction, mining/pollution
    o Species collected to brink of extinction

• All other threats are considered to be “reversible in time frame”.

***In Situ* Conservation**
A species for which mitigation of threats in the wild may still bring about its’ successful conservation.

Triggers for *In Situ* Conservation species are:
• Threat Mitigation = Threats are reversible in time frame that will prevent further decline/extinction **or**
• Threat Mitigation = Threats cannot/will not be reversed in time to prevent likely species extinction (species is in Rescue role) **and** Protected Habitat = No (species will need a secure place to go back to).

***In Situ* Research**
A species that for one or more reasons requires further *in situ* research to be carried out as part of the conservation action for the species. One or more critical pieces of information is not known at this time.

Triggers for *In Situ* Research species are:
• IUCN Red List category = Data Deficient (DD) **or**
• Threat Mitigation = Unknown **or**
• Protected Habitat = Unknown **or**
• Population Recovery = Unknown **or**
• Over-collection status = Unknown.

***Ex Situ* Research**
A species undergoing specific applied research that directly contributes to the conservation of that species, or a related species, in the wild (this includes clearly defined 'model' or 'surrogate' species).

Triggers for *Ex Situ* Research species are:
• The species has been identified as a husbandry analogue for a more threatened species **or**
• IUCN Red List category = Critically Endangered (CR) **or** Endangered (EN) **or** Vulnerable (VU) **or** Near Threatened (NT) **or** Data Deficient, **and** conserving this species depends on *ex situ* research **and** Threat Mitigation = Threats unknown or Threats are reversible in time frame **or**
• IUCN Red List category = Critically Endangered (CR) **or** Endangered (EN) **or** Vulnerable (VU) **or** Near Threatened (NT) **or** Data Deficient, **and** the species has not been successfully maintained and bred in captivity **and** the species is biologically or evolutionarily distinct.

Mass production in captivity
A species threatened through wild collection (e.g. as a food resource), which could be or is currently being bred in captivity – normally in-country, *ex situ* - to replace a demand for specimens collected from the wild. *This category generally excludes the captive-breeding of pet and hobbyist species, except in exceptional circumstances where coordinated, managed breeding programs can demonstrably reduce wild collection of a threatened species.*

Triggers for Mass Production in Captivity species are: IUCN Red List category = Critically Endangered (CR) **or** Endangered (EN) **or** Vulnerable (VU) **and** Species is suffering from over-collection from the wild.

Conservation Education
A species that is specifically selected for management – primarily in zoos and aquariums - to inspire and increase knowledge in visitors, in order to promote positive behavioural change. For example, when a species is used to raise financial or other support for field conservation projects (this would include clearly defined 'flagship' or 'ambassador' species).

Triggers for Conservation Education species are:
• The species has a high Evolutionary Distinctiveness score **or**
• The species is biologically, culturally, or scientifically significant **or**
• The species is suited to be an educational ambassador for amphibian conservation.

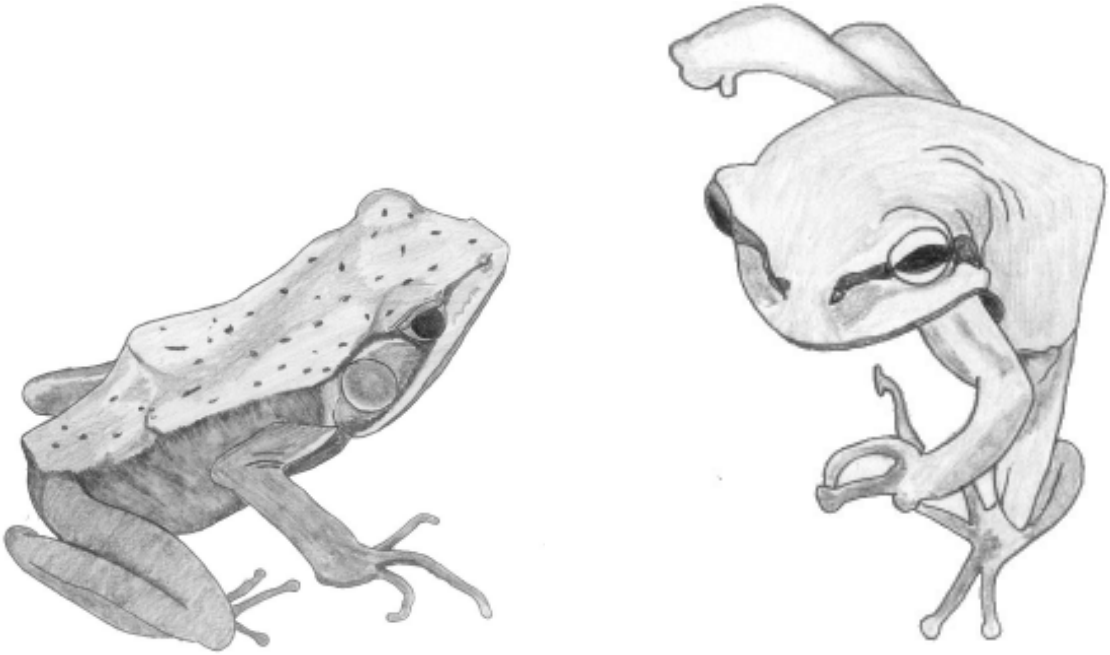
Supplementation
A species for which *ex situ* management benefits the wild population through breeding for release as part of the recommended conservation action.

Triggers for Supplementation species are:
• Threat Mitigation = Threats are being managed **or** Threats are reversible in time frame that will prevent further decline/extinction **or** Species is effectively protected **and**
• The (sub)population of the species in the wild is too small to recovery naturally.

Appendix Two – *Ex situ* Mandate
Mandate for* Ex situ *Conservation

The decision about which species should be protected in *ex situ* conservation programmes should not be made by the AARK community alone because such programmes must be part of broader plans for species conservation. The AARK community needs to respond to needs identified by appropriate conservation authorities, especially since the decision to safeguard species in *ex situ* programmes needs to follow from a careful assessment of which species cannot currently be assured of adequate protection *in situ*. A recommendation for an *ex situ* population of a threatened amphibian species can come from a number of recognised sources, such as:

• The IUCN/SSC Amphibian Specialist Group (ASG).
• The Global Amphibian Assessment (**www.globalamphibians.org**) - the authority on IUCN Red List status for all amphibian species and which recommends *ex si*tu conservation action for at least 240 species.
• The IUCN - the IUCN Technical Guidelines for the Management of *Ex situ* Populations recommends *ex situ* populations for all Critically Endangered species.
• An IUCN/SSC Conservation Breeding Specialist Group (CBSG) Population and Habitat Viability Assessment (PHVA) workshop process. (**www.cbsg.org/toolkit/phvas.scd**)
• An IUCN/SSC Conservation Breeding Specialist Group (CBSG) Conservation Assessment and Management Plan (CAMP) process. (**http://www.cbsg.org/toolkit/camps.scd**)
• An IUCN/SSC regional amphibian (and reptile) specialist group recommendation (Madagascar & Mascarene, Europe or China)? A published Species Action Plan.
• A local, regional or national government request.



The mission of the AArk is "facilitating partnerships that ensure the global survival of amphibians, focusing on those that ***cannot currently be safeguarded in nature****".*

Ex situ *conservation of a threatened amphibian species should be considered a necessity when the imperative of in situ conservation cannot by itself ensure the survival of a species and its ecosystem.*