A guide to the biosecurity and husbandry standards required for the safe and responsible management of *ex situ* populations of amphibians – 11th January 2008

These standards are based upon those reported in the proceedings of the *CBSG/WAZA Amphibian Ex situ Conservation Planning Workshop, El Valle, Panama, 12-15th February 2006*.

Introduction

Ex situ breeding of selected amphibian species is recognised as an essential and integral part of the IUCN Amphibian Conservation Action Plan to stem the loss of amphibian species worldwide. However, the emergence of the infectious disease chytridiomycosis (caused by the fungus *Batrachochytrium dendrobatidis*) as a significant factor in the recent decline and extinction of many amphibian species, raises specific challenges for *ex situ* conservation. Additionally, the difficulty and expense involved in reliably testing amphibians for this disease means that it may often go undetected for extended periods of time and even re-emerge in animals thought to be negative.

Therefore, the safest and most responsible way to proceed with the keeping of all amphibians in captivity is to treat all animals as *potentially* infected (with chytrid and/or other pathogens) and avoid the discharge of potentially infectious water and other materials into the environment (where they may infect local native amphibian populations).
Furthermore, increasing awareness of biosecurity issues and introducing a quarantine-like approach to amphibian husbandry of enclosures/rooms within an institution and between institutions will significantly reduce the risk of an epidemic outbreak of chytridiomycosis (or other disease) in captivity.

Attempting to screen for and treat, known and unknown diseases is no substitute for bio-security – i.e. implementing strict and thorough quarantine and maintaining high levels of barrier management.

For more information on amphibian diseases and chytrid fungus detection, management and treatment see:
http://www.jcu.edu.au/school/phtm/PHTM/frogs/ampdis.htm and
http://www.amphibianark.org/chytrid.htm

Biosecurity and husbandry standards

Biosecurity and husbandry standards can be divided into three categories based on the intended Role of the animals in captivity.

Basic Specimens maintained *ex situ* for **Educational*** purposes with no requirement for research and no prospect of release to the wild.
BIOSECURITY
• Separate footwear per room and/or footbaths at entry/exit.
• Treatment/decontamination of **all** waste water from enclosures and rooms housing amphibians prior to discharge/disposal.
• Incineration (or disinfection by means of suitable chemicals, heating to 60°C for 5mins, or complete desiccation) of all amphibian enclosure waste – soil, leaves, plants, food items, faeces, bodies (after post-mortem examination).
• Escape-proof housing of a size appropriate for species.
• Pest-proof housing (rodents, cockroaches, ants, etc) to prevent pathogen transfer, predation of amphibians, and escape of food insects.
• Water free of pathogens and chemical contaminants.
HUSBANDRY
• Regular water changes – automated or manual.
• Appropriate cage furnishings wherever necessary.
• Exposure to natural light (or good artificial equivalent) if exposure is normal in natural history of the species.
• Appropriate temperature/humidity for natural history of the species.
• Appropriate food, dependent on species – with supplementation (vitamin/mineral).

Intermediate Specimens maintained *ex situ* for **Conservation Research*** purposes with no prospect of release to the wild.
All Basic standards, but also:
BIOSECURITY
• Individual instruments (tongs, nets, bowls, tanks, pumps, filters etc) per enclosure and/or species.
• Change gloves (non-powdered) for each enclosure.
• Design of enclosure should minimize keeper/animal contact.
• Maximize use of automation in water quality maintenance/watering.
• Maintain a consistent/directional flow of husbandry routine – from low risk and high importance species/individuals to high risk and lower importance species/individuals.
HUSBANDRY
• Climatic conditions (lighting, photoperiod, temperature, rainfall, humidity, etc) should follow the natural cycle for the species and be automated wherever possible.
• Highest level of record-keeping.

Advanced Specimens maintained *ex situ* for conservation breeding purposes **(Ark/Rescue/Supplementation)*** with the ultimate expectation of release to the wild.
All Basic and Intermediate standards, but also:
BIOSECURITY
• One species or local assemblage of species per room/unit – a state of *permanent quarantine.*
• Separate uniforms/overalls per room (stays in room unless disposable).
• Food coming from known and trusted source; 3-month period of familiarization with natural food types recommended prior to any release.
• Pre-release, monitor condition of specimens to determine fitness for release – thorough health screening including; regular and frequent PCR screening for chytrid fungus over several months; screening for *Ranavirus*; regular bacteriological and parasitological screening; and thorough necropsy and histological examination of deceased animals and a representative subset of the intended release animals – see *Pessier, A. P. (In press): Management of disease as a threat to amphibian conservation. International Zoo Yearbook, 42*, for a comprehensive overview of amphibian health screening needs.

*Conservation Role

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

a) **Ark** – An amphibian species that is extinct in the wild (locally or globally) and which would become completely extinct without *ex situ* management.

b) **Rescue** – An amphibian species that is in imminent danger of extinction (locally or globally) and requires *ex situ* management as part of the *recommended* conservation action.

c) **Supplementation** – An amphibian species for which *ex situ* management benefits the wild population through breeding for release as part of the *recommended* conservation action.

d) **Conservation Research** – An amphibian 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 and husbandry research).

e) **Conservation Education** – An amphibian 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 includes clearly defined 'flagship' or 'ambassador' species).

NB – *ex situ* includes any and all animals removed from their wild habitat whether within or outside of their native range and country.