2014 CBSG Annual Meeting Briefing Book Part II:

Working Group Information

2014 CBSG Annual Meeting
New Delhi, India
30 October-2 November 2014

Briefing Book Part II
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CBSG Annual Meeting
2014
New Delhi, India

Section 1
Working Group Schedule

2014 CBSG ANNUAL MEETING WORKING GROUP SCHEDULE

Working Group Topic	31 Oct Day 1 **Session 1** 3:00–5:30pm	1 Nov Day 2 **Session 2** 10:00am– 1:00pm	1 Nov Day 2 **Session 3** 2:30–5:00pm	2 Nov Day 3 **Session 4** 9:30– 11:00am
Dysfunctional zoos: learning from India's experience	**X**	**X**		
A new initiative to ensure continued development of species risk assessment tools			**X**	
'Training' session on the new IUCN guidelines		**X** (*ex situ* management, reintroduction)	**X** (placement of confiscated animals)	**X** (wildlife disease risk analysis)
Asian Species Action Partnership	**X**	**X**		
CBSG/Conservation Genetics Specialist Group collaboration	**X**			
The way forward for collaborative conservation breeding programs in India			**X**	**X**
Rolling out the Climate Reality Community Conservation Package		**X**	**X**	

CBSG Annual Meeting
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Section 2
Working Group Descriptions

2014 Working Group Descriptions

Dysfunctional Zoos: Learning from India's Experience

Convenor: Sally Walker

AIM

The aim of this working group is to work towards a range of very specific actions that would lead to improvements or closure of substandard zoos.

BACKGROUND

It is estimated that there are more than 10,000 zoos in the world and the great majority of these zoos are dysfunctional. It is not just a matter of "roadside attractions" … it is that throughout the world, very large sums of money have been and are being invested in setting up elaborate and costly zoos whose owners and operators are not dedicated to or often even conscious of animal welfare or wildlife conservation.

It is fortunate that we in CBSG are running this working group again as the venue could not be better. We are in India, which is the only country that has taken the subject of dysfunctional or substandard zoos 100% seriously. At one time some years ago, it was not known by anyone how many zoos were functioning in India. Even the government had no idea that their count of 44 zoos was dramatically incorrect. An NGO did a survey and came up with over 100 zoos. Another NGO continued the survey and added some more zoos and the first NGO found more zoos and added to that … but when the Ministry of Environment and Forests, Government of India took up the matter, after demanding that all zoos in the country register with the government, it emerged that there were 600 zoos functioning in the country under 14 different agencies. No state government, or NGO, or animal welfare society could have set this right. The Government of India had to do so and they did. It took several years and many rupees and the closure of 400 zoos. No other country or its government has gone to such lengths.

PROCESS

The group, using the Indian experience as a starting point, can discuss:

1. How other countries in a similar situation might utilize some of the actions taken by India to begin making improvements in their zoo culture.
2. How one person or a group of people might approach a government that wants to improve their zoo situation by using the story of India's zoo experience.

OUTCOMES

That group members have a different attitude toward improving dysfunctional zoos by discussing the Indian method.

PREPARATION

Read briefing material provided in briefing book.

Species Conservation Toolkit Initiative Working Group

Convenors: Bob Lacy and Jon Ballou

AIMS

- Describe this new initiative to develop and maintain advanced digital tools for conservation risk assessment and population management.
- Identify priorities for enhancements to the existing set of species conservation modeling tools.
- Identify new software tools that are needed to enable effective species conservation.
- Identify collaborators who will be able to contribute to the developing the science and providing the conceptual design for species conservation tools.
- Discuss what training and support will be needed to build capacity of the conservation community to use the tools effectively, and how this initiative can be expanded to include the needed capacity building.

BACKGROUND

A description of the initiative is provided as a separate document in the briefing materials. We expect to be able to announce the launch of this initiative at the CBSG and WAZA annual conferences in Delhi. Significant sponsorship has already been offered by CBSG, Chicago Zoological Society, Smithsonian Conservation Biology Institute, Auckland Zoo, St Louis Zoo, and a private individual. A few more sponsors are needed to make sure that the initiative can begin with the hiring of a conservation scientist/programmer. Many more sponsors are needed to ensure that the initiative can fill the needs not only to develop tools but also to provide necessary support and training in the use of the tools.

PROCESS and OUTCOMES

We will start this Working Group with an initial overview of the initiative. We will briefly describe the new features currently being added to some of the core software tools used by CBSG and others. We will then identify the priority areas of work that need to be tackled by this initiative. We will also identify who can contribute as collaborators by developing the science, designing new tools, and providing rigorous testing,

PREPARATION

Please read the description of this initiative, provided in the meeting Briefing Materials.
Then think about needs for (1) further enhancements to existing software tools, (2) better integration of analysis and planning methods across the spectrum of levels of intensity of management, and (3) new tools to assist with threat analysis and conservation management. For any needs that you identify, come to the meeting with specific examples of species conservation activities that require the new innovations to be successful.

IUCN Guidelines on the Placement of Confiscated Animals

Convenor: Neil Maddison

AIM

IUCN is re-drafting the current 'Guidelines on the Placement of Confiscated Animals'. The aim of the group is to comment on the latest draft (with a proposed amended title of 'Guidelines for the Management of Confiscated Species') and make suggestions for change, such that the Guidelines can be used as a PRACTICAL tool for managing authorities (MAs).

BACKGROUND

Whilst the current Guidelines appear to have been consulted widely, there appears nonetheless to be a tension between the management of confiscated species from a purely *conservation* perspective, and that from an *individual animal* (welfare) aspect, which can give rise to practical challenges. IUCN's remit is to conserve the world's biodiversity, but it acknowledges that individual attitudes, as well as cultural differences, will play a large part in day-to-day decision making for confiscated species and that these factors need to be taken into account if the Guidelines are to be used even more widely.

Ideally, agreement will be found whereby cultural differences can be accommodated such that threats to biodiversity, such as the release of species outside of their natural range, are minimized. It is envisaged that a 'decision-tree' approach (which was introduced in the current Guidelines to great effect) will be confirmed. In order to prove useful as a practical tool, it is intended for the decisions trees to be produced into wall-charts, in several languages, for daily use by the MAs.

PROCESS

The group will review and make recommendations for amendment of draft text, and make recommendations on changes (if any) to the decision tree analysis, using the group attendees' knowledge and experience of working in different cultures around the world. The process will be to first of all review the decision tree, then recommend amendments to the text of the Guidelines.

OUTCOMES

Recommendations of changes to the latest draft text for the IUCN Guidelines for the Management of Confiscated Species such that they can be utilized by the MAs as a day-to-day operating tool.

PREPARATION

Review of the latest draft Guidelines NB. The current draft will undergo a review on 24th October, so there will be limited opportunity beforehand for the group attendees to comment on – I will try and circulate the amended Guidelines over the weekend of 25/26 October. It would help to read the existing (2002) Guidelines (attached) in order to understand the reasons for the re-write of some sections.

IUCN Guidelines Working Group: Disease Risk Assessment

Convenor: Richard Jakob-Hoff

AIM

To become familiar with the new IUCN-OIE Wildlife Disease Risk Analysis (DRA) publications and how the DRA process can benefit conservation planning decision making.

BACKGROUND

Participants should be familiar with the first 9 pages of the Guidelines for Wildlife Disease Risk Analysis (see Preparation below)

PROCESS

Workshop participants will initially share some examples of disease threats involving wildlife they are aware of in their own country or geographic region. With this as a background they will then collaboratively apply the DRA process and some associated tools to a scenario involving disease risk to a threatened wildlife species. The session will culminate in a facilitated discussion of the potential for application of this process to the situations they are personally familiar with.

OUTCOMES

Participants will:

1. Be aware of the new IUCN-OIE DRA publications, their availability and the potential application of the DRA process to conservation planning and decision making.
2. Understand the structure of the DRA process including the purpose of each step.
3. Identify at least one situation of relevance to themselves in which this process could be of value.

PREPARATION

Think about and bring notes on conservation scenarios in their own region in which wildlife health is at risk (infectious and non-infectious causes) or where disease in wildlife is a threat to the health of domestic animals or people. As above, read the DRA Guidelines (at least pp 1-9): http://www.cbsg.org/sites/cbsg.org/files/documents/IUCN%20Wildlife%20DRA%20Guidelines%20PUBLISHED%202014.pdf

Application of the New IUCN Guidelines for *Ex Situ* Management and for Reintroductions and Other Conservation Translocations

Convenors: Kathy Traylor-Holzer and Kristin Leus

AIM

For participants to become familiar with the new IUCN guidelines on *ex situ* management and on reintroduction/conservation translocations, and on how these guidelines might be applied as part of an integrated species conservation planning process.

BACKGROUND

Recently two complementary sets of IUCN guidelines have undergone major revision. In 2013 the IUCN SSC *Guidelines for Reintroductions and Other Conservation Translocations* were published. The newly revised IUCN SSC *Guidelines on the Use of Ex Situ Management for Species Conservation* were recently

approved by the SSC and will be published soon. These guidelines outline a decision-making process that recommends factors to be considered before making a decision to implement these forms of population management for conservation purposes.

PROCESS
An overview of these two guidelines (scope, process, etc.) will be presented along with examples of how they have already been applied in several CBSG species conservation planning workshops. Group members will be encouraged to discuss how to disseminate and encourage implementation of these guidelines, especially in the context of One Plan approach integration of *in situ* and *ex situ* conservation activities.

OUTCOMES
Participants will have a good understanding of the recommendations in both sets of guidelines and how they might incorporate them into further conservation planning activities, both *in situ* and *ex situ*.

PREPARATION
Group participants would benefit from reviewing at least the executive summary and figures in the reintroduction guidelines, and the five-step process and figure in the *ex situ* management guidelines. They are encouraged to think about examples for possible application of these guidelines in current or upcoming conservation planning activities.

The Asian Species Action Partnership: involving zoos and aquaria in averting the extinction of Southeast Asia's Critically Endangered non-marine vertebrate species

Convenors: Madhu Rao and Bill Robichaud

AIM
Vertebrates in South-east Asia are among the most critically endangered in the world. The *Asian Species Action Partnership*, an IUCN SSC initiative, is a consortium of institutions committed to saving the (ASEAN + E. Timor) region's threatened vertebrates on the brink of extinction. The aim of the working group is to identify concrete actions for the engagement of zoos and aquaria in the conservation of these species.

BACKGROUND
Across the globe, vertebrate extinction risks are highest in South-east Asia. This region also has among the world's fastest recent habitat-loss rates within a context of rapid economic growth. An explosion in the trade demand, and thus harvest rates for wild species for luxury food, medicines, tonics, horns and other trophy parts has resulted in the near-extinction of globally significant biodiversity with implications for ecosystem services and dependent human communities in this rapidly developing part of the world.

The protected area systems are neither effectively managed nor sufficient to protect biodiversity and are under serious threat due to large-scale deforestation. Consequently, many South-east Asian species will become extinct in the near future if current trends continue.

Acknowledging the need for urgent action, 14 institutions have joined forces in a call to emergency action to address the crisis. By mobilizing support where it is urgently needed, drawing on the synergistic strengths of the participating institutions, there is need to implement urgent actions that include a combination of *in situ* and *ex situ* measures to prevent the extinction of Critically Endangered[1] vertebrate species in South east Asia.

PROCESS
The proposed structure is as follows:

Part I. 10-minute presentations

- EAZA support for ASAP species: building on an effective working model (Speaker, tbc=to be confirmed)
- Developing effective strategies using science-based tools for averting species extinctions: a role for CBSG (Carolyn Lees, CBSG) (confirmed)
- The status of Sumatran Rhino conservation. (Susie Ellis, IRF) (tbc)
- Saving the Saola through *in situ*, *ex situ* collaboration (Bill Robichaud, Saola Working Group) (confirmed)
- The Javan Songbird crisis in Indonesia: a critical role for zoos (tbc)

Part II. Discussions (by taxon/topic sub-group) on potential needs and collaborations between ASAP and the zoo/aquarium community
Broadly, the topics could be the following:

- Priority IUCN SSC- Specialist Group needs for progress on ASAP species
- ASAP species in collections: which ASAP species are currently in zoos and aquaria?
- ASAP-species/taxon-specific collaborations with zoos and aquaria
- Which ASAP species are suited for zoo/aquaria campaigns? (identifying attributes)
- Conservation genetics needs for ASAP species

Part III. Consensus: Key actions and zoo/aquarium linkages for ASAP species moving forward

OUTCOMES

- A list of potential collaborations (at varying scales) for ASAP species with the zoo and aquarium community
- A list of concrete actions (also at varying scales) moving forward, linked to responsible agency/individuals and timeline.

PREPARATION

- Basic knowledge of the ASAP initiative and the list of ASAP species (see briefing material)
- Knowledge of IUCN CR species in their institution's collections
- Knowledge of IUCN CR species in the current regional / global management plans, e.g. RCPs, GSMPs etc.

[1] Critically Endangered (CR) as per the IUCN Red List

The Way Forward for Collaborative Conservation Breeding Programmes in India

Convenor: PC Tyagi

Introduction

The Central Zoo Authority was created in the year 1992 through a statutory amendment of the Wildlife (Protection) (Amendment 1991) Act, 1972 to oversee the functioning of the zoos in the country and to enforce minimum standards and norms for upkeep and health care of animals in Indian zoos.

The National Zoo Policy, 1998 and the National Wildlife Action Plan (2002-2016) advocates that zoos' role is to complement and strengthen the national effort in conservation of the rich biodiversity of the country, particularly the wild fauna, and that zoos should initiate *ex situ* breeding of endangered species of wild fauna and their rehabilitation in the wild as per the IUCN guidelines for re-introduction.

The Central Zoo Authority, in consonance with the policy mandate, formed a group of experts to prepare a strategy for conservation breeding of endangered species in Indian Zoos. The group identified 35 mammals, birds, and reptiles for their probable captive breeding in identified zoos. The Chief Wildlife Warden of the states who were selected as coordinators for the endangered species found in their region were unable to achieve adequate progress due to several impediments. The main drawback was lack of appropriate founders, the setting up of off-exhibit enclosure for the species, and availability of technical manpower dedicated for the programme.

The Central Zoo Authority again constituted an expert group on conservation breeding and after several deliberations, a concept paper was prepared in July 2007. The expert group approved a list of 26 endangered species prioritized based on scientific criteria for initiating the conservation breeding programme. A further two workshops were conducted in 2013 with active collaboration between Captive Breeding & Zoo Management Cell of Wildlife Institute of India, Dehradun and Laboratory for Conservation of Endangered Species, Hyderabad under the guidance and support of Central Zoo Authority. These workshops were held to formulate a conservation breeding and species recovery plan for the endangered species based on the existing information and knowledge about the ecology, biology and behavioral characteristics of the species. The draft plan needs further review and improvement for implementation.

At the CBSG Annual Meeting, a working group discussion is being organized to address strategies, issues and the way forward for collaborative conservation breeding programmes in India.

AIM

1. To validate the prioritized list of endangered species for the conservation breeding programme
2. To indentify the constraints in the conservation breeding programme initiated with the support of the Central Zoo Authority.
3. To address emerging issues pertaining to the following:

    A. Acquisition of appropriate founders for the Conservation Breeding programme of endangered species and to assess the number of founders required.
    B. Housing requirement in the off-exhibit conservation breeding centre for the species.
    C. Technical support required for the implementation of the programme.

D. Linking *ex situ* management of endangered species with *in situ* conservation programmes.
E. Veterinary & health care of conservation breeding programme.
F. Genetic & Demographic management of species for the conservation breeding programmes.
G. Use of biotechnology for conservation breeding.
H. Protocol for re-introduction of captive bred population in the wild.

BACKGROUND
The list of books and research papers available will be compiled as Reference material. This will include the following:

1) ENVIS report on various endangered species compiled by Wildlife Institute of India, Dehradun
2) Final Report on the Research Project 'Housing & Enclosure Enrichment of select species in Indian Zoos", prepared by WII, Dehradun
3) Studbook data on endangered species compiled by WII, Dehradun
4) International Studbook of species
5) Conservation Breeding & Species Recovery draft plans.

PROCESS
Resource persons will make 2-3 short presentations to introduce the topic and initial discussion issues will be identified for further discussion in the forum. A list of critical issues has been already identified in the purpose and objectives given above, however based on collective wisdom of the group, issues would be prioritized for discussion.

OUTCOME
After deliberation on each issue, recommendations will be suggested by the group on which a presentation will be made and a brief note will be prepared for taking the conservation breeding programme forward.

Rolling out the Climate Reality Community Conservation Package

Convenor: Madelon Willemsen

BACKGROUND
There have been a number of strong internal campaigns related to climate change in zoos and aquaria. As a collective, we have an opportunity to talk to a large number of visitors to raise awareness and inspire action on this important world issue.

Continuing on the momentum of Zoos & Aquariums for 350, global marketing communications group WPP and GPY&R Sydney are working with Madelon Willemsen to deliver an innovative and impactful climate change campaign. This campaign will enable zoos and aquaria to lead a collective and consistent global call to action on climate change. The new global climate change campaign will be applicable to all zoos and aquariums and inspire the global visitors in taking action to ultimately reduce the effect of man-made climate change on animal species. It will go hand in hand with the already

existing great campaigns such as Pull the Plug, from the EAZA Pole to Pole campaign. The marketing strategies, creative work, and assets are designed to empower zoo and aquarium visitors in learning about the impact of climate change on animals and what action they can take.

The creative team is well known for the pro-bono work on global campaigns for climate change. GPY&R Sydney and a number of other WPP agencies are currently working with Al Gore and his team from the Climate Reality Project and the UN Secretary-General Ban Ki-moon, to put pressure on world leaders, through their citizens, to make meaningful commitments on carbon emission reduction. http://climaterealityproject.org/initiative/why-why-not

WPP has also done pro-bono work for Al Ain Zoo for the World Water Day - http://www.wpp.com/sustainabilityreports/2012/case-studies.html

During our presentation we will present the creative work and its application on the ground and in media for use by all WAZA members, CBSG representatives and other organizations signed up to Z&A for 350.

AIM

The aim of the working group is to receive participants' valuable feedback on the campaign, its assets and roll out strategy. We are also interested to receive feedback on the funding campaign to create and roll out the physical assets for use.

PROCESS

With the presentation that was introduced earlier in the day in mind we will:

1. Present a brief recap on the presentation and a presentation on the assets
2. Answer general questions about the campaign
3. Do a Gap analysis: your opinion and feedback on gaps in the creative work and assets.
4. Discuss the roll out and marketing strategies: discussion of barriers and opportunities
5. Present a funding proposal for feedback and ideas on funding opportunities to roll out this campaign across the global zoos and aquaria.

OUTCOMES

Participants' input and feedback will be incorporated into the campaign before being launched at the WAZA conference a couple of days later. The discussion outcomes will be key to ensure the campaign can be rolled out across the global zoos and will help firm up the proposal for an acceptable funding strategy.

Follow the creative team whilst developing this campaign in the months before the New Delhi meeting: http://www.cbsg.org/blog/blog-category/climate-reality-community-conservation.

Conservation Genetics Specialist Group Working Group

The Conservation Genetics SG will act as a genetics focal point within the SSC, providing advice on policy and management not only to SGs lacking expertise but also to geneticists working within larger SGs who may need access to policy information and advice on the latest techniques and analytical approaches available and their applicability to the group they are studying. This new SG is Co-chaired by Michael Bruford of Cardiff University, UK and Gernot Segelbacher of University Freiburg, Germany.

Because we anticipate that several CBSG members will also become members of CGSG (Bob Lacy has been invited to join the group's Senior Advisory board), and the groups will provide assistance to each other and collaborate on joint initiatives, it will be valuable for the CBSG community to provide input at this early stage of development of this Specialist Group. This working group is an opportunity to discuss what this input might consist of and to consider areas of potential synergy between the two Specialist Groups. It will be held if there is sufficient interest among Annual Meeting participants.

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Section 3
Working Group Briefing Materials

Dysfunctional Zoos: Learning from India's Experience

Working Group Briefing Materials

2014 CBSG Annual Meeting
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Dysfunctional Zoos: Learning from India's Experience

Convenor: Sally Walker

AIM

The aim of this working group is to work towards a range of very specific actions that would lead to improvements or closure of substandard zoos.

BACKGROUND

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PROCESS

The group, using the Indian experience as a starting point, can discuss:

1. How other countries in a similar situation might utilize some of the actions taken by India to begin making improvements in their zoo culture.
2. How one person or a group of people might approach a government that wants to improve their zoo situation by using the story of India's zoo experience.

OUTCOMES

That group members have a different attitude toward improving dysfunctional zoos by discussing the Indian method.

PREPARATION

Read briefing material provided below.

Assisting Zoos in Animal Welfare Working Group Report

Participants

Session One: Kristin Leus, Kathy Traylor-Holzer, Phil McGowan, Dave Morgan, Dan Wharton, Gordon McGregor-Reid, Gloria Svampa, Chris West, Bob Cook, Sally Walker

Session Two: Dave Morgan, Andrea Fidgett, Jackie Ogden , Bryan Carroll, Georgina Groves, Lydia Kolter, Clifford Nxomani, Theo Pagel, Saman Semanayake, Sally Walker

This Working Group met in two sessions. The first was during the CBSG Steering Committee Meeting, and the second during the Annual Meeting. The reports from these groups are presented sequentally below.

Session One

We began by clarifying whether we were talking about assisting all zoos or just those involved in conservation activities. It could be 'dangerous' to be perceived as supporting the entire spectrum – maybe CBSG should be involved with only some zoos and not others. Many thought that it is difficult to delineate between those types of zoos – it is a continuum – and difficult to disentangle these issues. There is an implication that if you improve welfare, you then also improve the ability for conservation activities, and therefore it is appropriate to involve all zoos. The welfare of animals in regions holding native threatened species can impact the conservation potential of other regional programs holding those species, and so can have conservation impacts even if that individual zoo is not engaged in conservation activities. It also may be that the approach will not be to zoos on an individual basis, but handled at the zoo association level. It was brought up that this issue goes beyond animals in zoos (e.g., dolphin drives, animal handling by field biologists).

We agree that this is an issue that needs to be addressed – and is being addressed to some extent within WAZA, regional zoo associations, and by animal welfare organizations. The question here is – should CBSG be involved in assisting zoos with improving the welfare of its animals?

Points Favoring CBSG Involvement/Potential Roles for CBSG:

- If welfare compromises conservation activities, then CBSG involvement is appropriate.
- CBSG has strengths (facilitation skills, conflict resolution skills, cultural sensitivity, more neutral position) in its approach that make it valuable to facilitate discussions between zoo associations and other stakeholders to facilitate progress, standards development, etc.
- It was acknowledged that WAZA tends to be reactive vs proactive, although this is changing, and that it is difficult for WAZA to deal with this (tried before) in its current structure (regional zoo associations are probably better placed to deal with this issue).
- Potential role for CBSG might be to jumpstart effort that WAZA (and regional zoo associations) then take up; both CBSG and WAZA can take an interest and contribute.
- Zoos need information, motivation, inspiration, and to tie welfare together with other aspects of *ex situ* management; CBSG is well suited to help with this.
- Potential role for CBSG is to help stakeholders define what we really mean by welfare (e.g., "5 Freedoms" were developed for domestic animals and are not quite appropriate for welfare in zoos); CBSG better equipped to help with philosophy, etc. than others.
- CBSG can bring scientific approach to welfare definition
- CBSG has members who are knowledgeable about zoo and wildlife legislation as well as standards for welfare and conservation, some of them with legal qualification. CBSG members can also provide advice and even manpower for qualified enforcement of legislation, which is a necessity for implementation of legislation appropriately.
- CBSG can help zoos in identifying how they can appropriately contribute to conservation.

Points Against CBSG Involvement

- Welfare is a big focus and priority for some zoo associations – best done by regional zoo associations (BUT this is not the case in all world regions).
- If CBSG takes this on, it could possibly come with the cost of reducing our efforts in other areas; we need

to figure out how CBSG can best use its strengths to help others take this on without developing a big task for CBSG (need specific roles for CBSG).
- Some big welfare organizations could help, but not all are open-minded.

There was a brief discussion regarding if the IUCN currently has a statement on welfare of wild animals. Such a position statement could be quite valuable.

Session One Conclusions

1. Yes, there is a need to address animal welfare concerns (for animals in zoos and field biologists handling animals in field projects).
2. CBSG does have a role to play—to provide high level strategic guidance; specifically:
    - Feeding into WAZA, regional zoo associations, IUCN (e.g., position statement on welfare of wild animals)
    - Help define welfare in a conservation context (science based) – CBSG can be the medium to lead to welfare standards (help bring WAZA, regional zoo associations, welfare organizations together, and then hand off to them) e.g., how CBSG provided the platform for development of work on climate change, AArk, 'disfunctional zoos' project
    - Help to define links between welfare and conservation (animal welfare in the continuum of intensively managed populations, breaking down *ex situ – in situ* barriers); 'wildlife welfare' is a new and handy term

Action Items

- CBSG office should contact the IUCN re: the need for/value of a position statement on welfare – if there is agreement, then possibly convene a working group.
- There is a working group scheduled during this CBSG annual meeting to take this discussion further
- Chris West (as chair) will take the discussions from the CBSG working group to WAZA's Ethics and Welfare Committee to work in collaboration with regional zoo associations

During the plenary discussion, it was noted that there are two ongoing IUCN statements/projects that may be relevant; we need to investigate to see if they relate to/include welfare: statement on wildlife research and the statement on ethics of conservation (ethical obligations to wildlife).

Session Two

Reviewed results from Day One, and acknowledged that this issue is receiving recent attention, including two journals that have had recent issues devoted to conservation animal welfare, including Zoo Biology and Animal Welfare Journal, UFAW, UK, and a recent workshop on "Compassionate Conservation" by ZooCheck at Oxford with Wildcru. It is not our focus to develop welfare standards. We focused on animal welfare rather than ethics/rights

Background Thoughts

Conservation is often considered antithetical to animal welfare; some field conservationists may not consider animal welfare when handling animals. Animal welfare community historically has used "Five Freedoms" to describe welfare; these are fairly old, and also less relevant to zoo animals - more for domestic or companion or livestock animals.

Five Freedoms of Animal Welfare

- Freedom from thirst and hunger
- Pain injury and Disease
- Fear and distress
- Discomfort
- To express normal behavior

It is imperative to have a scientific measurement of welfare. Agreed there are many challenges of defining welfare, and of measuring it.

There is a good bit of work on defining and measuring animal welfare going on by some of the different regional associations, but not all. (For example, there is a different version of five freedoms that better applies to zoo animals). In some cases and some areas, zoo designers may be designing for visitors rather than animals, and not considering the biology of the animals, thus removing options for the animals and leading to stress/poor welfare.

Although we didn't define it, there was general agreement on some key elements:

- What are the biological aspects?
- Focus on natural behavior - including some level of stress etc
- Opportunity to express most normal behaviors
- Animals must continually make decisions, must be optimizing their situations
- From a conservation perspective, minimizing our impact on animals

Acknowledged that there are also significant cultural differences regarding welfare (e.g., euthanizing feral cats is highly controversial in some areas, not in others)

Acknowledged the differences in the sanctuary approach vs. zoo approach. What are the implications of not breeding animals for the long-term, in terms of welfare?

Is this related to public engagement/education? Often people don't understand what natural state of animal is. How do we in zoo/animal settings educate people about welfare issues?

Conservation welfare continuum

Is the purpose to contextualize welfare as it relates to conservation? As it relates to zoos and aquariums? CBSG doesn't specifically deal with zoos, but how it applies to conservation? The group recognized that the application of welfare constructs in zoo environments and in field are very different.

Conservation Welfare Continuum

Extensively Managed	Intensively Managed
(Less/no responsibility for welfare)	(More responsibility for welfare)
Focus on population	Focus on individual

Focus on welfare diminishes as animals are less managed. Focus: Where conservation and welfare intersect

This led us to discuss whether there should be a statement of animal welfare as it applies to conservation. Possible scope: zoo animals, handling of animals in field, reintroduction, culling, where conservation and welfare intersect.

Action Points in Priority Order

- Define why CBSG should be involved - what our niche is (e.g., our role as a science-based organization)
- Engage with conservation NGOs and animal welfare community to understand what work is going on and where the gaps are.
- Define contexts where welfare and conservation really intersect - where the impact of welfare in conservation lies (reintroduction, culling, moderate management-mountain gorillas receiving vet care)
- IUCN statement on conservation welfare
- Address cultural differences in welfare - science, regulatory/legal and society/public opinion

CITES Issues

- educate the public (should the public education working group work with this group?)
- address conflicts between welfare and conservation (black footed ferret and live prey items)
- define continuum between "extensively managed/wild/less responsibility" and "intensively managed/zoos/ complete responsibility for welfare"
- consider human/wildlife conflict and how that relates to conservation welfare
- clarify our targets - are we assisting all zoos, those actively working on conservation?

The Ashoka Tablet -- India's ancient Animal Welfare & Animal Veterinary Legislation

Recently, while on a tour of Junagadh arranged by the Forest Department of Gujarat following the CBSG RSG meeting and SAZARC, a group of us, zoo people from different countries had an opportunity to visit the boulder at the foot of Mount Girnar which displays the actual Inscription of Asoka Rudradaman and Skanda gupta. This monument is often referred as the Ashoka stone or Ashoka Tablet and is historical evidence of the great ruler's compassion as well as power, for the edicts have had immeasurable impact on the moral and ethical mores of the region.

The literature describing the stone refers to it as one of three scripts in the same place over 7centuries from 3rd to 5th century A.D, e.g. Asoka's 14 edicts (273 BC), Mahaksatrapa Rudradaman (150 AD) and Gupta King Skandagupta (456-7 AD). Ashoka's edits are written in Brahmi alphabet which evolved into the Devanagari script, the language resembling both Sanskrit and Ceylonese Buddhist. The Asoka edicts are written on the NE face of the boulder. They are written in the Brahmi alphabet which gave rise to the Devanagari script. Their language is a form of prakrit closely allied to Sanskrit and the pali of the Ceylonese Buddhist books, but not identical with either. It is said that the carving is not of the best quality and difficult to read but it has been translated. The matter below contains only the edicts and parts thereof dealing with animal welfare.

It was very inspiring to take a group of zoo managers to this spot, although the significance was not completely clear to all. This is, however, a part of a pilgrimage that every person who works with animals should make and give homage to the ancient ruler who established a tradition of animal welfare in the subcontinented.

(I Edict) This edict on morality has been caused to be written by King Devanampriya Priyadarsin. Here **no living being should be killed and sacrificed.** And no festival meeting should be held. For King Devanampriya Priyadarsin sees much evil in festival meetings. But there are also some festival meetings which are considered meritorious by King Devanampriya Priyadarsin. **Formerly in the kitchen of King Devanampriya Priyadarsin many hundred thousands of animals were killed daily for the sake of curry. But now, when this rescript on morality is written, only three animals are being killed (daily) for the sake of curry, (viz.) two peacock (and) one deer, (but) even this deer not regularly. Even these three animals shall not be killed in future.**

(II Edict) Everywhere in the dominions of king Devanampriya Priyadarsin, ... two (kinds of) medical treatment were established by king Devanampriya Priyadarsin, (viz.), **medical treatment for men and medical treatment for cattle.**

And wherever there were no herbs that are beneficial to men and beneficial to cattle, everywhere they were caused to be imported and planted. Wherever there were no roots and fruits, everywhere they were caused to be imported and to be planted. **On the roads wells were caused to be dug, and trees were caused to be planted for the use of cattle and men.**

(III Edict) King Devanampriya Priyadarsin speaks thus:- ... Meritorious is obedience to mother and father. Liberality to friends, acquaintances and relatives, to Brahmauns and Bramanas is meritorious. **Abstention from killing animals is meritorious.** ...

(IV Edict) In times past for, many hundreds of years, there had even been promoted the killing of animals and the hurting of living beings, discourtesy to relatives, ... there are now promoted, through the instruction in morality ..., **abstention from killing animals, abstention from hurting living beings,** etc. ...

Related by Sally Walker, Editor Emeritus

SAZARC participants (partially in frame) at the Ashoka Tablet in old Junagadh, Gujarat.

Linking Wildlife Conservation and Wildlife Welfare: Educator Training Workshop Report

B.A. Daniel[1], R. Marimuthu[2] and S. Walker[3]

Universities Federation for Animal Welfare (UFAW) based in Gt. Britain, works to promote and develop improvements in animal welfare with scientific research and creating awareness globally. UFAW takes a practical approach knowing that certain types of research are necessary and will be carried out despite any amount of protest. So UFAW devises research protocols for urgently required medical and other scientific research which cause the least possible discomfort for laboratory animals. UFAW has many programmes; see <www.ufaw.org>.

Left : The "Old School" based in Great Britain is the Headquarters of the Universities Federation for Animal Welfare UFAW

Below: UFAW Council and S.Walker at their HQ having a discussion over high tea

Founded in 1929 with a tagline of Science in the service of animal welfare UFAW describes itself as an "internationally recognised, independent, scientific and education animal welfare charity concerned with improving knowledge and understanding of animals' needs in order to promote high standards of welfare for farm, companion, laboratory, captive wild animal and those with which we interact in the wild."

Zoo Outreach Organisation has a very long relationship with UFAW and has been much influenced by their combined philosophy of science and practical approach. With support from UFAW, ZOO organized a two-day educator training programme for selected educators involved in wildlife education and conservation in South India. The training programme was organized at Karunya University Campus during 18-19 February 2011 with the them of making conservation and welfare work together for the benefit of wildlife.

Background

From the time of its found in 1985, ZOO defined itself as both a conservation and animal welfare organisation, among other things, e.g., "*Zoo Outreach Organisation (ZOO) is a Positive, Constructive, Practical, Scientific, Sensible and Sensitive Conservation, Education, Research and Animal Welfare Society.*"

Over the years since inception ZOO has conducted education programmes in which animal welfare was included with conservation and some in which animal welfare specifically in zoos and in field biology was highlighted. ZOO has developed power point presentations, and educational packets to supplement the programmes. More recently an

Bhutan small mammal students and academics with Dr. Paul Racey, Chair, Bat Specialist group and Mike Jordan, Director, National Zoo Pretoria South Africa. Paul and Mike are shining examples of combining conservation and animal welfare in many training workshops in South Asia in collaboration with ZOO

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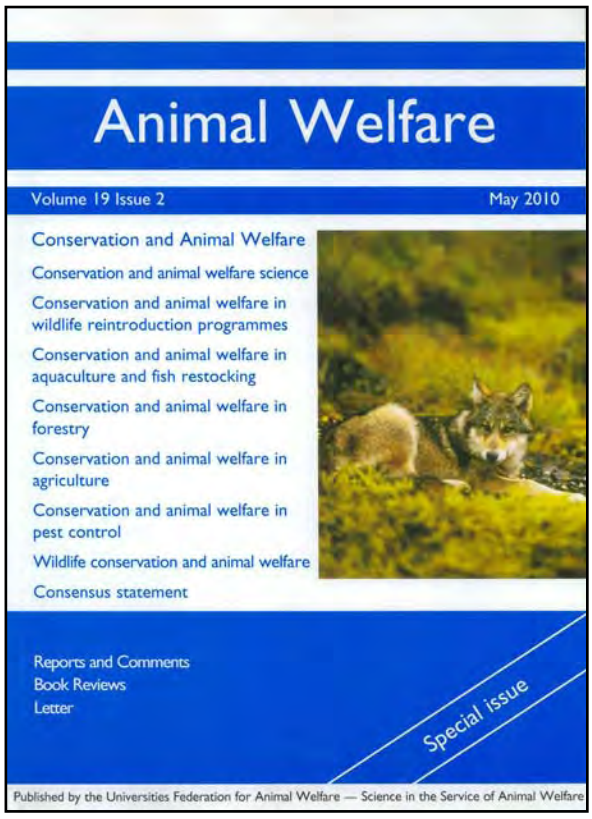
conservation and wildlife welfare and another two packets themed Good Zoo practice Zoo Animal Welfare. In its field techniques training for taxon networks, ZOO's choice of Resource Persons (such as Dr. Paul Racey, and Dr. Mike Jordan pictured on the previous page) have been invited to our workshop as Resource Person over and over again for their superb handling methods in field techniques training, emphasizing that field research doesn't have to be torture for animals.

Last year, UFAW devoted an entire issue of their Animal Welfare Journal (*Animal Welfare* 19: 2010) to the Proceedings of a Symposium conducted the same year and which addressed "conservation and welfare of animals" as a single topic. The conference highlighted communication and cooperation between the fields of conservation biology and animal welfare sciences as leading to better science and better treatment of animals in research. Also in September 2010 there was a workshop entitled "Compassionate Conservation" by ZooCheck with Wildcru at Oxford.

Previous to this in a CBSG Strategic Planning brainstorm in 2009, the third author suggested the topic of wildlife welfare as a theme that the IUCN SSC Conservation Breeding Specialist Group should consider as one of their mandated activities. It was accepted in the 2010 meeting of CBSG after a 2-day working group discussed the topic in detail. *(See Appendix 1 for Working group Report end of this article)*.



ZOO Educator Workshop Linking Conservation and Welfare

With this background ZOO planned a two-day educator programme in Conservation and Animal Welfare for conservationists interested in education as well as educators interested in conservation. The theme of the training was *'Linking Wildlife Conservation with Wildlife Welfare ... tools for making both work for the benefit of wildlife" with the following objectives:*

- to empower educators of all kinds to teach about wildlife conservation and wildlife welfare;
- to understand the link between wildlife conservation and wildlife welfare and issues related to it
- to demonstrate innovative teaching and learning techniques designed to understand the above concept. The first and second author also were trainers for the programme.

Participants were zoo volunteers, animal rescue team members, research/graduate students, education interpretation assistants, members from NGOs involved in wildlife education, police involved in wildlife rescue, school teachers and wildlife photographers *(Appendix 2: Participants list).*

The programme module involved a pre- workshop assessment to understand the attitude of the participants and their knowledge about the subject "conservation and animal welfare. Two assessments were conducted, i.e., attitude assessment and content survey. People's attitudes vary from individual to individual when they hear some news. A set of questions related to conservation and welfare was read out to the group to assess the attitude of group or individual based on their expression. In the second assessment they were asked to give their reply on a piece of paper. The assessments or "front end evaluation" is done both before and after the workshop, which help the organizers to measure acquisition of facts about conservation and welfare, comprehension, feelings and effect on behavior. As part of the programme, an activity to help the group to break social barriers and interact among each other without inhibition was carried out.

Unlike species or habitat related topics, Wildlife conservation vis a vis wildlife welfare are virtually untouched for discussion among educators. So an introduction on the history and definition of conservation biology and animal welfare was done. Animal welfare and wildlife conservation evolved as two distinct lines of thoughts that were developed due to concern over the impact of human beings on animals. According to D. Fraser in his presentation at the UFAW symposium: "Animal welfare ... focuses on how human actions affect individual animals and their quality of life." Some examples from animal welfare perspective are: cruelty and neglect of domestic or captive animals, misuse of animals in research, cruelty to captive wild animals used for entertainment, discomfort and pain caused by institutionalized forms of animal slaughter from industrialized food production, etc. The animal welfare movement began in response to the awareness of human cruelty to animals, in whatever form. Wildlife conservation is in response to the decline of wild taxa irregardless of cause. Some examples of negative impact of human beings from a perspective of wildlife conservation are: extermination of wild animals by hunting, etc., reduction of animal populations due to shrinkage of habitat as a result of development by human beings, etc. These changes were welcomed as part of economic necessity as per history, but as the population declines and near

extinctions became more noticeable, perceptions began to shift among people who view this destruction of nature with distress. In response, a conservation movement began to form to protect natural populations and ecological systems.

Daniel opens the programme Linking Wildlife Conservation with Wildlife Welfare.

Animal welfare and wildlife conservation movements emerged as independent disciplines of science and social concern at different times of human culture, however, both recruited scientific research to help understand problems of both domestic and wild animals and to identify solutions. In spite of this, communication between animal welfare scientists and conservation biologists has been sparse throughout the history, until more recently. This led to the development of two separate bodies of science, both rooted in social concern about animals but viewing animals and addressing concerns with different perspectives.

If analyzed, the negative impact on animals caused by all forms of human activity are implicated both in both wildlife conservation and animal welfare; animals suffer and die lingering deaths, ecological systems are disturbed, and in extreme cases taxa are threatened with extinction. As human population increases, impacts on animals will increase manifold. The results are of enormous significance for both wildlife conservation and animal welfare. To a degree the problems of animal conservation and animal welfare may well tend to merge.

Definitions of conservation biology, wildlife, wildlife conservation, animal welfare, wildlife welfare were explained with some examples which helped the group to understand the difference between the terminologies used during the programme. Definitions, some of which are *ad hoc,* and examples follows.

Conservation biology is a multi-disciplinary science to study the nature and status of Earth's biodiversity with the aim of protecting species, habitats, and ecosystems from decline and extinction. It also includes basic research for the conservation of specific taxa and habitat and inter-dependence of species and threshold effects in ecological process. Some types of field research for conservation has been criticised by animal welfare advocates, often the reason being that some field conservationists may not consider the welfare of the animal when handling or even observing.

Wildlife includes primarily animals that are not domesticated or captive, but there is a terminology which refers to "wildlife in the wild" and "wild animals in captivity" as well. Wildlife usually is considered to be those animals that live in the wild or away from human habitation, which is not always the case. We come across many wild animals in our day-to-day life. For example: frogs, house geckos, lizards, spiders, bats, vultures, etc. Zoo Outreach Organisation created an education programme some years ago called "Daily Life Wildlife" which covered these examples. This programme was created by the third author who had been mightily impressed during her first few days in India by the daughter of her host catching up a very large centipede on the end of an Indian broom and calmly depositing it outside the house. Even pest animals that are not wanted can be treated with respect and permitted to live … outside.

Wildlife conservation is a practice in which people attempt to protect wild animals and their habitats and prevent species decline and extinction.

Animal welfare: welfare is well-being, which means free from neglect, abuse, stress, distress and deprivation. Until the last couple of decades, when the animal welfare community has taken very dramatic interest in zoo and circus animals, *Animal welfare* science had been focused on captive animals most of which are normally domesticated. All told, animal welfare as a subject addresses concerns at the level of individuals and small groups of animals ; it is concerned about their health, quality of life and affective states, especially negative states such as pain and stress.

Wildlife welfare, a relatively new term, so far refers to the well-being of wild animals in both wild and captive states. Wildlife welfare is easily accepted regarding captive animals i.e., animals in the laboratory, circus, forest camps, zoos, etc. Wildlife welfare is intended to apply to all wildlife, free-living or free ranging non-domestic animals whether in the home, fields or forest . Some examples of human activities which can impact the well-being of free-living wild animals are: destruction of the habitat, introduction of diseases, reduction of food availability, hunting,trapping, poisoning, removing food source, use of hunting techniques that may result lingering death, disturbance from recreational activities, introduction of non-native animals, release of chemical pollutants leading to pathology, poisoning, release of hybrid captive born animals in the wild, building structures or using machines which can injure animals within the forest; human transportation systems that create major problems for animals such as fragmentation of habitat.

The Five Freedoms of Animal Welfare

The Five Freedoms of Animal Welfare developed by the Farm Animal Welfare Council, UK some years ago was introduced to participants. Although the Five Freedoms .. were developed for the welfare of farm animals, they have been adopted over the years for use in other animal caretaking venues such as rescue centres, laboratory animals, pets, etc. As per CBSG Working Group on Conservation and Welfare, the "5 Freedoms" were developed for domestic animals and are not appropriate for welfare in modern zoos, particularly for animals that are intended to be released in the wild in future. There is a view however that the Five Freedoms of Animal Welfare are better than bad welfare in zoos. Many zoos which are not in the mainstream of the modern zoos have improved their welfare considerably after being introduced to the Five Freedoms.

Five freedoms of animal welfare are:

(i) Freedom from thirst, hunger and malnutrition - by ready access to fresh water and a diet to maintain full health and vigor.

(ii) Freedom from discomfort - by providing a suitable environment including shelter and a comfortable resting area.

(iii) Freedom from pain, injury and disease - by prevention or rapid diagnosis and treatment.

(iv) Freedom to express most normal behavior - by providing sufficient space, proper facilities and company of the animal's own kind.

(v) Freedom from fear and distress - by ensuring conditions, which avoid mental suffering.

After introducing the background, wildlife conservation and wildlife welfare issues were discussed by way of activities inspired by active learning techniques.

To ensure understanding of conservation and welfare and to understand human impact on animals, a mapping activity was conducted. The history of former distribution of Asian elephant (100 years ago) was compared with the present distribution to understand human impact over time. Participants were asked to form three groups of equal size and given a set of 'past' maps in pieces. The task was to assemble all parts of the set to complete the past distribution range maps of Asian elephant. Subsequently a current distribution map of Asian elephant was given. After assembling both the maps, based on map information, they were asked to list country-wise distribution of Asian elephants. About 200 years ago the Asian elephants had a continuous distribution in 17 countries ranging from Iraq in the west up to Eastern China and from the foot hills of Himalayas in the North up to Indonesia in the south. However the present distribution is restricted to 13 countries with a patchy distribution with high number of elephants left only in India. Now the elephant populations have limited movements due to fragmentation of the habitat. The present distribution Asian elephant is facing both conservation and welfare issues.

Keeping this as an example the participants were asked to list examples of human impact on Asian elephants from conservation and welfare point of view. The group listed 16 issues (Table 1) of which 13 were common for both conservation and welfare issues.

Table 1: Adverse human impact on Asian elephants with implications for both conservation and welfare issues (as per the view of the participants)

Effect of people	Conservation issue	Welfare issue
Habitat loss	√	√
Habitat alteration	√	√
Fragmentation	√	√ (stress)
Electric lines/windmills	-	√
Poaching	√	-
Revenge killing	√	√
Inbreeding	√	√
Migration	√	√
Capturing	√	√
Road and train kills	-	√
Tourism	√	√
Diseases	√	√
Forest fire	√	√
Tree felling	√	√
Pollution (all kinds)	√	√
Global warming	√	√

Mapping activity demonstrates how human presence has harmed elephants.

Understanding conservation and welfare issues through drama: Welfare issues in animal conservation and research

Drama is a useful tool in education as it is enjoyable to do and also memorable. Drama illustrates concepts lucidly. The dramas we use for education are designed so that no special props or costumes are necessary, easily available props such as masks and natural sounds can be used. The participants designed two drama themes and performed mime dramas. The participants rehearsed during evening hours and performed the next day. Both the groups of participants designed dramas that highlighted human impact on animals with dramas on "dancing bear" and "human-elephant conflict".

Participants can experience the cruelty of a "Kalandar" tribesman capturing a bear cub and teaching it to dance using a painful ring and rope through its nose.

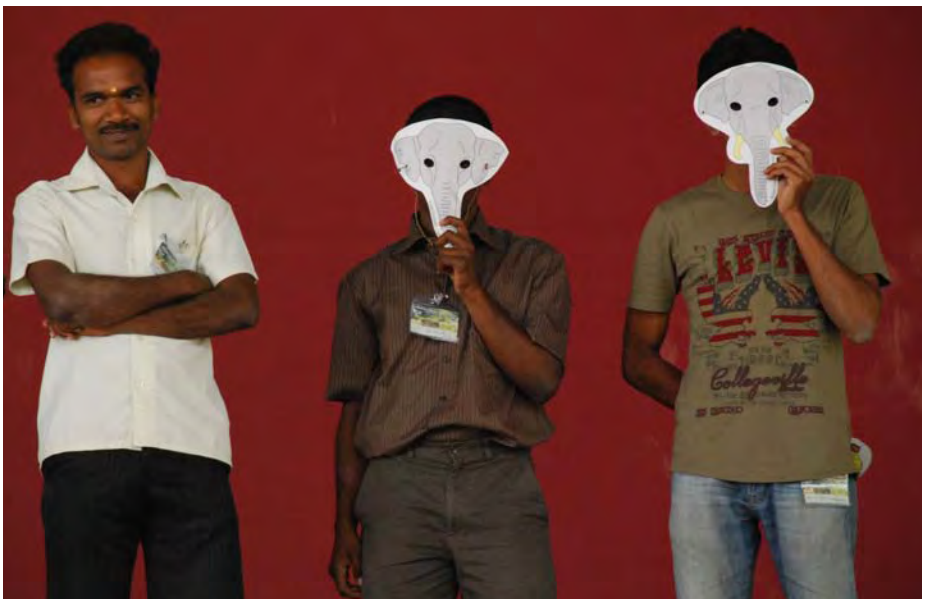
The conclusion of a highly successful human/elephant conflict drama

Drama 1: Two trappers shoot a mother bear with two cubs and take the cubs in a gunny bag to a village where a buyer waits. The cubs are frightened; they cry and moan. The buyer sells cubs to traveling performers who use dancing bears in their act and collect money. The itinerant performers feed them bread and milk and cubs become attached to them. The owners pierce their tender noses and put a ring and chain through the nostril. They also break the teeth so the young bears can't bite. They train the cubs to dance and perform other entertaining antics. A wildlife organization running a rescue centre searches for such bears and they find these cubs. They speak for a long time to the performers about their lives and offer them money and training to start a new career. The performers agree to hand over their bears for this chance and even sign a contract that they will not buy any more bears. The bears are taken to the bear rescue centre, given medical treatment, fed good food and given a forested area stocked with climbing trees, toys, water pools and other bears. The performers do well at their new business earning a better living than they did with the bears.

Drama 2: Villagers convert a forest area that is a migratory path of elephants into cultivable land. They fence the entire area that blocked migration of elephants. Elephants during the next season, visit that area as usual and found no way to cross the fenced area. While trying to get away some elephants are hit by a speeding train and die. The villagers also lose their crop and sustained injuries while driving the elephants away. Later, biologists conduct a study and teach the villagers about coexistence. They convince the people to allow elephants to use their original path. Villagers plant native plants with the help of forest department. After some time both man and elephant live without any trouble.

Each group took about 7 minutes to perform their drama. At the end of each drama conservation and welfare issues involved in both the situation were discussed.

Towards the end of day one, two other games were played to explain wildlife welfare by reduction of food availability and destruction of habitat of the animals. Before breaking up for the day, interested participants shared their conservation/research activities or institutional activities with others.



Very simple props can be extremely effect in an education drama

Participant presents a working group report

A very funny game called "bear dancing" also has a deep inner meaning. Kids of all ages love "bear dancing" but bears don't like it much !

Day 2:

The second day's programme started with a recap of day 1 activities and then performance of a mini drama. Drama helped participants to discuss detailed aspects of conservation and welfare without any barrier. After drama a debate was organized. The theme of the debate was 'Wildlife welfare and wildlife conservation: two sides of the same coin'. The participants formed two groups representing conservation researchers and welfare people. They selected two case studies: 1. Conservation and welfare aspects while translocation of big cats (leopard) for conservation purpose, 2. Rescue and handling of snakes. They listed out welfare and conservation issues in both the case studies and pointed out how they converge.

Understanding the link between human population growth and species endangerment – wildlife conservation and welfare

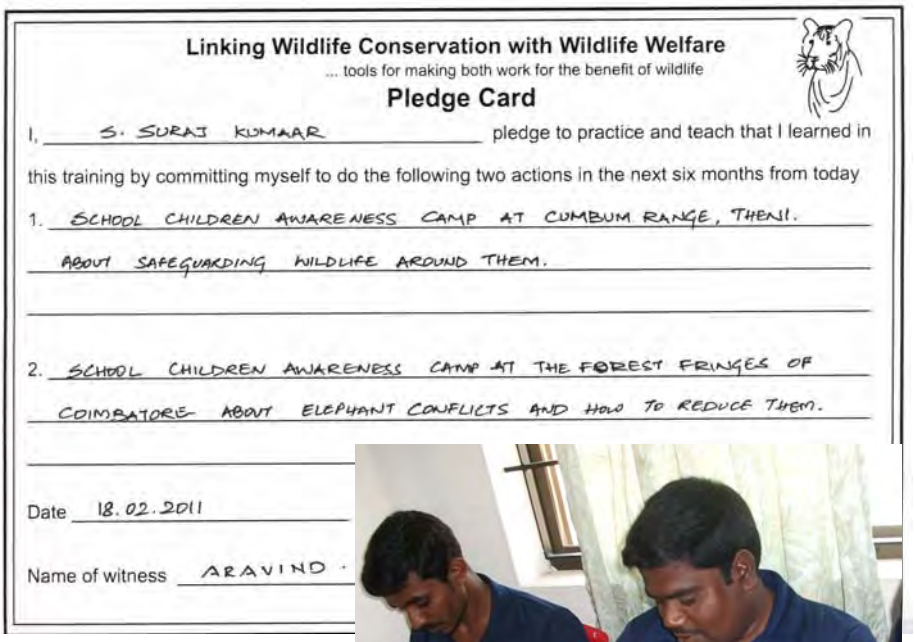
A game called "Big-squeeze" game dramatizes the critical link between human population and species endangerment. In the last 100 years, human population has increased tremendously resulting in competition for natural resources between human beings and wildlife. Tiger population status was taken as an example for playing the game. The object of the game is for individuals representing tigers and other wildlife species to avoid becoming threatened or extinct. Wild animals, in order to survive in the wild require three major resources: food, water and space. These major resources should be protected in order to protect wildlife. The game explains how an increase in human population since 1900 resulted in competition for natural resources that push the animal to the brink of extinction.

This game explains how human beings impact wildlife welfare by destruction of habitat, reduction of food availability for animals, hunting, and other impacts discussed earlier. The same impact lead to species decline which is a conservation as well as welfare issue.

ZOO is now developing a learning packet to assist educators in conveying the relationship between conservation and welfare to students. If you are interested to receive such material please send us your name and email and request.

Planning an education programme:
Apart from learning about conservation and welfare during the training, participants also learned about active learning tools. All the participants were inducted into ZOO's Educator Network *ZEN*, and can avail some help from ZOO to carry out education programmes in their respective localities. They must learn how to plan an education programme, since this methodology is new to many educators. As a member of ZOO's Educator Network, they are entitled to receive publications of ZOO's education materials. During this session they were taught how to use ZOOs education packets effectively and make best use of it. A full demonstration was given explaining the ways to use the education packets at different types of occasions by *rakhi*-tying, marching with placards and convincing people to promote wildlife conservation and welfare.

Personal commitments
ZOO request participants in all of our programmes to commit themselves to do any two simple actions within the next six month of the training. A special commitment card was developed for participants to write down their commitments and keep with them as reminders.



Linking Wildlife Conservation with Wildlife Welfare
... tools for making both work for the benefit of wildlife
Pledge Card

I, S. SURAJ KUMAAR pledge to practice and teach that I learned in this training by committing myself to do the following two actions in the next six months from today

1. SCHOOL CHILDREN AWARENESS CAMP AT CUMBUM RANGE, THENI. ABOUT SAFEGUARDING WILDLIFE AROUND THEM.

2. SCHOOL CHILDREN AWARENESS CAMP AT THE FOREST FRINGES OF COIMBATORE ABOUT ELEPHANT CONFLICTS AND HOW TO REDUCE THEM.

Date 18.02.2011

Name of witness ARAVIND

Post training assessment were conducted to determine the effectiveness of our teaching. Workshop evaluation was also done to get feedback about the programme which will help us to improve the content of the training *(Appendix 3: Comments about the workshop)*. Certificates were distributed for all participants.

Participants receiving certificates

A very big thanks to UFAW for their innovative and stimulating symposium and generous financial support.

Appendix 1: CBSG Working Group Report on CBSG getting involved in Welfare issues

Participants
Session One: Kristin Leus, Kathy Traylor-Holzer, Phil McGowan, Dave Morgan, Dan Wharton, Gordon McGregor-Reid, Gloria Svampa, Chris West, Bob Cook, Sally Walker
Session Two: Dave Morgan, Andrea Fidgett, Jackie Ogden , Bryan Carroll, Georgina Groves, Lydia Kolter, Clifford Nxomani, Theo Pagel, Saman Semanayake, Sally Walker

Session Two: Dave Morgan, Andrea Fidgett, Jackie Ogden , Bryan Carroll, Georgina Groves, Lydia Kolter, Clifford Nxomani, Theo Pagel, Saman Semanayake, Sally Walkr

This Working Group met in two sessions. The first was during the CBSG Steering Committee Meeting, and the second during the Annual Meeting. The reports from these groups are presented sequentially below.

We began by clarifying whether we were talking about assisting all zoos or just those involved in conservation activities. It could be 'dangerous' to be perceived as supporting the entire spectrum – maybe CBSG should be involved with only some zoos and not others. Many thought that it is difficult to delineate between those types of zoos – it is a continuum – and difficult to disentangle these issues. There is an implication that if you improve welfare, you then also improve the ability for conservation activities, and therefore it is appropriate to involve all zoos. The welfare of animals in regions holding native threatened species can impact the conservation potential of other regional programs holding those species, and so can have conservation impacts even if that individual zoo is not engaged in conservation activities. It also may be that the approach will not be to zoos on an individual basis, but handled at the zoo association level. It was brought up that this issue goes beyond animals in zoos (e.g., dolphin drives, animal handling by field biologists).

We agree that this is an issue that needs to be addressed – and is being addressed to some extent within WAZA, regional zoo associations, and by animal welfare organizations. The question here is – should CBSG be involved in assisting zoos with improving the welfare of its animals?

Points Favoring CBSG Involvement/Potential Roles for CBSG:
• If welfare compromises conservation activities, then CBSG involvement is appropriate.
• CBSG has strengths (facilitation skills, conflict resolution skills, cultural sensitivity, more neutral position) in its approach that make it valuable to facilitate discussions between zoo associations and other stakeholders to facilitate progress, standards development, etc.
• It was acknowledged that WAZA tends to be reactive vs proactive, although this is changing, and that it is difficult for WAZA to deal with this (tried before) in its current structure (regional zoo associations are probably better placed to deal with this issue).
• Potential role for CBSG might be to jumpstart effort that WAZA (and regional zoo associations) then take up; both CBSG and WAZA can take an interest and contribute.
• Zoos need information, motiva-tion, inspiration, and to tie welfare together with other aspects of *ex situ* management; CBSG is well suited to help with this.
• Potential role for CBSG is to help stakeholders define what we really mean by welfare (e.g., "5 Freedoms" were developed for domestic animals and are not quite appropriate for welfare in zoos); CBSG better equipped to help with philosophy, etc. than others.
• CBSG can bring scientific approach to welfare definition
• CBSG has members who are knowledgeable about zoo and wildlife legislation as well as standards for welfare and conservation, some of them with legal qualification. CBSG members can also provide advice and even manpower for qualified enforcement of legislation, which is a necessity for implementation of legislation appropriately.
• CBSG can help zoos in identifying how they can appropriately contribute to conservation.

Points Against CBSG Involvement
• Welfare is a big focus and priority for some zoo associations – best done by regional zoo associations (BUT this is not the case in all world regions).
• If CBSG takes this on, it could possibly come with the cost of reducing our efforts in other areas; we need to figure out how CBSG can best use its strengths to help others take this on without developing a big task for CBSG (need specific roles for CBSG).
• Some big welfare organizations could help, but not all are open-minded.

There was a brief discussion regarding if the IUCN currently has a statement on welfare of wild animals. Such a position statement could be quite valuable.

Session One Conclusions
1. Yes, there is a need to address animal welfare concerns (for animals in zoos and field biologists handling animals in field projects). 2. CBSG does have a role to play—to provide high level strategic guidance; specifically:

• Feeding into WAZA, regional zoo associations, IUCN (e.g., position statement on welfare of wild animals)
• Help define welfare in a conservation context (science based) – CBSG can be the medium to lead to welfare standards (help bring WAZA, regional zoo associations, welfare organizations together, and then hand off to them) e.g., how CBSG provided the platform for development of work on climate change, AArk, 'disfunctional zoos' project
• Help to define links between welfare and conservation (animal welfare in the continuum of intensively managed populations, breaking down *ex situ – in situ* barriers); 'wildlife welfare' is a new (to CBSG) and handy term

Action Items for Session I
CBSG office should contact the IUCN re: the need for/value of a position statement on welfare – if there is agreement, then possibly convene a working group. There is a working group scheduled during this CBSG annual meeting to take this discussion further Chris West (as chair) will take the discussions from the CBSG working group to WAZA's Ethics and Welfare Committee to work in collaboration with regional zoo associations
During the plenary discussion, it was noted that there are two ongoing IUCN statements/projects that may be relevant; we need to investigate to see if they relate to/ include welfare: statement on wildlife research and the statement on ethics of conservation (ethical obligations to wildlife).

Session Two
Reviewed results from Day One, and acknowledged that this issue is receiving recent attention, including two journals that have had recent issues devoted to conservation animal welfare, including Zoo Biology and Animal Welfare Journal, UFAW, UK, and a recent workshop on "Compassionate Conservation" by ZooCheck at Oxford with Wildcru. It is not our focus to develop welfare standards. We focused on animal welfare rather than ethics/rights

Background Thoughts
Conservation is often considered antithetical to animal welfare; some field conservationists may not consider animal welfare when handling animals. Animal welfare community historically has used "Five Freedoms" to describe welfare; these are fairly old, and also less relevant to zoo animals - more for domestic or companion or livestock animals.

Five Freedoms of Animal Welfare
• Freedom from thirst and hunger
• Pain injury and Disease
• Fear and distress
• Discomfort
• To express normal behavior

It is imperative to have a scientific measurement of welfare. Agreed there are many challenges of defining welfare, and of measuring it. There is a good bit of work on defining and measuring animal welfare going on by some of the different regional associations, but not all. (For example, there is a different version of five freedoms that better applies to zoo animals). In some cases and some areas, zoo designers may be designing for visitors rather than animals, and not considering the biology of the animals, thus removing options for the animals and leading to stress/poor welfare.Although we didn't define it, there was general agreement on some key elements:
• What are the biological aspects?
• Focus on natural behavior - including some level of stress
• Opportunity to express most normal behaviors
• Animals must continually make decisions, must be optimizing their situations
• From a conservation perspective, minimizing our impact on animals
Acknowledged that there are also significant cultural differences regarding welfare (e.g., euthanizing feral cats is highly controversial in some areas, not in others)

Acknowledged the differences in the sanctuary approach vs. zoo approach. What are the implications of not breeding animals for the long-term, in terms of welfare?

Is this related to public engagement/education? Often people don't understand what natural state of animal is. How do we in zoo/animal settings educate people about welfare issues?

Conservation welfare continuum
Is the purpose to contextualize welfare as it relates to conservation? As it relates to zoos and aquariums? CBSG doesn't specifically deal with zoos, but how it applies to conservation? The group recognized that the application of welfare constructs in zoo environments and in field are very different.

Conservation Welfare Continuum

Extensively Managed	Intensively Managed
(Less/no responsibility for welfare)	(More responsibility for welfare)
Focus on population	Focus on individual

Focus on welfare diminishes as animals are less managed.
Focus: Where conservation and welfare intersect

This led us to discuss whether there should be a statement of animal welfare as it applies to conservation. Possible scope: zoo animals, handling of animals in field, reintroduction, culling, where conservation and welfare intersect.

Action Points in Priority Order
• Define why CBSG should be involved - what our niche is (e.g., our role as a science-based organization)
• Engage with conservation NGOs and animal welfare community to understand what work is going on and where the gaps are.
• Define contexts where welfare and conservation really intersect - where the impact of welfare in conservation lies (reintroduction, culling, moderate management-mountain gorillas receiving vet care)
•IUCN statement on conservation welfare
• Address cultural differences in welfare - science, regulatory/legal and society/public opinion

CITES Issues
• educate the public (should the public education working group work with this group?)
• address conflicts between welfare and conservation (black footed ferret and live prey items)
• define continuum between "extensively managed/wild/less responsibility" and "intensively managed/zoos/ complete responsibility for welfare"
• consider human/wildlife conflict and how that relates to conservation welfare
• clarify our targets - are we assisting all zoos, those actively working on conservation?

From : CBSG News Vol 22 January 2011. Welfare Working Group. www.cbsg.org

Wildlife Conservation & Animal Welfare need one another …. "Conservation Welfare"

Sally Walker*

Conservation biology & animal welfare were once considered two separate disciplines, but in the last few years several symposia and publications have suggested more integration of these two topics. Some examples are:

Symposia / Publications

Organisation	Event	Publication(s)
Peter Wall Institute & Universities Federation for Animal Welfare	Interdisciplinary Workshop; Vancouver, 16-18, Nov. 07 http:// www.interaction. pwias.ubc.ca/	Sp. Issue Animal Welfare Journal, May 2010, UFAW, UK,
Chicago Zoological Society, Institute of Animal Welfare	2008, International Workshop zoo and animal welfare scientists	Sp. Issue Zoo Biology Journal, 28:501-506
WildCru, Oxford / Born Free Foundation, UK	Animal Welfare in Conservation Practice , 1-3 Sept 2010 Oxford, UK	"e-proceedings" on website all PPts in PDF, http:// compassionateconserva tion.org
AZA Welfare Committee	White paper approved	AZA, 2010
Zoo Outreach Organisation	Multiple education workshops over two decades in thousands of schools, zoos, ngo's, etc.	Educational packets, posters, booklets, Power-point presentations on the topic since about 1989. www.zooreach.org

Several papers delivered at the workshop held in Vancouver, Canada in 2007 were published by UFAW in the Animal Welfare Journal, May 2008. It was a special issue entitled "Conservation and Welfare" comparing and synthesizing the two fields. Fraser, in an overview article, commented that the output of the UFAW workshop "…showed that many research problems and practical interventions (of wildlife conservation) would benefit from involving animal welfare and recognizing animal welfare concerns." He also said "… for animal welfare scientists and advocates, the papers call for an expansion of concern to include the vast number of free-living animals whose welfare is adversely affected by human action. He stated that until relatively recently, animal welfare scientists had paid little attention to the welfare of free living wildlife"… yet routine forestry, agricultural, pest control measures gravely impact the welfare of wild animals.[1]

Also in 2008, the Chicago Zoological Society Center for the Science of Animal Welfare conducted an international workshop intended to bring zoo and animal welfare scientists together and to promote investigation and assessment of current zoo welfare research. The focus was how the understanding of wild animals could improve zoo animal welfare.[2] The papers from the workshop were published in Zoo Biology.

From 1-3 Sept 2010 WildCru, University of Oxford and Born Free Foundation organized a 2-day International Symposium entitled "Animal Welfare in Conservation Practice" to debate animal welfare issues in conservation, examine potential synergies, look for practical outcomes and promote dialogue in Oxford, UK. http://www.compassionateconservation.org

More recently, July 2011, the American Zoo Association's Welfare Committee brought out an excellent White Paper entitled "White tigers, lions, and king cheetahs: welfare and conservation implications of intentional breeding for the expression of rare recessive alleles."[4] The paper is striking because it unapologetically combines welfare and conservation in its title and throughout the document. This paper makes such a good case against intentional breeding for rare recessive alleles that it has been possible to use it to break through the mind-set of some Asian zoo personnel where the white tiger has been deified both for its godlike whiteness, its uniqueness and (perhaps more than anything) the "heavenly" price it brings on the market.

So there have been enough gatherings and publications about animal welfare and conservation to create a dialogue and extension of the utility of this concept. In October 2010 the Conservation Breeding Specialist Group entertained two sessions of a working group on the need for the welfare group in CBSG, and this will be followed by the creation of a Task Force on animal welfare under its auspices.

Education & training material

There is plenty of education and training material on conservation for youngsters as well as adults but much less welfare literature and precious little on this relatively new concept of "conservation welfare". Youngsters need to learn to be kind to animals from toddler to teen and beyond. They need to learn from actual reasons and facts and not just because "it's a nice thing to do." If they learn when they are young and if the reasons for protecting and not persecuting free ranging animals, as well as pets, it has a good chance of sticking to them as they grow into adulthood. One often hears that serial killers tortured animals when they were kids. That alone should justify a mighty effort to instill adequate respect for Life of any and all creatures.

At present the writer could turn up NO educational literature at all on conservation welfare except what has been brought out by Zoo Outreach Organization (Z.O.O). Z.O.O has been bringing out educational literature using the synthesis of conservation and animal welfare as a teaching and training tool to stimulates new thinking about both animal welfare and conservation, as well having the capacity to bring about changes human attitudes and behaviour.

Zoo Outreach Organization (ZOO) based in India was founded to help Indian and later South Asian zoos improve, including zoo staff and visitor attitudes and behaviour towards the captive wild animals. ZOO grew out of Friends of Mysore Zoo (FOZ) founded 1981. Some of the first teacher training, educational literature and educational signage the FOZ developed carried the seeds of conservation welfare. ZOO was the first to use the terms

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"wildlife welfare" and "conservation welfare" and to use them in a series of educational booklets, toys, packets and handouts. These have been supplied to hundreds of zoos and NGO's who wanted to educate their visitors and improve animals' conditions. Similar educational materials continue to be evolved, produced and distributed widely in South Asia. Some examples will be discussed further on in this paper.

Intersection of conservation and (animal) welfare
What are the ways that conservation and animal welfare intersect? Some quotes from the symposia, publications and education/training materials are helpful in establishing this.

From the UFAW Symposium published in Animal Welfare 2010, 19, ISSN 0962-7286.

In preparing captive living animals for life in the wild, concerns for welfare and conservation may collide. (B.Beck, 1995).

Since reintroduction programs involve moving animals from captive or wild environments and releasing them into novel environments, there are sure to be challenges to the welfare of the individuals involved.
RR Swaisgood, The Conservation-welfare nexus in reintroduction programs, 2010

Conservation biology and animal welfare science ... many areas of existing or potential overlap. Policies and practices targeting either conservation or animal welfare may not work unless they take account of both areas of concern.
D. Fraser, Toward a synthesis of conservation and animal welfare science, 2010

From the symposium of WildCru and Born Free, Compassionate Conservation Symposium 1-3 September 2010, Oxford

Animal welfare in conservation: working towards a common goal
Macdonald, et. al. makes a case for animal welfare in conservation in discussing ethics in conservation and describing "the great divide" as Welfare including the welfare of the individual and its right to live and Conservation as conservation of the population (many individuals) and their right to be left alone. Finding common ground will lead to a common goal. David Macdonald, Sandra Baker, Merryl Gelling & Lauren Harrington, September 2010.

Do the means justify the end? Welfare and the kangaroo harvest
The mission is to foster understanding amongst Australians about kangaroos in a sustainable landscape, through critically reviewing current kangaroo management practices and exploring non-lethal management methods that are consistent with ecology, animal welfare, human health and ethics. Dror Ben-Ami , 2010.

Dealing with interspecies conflicts in wildlife conservation, "What measures can be taken to minimize risks to welfare (in conservation)? The author refers the "Three Rs" or principles of humane use of animals in scientific procedures and suggests two of them for conservation interventions, e.g., Refinement – of protocols and methods in order to minimize adverse welfare consequences and Reduction – involving no more (nor fewer) animals than required in order to achieve the conservation objective James Kirkwood, 2010.

Animal Welfare in Zoo Education
Zoo education seems to have steered clear of animal welfare except in very uncreative, repetitious, brief and subtle ways. This is hard to understand because there are so many opportunities at the zoo for a child or adult to have fun messing with the animals and harming them, intentionally and/or unintentionally. Teasing animals, feeding, pretending to attack, shouting, throwing harmful items inside the enclosure or cage is rampant in many zoos. Signage alone is not sufficient to insure these practices stop; youngsters need to be guided before they will willingly give up such a treat as tormenting animals. Combining welfare and conservation can often create a rationale that reaches older youngsters. Even human–animal conflict can be very effectively addressed with conservation and welfare for both human and animal. Some examples follow. The Appendices contain the text of three documents and one document containing a list of topics covered.

"Daily Life Wildlife" is a concept meant to inspire kids to adopt kindness to the animals which hang around their home, school, roadside, ponds, etc., instead of tormenting them for entertainment. We don't think of what killing flies, torturing frogs, and lighting fires on cat's tails might be doing to kids in the long term. In some countries, even adults don't take it seriously, and the result is kids who grow up thinking that is "right behaviour". "Daily Life Wildlife" addresses all minor and some major cruelties perpetrated by so called innocent youngsters on animals we encounter on a daily basis. "Daily Life Wildlife" has been the most popular packet for the longest duration of any ZOO has developed in the last two decades. See Appendix I.

"Monkey Manners" confronts the issue of invasion of monkeys from destroyed forests and barren lands into villages, towns and cities, schools, hospitals, etc. … where human beings eat and or throw leftovers away. Monkeys quickly become accustomed to this life and morph into very bold and pugnacious creatures that cause enormous angst, as well as a range of injuries, etc. Human beings cause this monkey mischief … in countries where locking up garbage and trash is not practiced and rotting food and leftovers are left outside houses for dogs or flies to eat, and they attract monkeys. The Monkey Manners literature explains the mistakes made by human beings and also warns children not to fight the monkeys if they snatch food, or to run from the animals as that will incite the monkeys, and to take responsibility for the problem since the monkeys cannot be expected to do so. Learning how NOT to be attacked by a monkey, how NOT to attract them with food, etc. creates a vacuum in which monkeys hopefully find other forests where they may feed on wild fruits, bark, etc. Consult Appendix II in this paper.

"Human Elephant Conflict HEC → Human Elephant Coexistence HECx". Much like the Monkey Menace, human beings cause much of the injury and death from elephants themselves. The elephants have been squeezed out of their large range and also done out of their watering and grazing areas. People become enraged at the behaviour of the

elephant and forget the strength and fury of the elephant. Ultimately human beings, aided by forestry officials, prevail with the elephants getting the worst of it. Many elephants are maimed or killed! Many are killed trying to find water or food. Over all, it is both a conservation and animal welfare issue, despite the fact that human beings are also harmed. Elephant Etiquette explains what human beings should do and not do in cases of marauding elephants. See Appendix III.

Conservation Conscious v.s. Conservation Careless – This packet is a complicated one about zoos, differentiating between "conservation conscious" and "conservation careless" zoos. The packet is designed with the idea of teaching people in a wide range of ages to appreciate a zoo, what to do if the zoo is not good. A collection of a dozen large "cards" explains almost everything one should know about a zoo, in order to behave well in it, or to help it as a volunteer, to respect a good zoo, etc. Frequently Asked Questions (FAQs) about different aspects of zoos are frank and to the point and a card on how to really help a zoo that wants to improve. Only the FAQs are included in the Appendix due to the size of the packet. See Appendix IV.

ZOO also has brought out a wide range educational material on sloth bears who are used as entertainers by their owners and live horrible lives tramping the hot roads and streets of city and country in India including a teaching manual.

Welfare is no less than the "well-being" of wild animals. The welfare/well-being of wild animals either captive or wild is essential to conservation of wildlife. This is so simple and obvious that it literally goes without saying. Wildlife conservation, however, requires a different kind of welfare than domestic animals – it requires "conservation welfare" which involves a heavy measure of "leave them alone", as well as certain necessary welfare actions. Good zoos and conservation biologists or field practitioners routinely use welfare practices in their keeping, breeding (or not breeding), catching, handling, etc. Ironically "welfare" is still not wholly welcome by all people in the context of conservation, and "conservation" is not welcome to all in the context of animal welfare. This anomaly can be mitigated if a clear distinction between Conservation Welfare and Animal Welfare is established.

Good practice
- Good practice of welfare both in the field and captivity is desirable for ethical and humane reasons.
- Good practice is necessary for wildlife conservation which requires physically and psychologically fit animals.
- In the final analysis, what's good for the health and well-being of either captive or wild animals seems good also for their conservation.

Conservation … saving species, populations, and individuals … is welfare plus benefits!

Appendix I
Wildlife Welfare in Daily Life (illustrations removed)

Produced and published by Zoo Outreach Organization (ZOO) Sponsored by Chester Zoo and UFAW, Text by Sally Walker, Education booklet No#14/2006

What is "Wildlife" ?
Definition : "Wildlife" refers to (wild) animals which are not domesticated (in case of plants, not cultivated)
- When we think of "wildlife", we think of animals that live in the wild or away from human habitation.
- But any free-ranging non-domesticated animal is wildlife (except feral formerly domestic animals).
- Examples are tigers, lions, eagles, butterflies, fish, rodents, bats, lizards, snakes, etc., that one sees in the forest.

What is Captive Wildlife ?
- Animals kept in zoos are wildlife, even though they live in captivity.
- Temple animals, although domesticated perhaps, are still wildlife -- elephants, monkeys, bats!
- What about frogs, insects, house geckos, lizards, spiders, snakes, crows, etc. that we see around our house and compound. There are also wildlife. We call it "***daily life wildlife".***

What is "Daily life wildlife"?
- "Daily life wildlife" is a term created by Zoo Outreach Organisation to draw attention to the animals that live close to us that we all take for granted.
- We consider these animals so common that we treat them like objects, as if they didn't have feelings.
- Youngsters may get a habit of mistreating animals by being careless with the feelings and lives of these animals they encounter on a daily basis.

What is "animal welfare"? …. Welfare means **"well-being".**
Wildlife welfare therefore means the well-being of wild animals *both* in wild and in zoo.

Well-being means
- to be free from neglect, abuse, stress, distress and deprivation.
- to have basic needs satisfied, & even to have comfort, happiness, contentment, and general good . . .

Human Welfare
- Humans give a lot of importance to their own welfare.
- For our own welfare, we often harm other life forms unknowingly and unnecessarily.
- Captive wild animals i.e., animals in the laboratory, zoos, pets often have a hard time when human beings are insensitive.
- Free-living animals also deserve kind treatment to the extent possible.

Why learn about wildlife welfare?
- Wildlife is important to our survival, even daily life wildlife.
- You kids are tomorrow's adults.
- Good values will not let you down. Practicing good values makes us feel good.
- Learning to be kind to all animals builds good values and prevents other bad habits.

Human activities affect welfare of wild animals in forests:
- Destruction of habitat

- Introduction of diseases through domestic animals
- Hunting / trapping / poisoning
- Disturbance caused by tourism (firing crackers in forest)
- Introduction of inappropriate animals
- Release of chemical pollutants

Cruelty in Daily life
- Killing household insects that could be scooped up and set free.
- Killing or injuring animals that come in or near the house but are harmless (such as frogs, garden lizards, insects, birds, bats, shrews, etc.).
- Torturing animals just for entertainment
- Such animals are not just harmless … most of them are helpful to us !
- Some animals like mosquitos are pests due to their impact on human health, but they are few compared to the number of useful animals.

Daily life mistakes!
- Many of the animals people kill or shoo away play a beneficial role in our lives ...
- Frogs, snakes, bats control insect and rodent populations.
- Many insects and some bats are pollinators. They are responsible for one-third of the food we eat and also for flowers and some trees.
- Shrews and other small rodents spread seeds and also eat up grasses that clog waterways.
- Worms break down living material for enriching the soil.

Check your Habits!
- These are bad habits. We just don't think !
- Common sense applies. No need to be fanatical ! (You can swat mosquitos).
- Sometimes we just don't know what animals are harmless.
- Cultivate investigation, rather than careless habits.

Daily life wildlife as pets?
- Wild animals — even daily life wildlife should not be kept as pets.
- Not every animal can adapt itself to humans' conditions.
- All animals have some basic requirement that a captive situation can't provide.
- Many wildlife pets become upset and even die of stress and trauma.
- Keeping wild animals can sometimes be dangerous to humans because of their unpredictable nature or disease.

Watching daily life wildlife
- Daily-life wildlife doesn't have to be kept. You can watch them from a distance like a naturalist studying wildlife in the wild.
- Keep a record of the behaviour of a familiar gecko. Does it come in the same room daily ? Does it like the wall or ceiling better ?
- See how many frogs come into your bathroom in a month.
- Watch ants troop up the wall to get a dab of jelly or other sweet stuff.
- Count the kinds of birds in your compound.

Since we are talking about wildlife...when you go to the zoo
- Don't tease animals in the zoo; they also have feelings.
- Don't throw stones, or paper, or sticks or stones.
- Don't feed zoo animals your food. It is not good for them and could make them sick.
- Watch wild animals at the zoo like you watch daily life wildlife

Appendix II

MONKEY MANNERS !
Misplaced Monkey Mischief - How to Handle

Concept and text by S. Walker with help from J. Lenin, S. Paul, S. Molur
Sponsored by Awley Wildlife and People (www.awley.com) and Apenheul Primate Park (www.apenheul.nl)
Published by Zoo Outreach Organization/South Asian Primate Network
Education booklet number 18/December 2007

Hello ! Will you answer some questions? just answer "yes" or "no"
- Do you have wild monkeys roving your neighborhood doing bad things?
- Have you ever had wild monkeys come home, steal food & make a big mess?
- Have you ever been bitten by a wild monkey in a public locality?
- Have you ever met a wild monkey in a park and felt scared?

If you have replied YES to even one question, you need to learn some "Monkey Manners!"

But what ARE Monkey Manners?
Monkey Manners are NOT the bad manners of monkeys, described before.

Monkey Manners are a set of behaviors or actions to be learned by YOU and your friends and family, so that you will be safe from these mischievous relatives of mankind. That's what this booklet, and this whole packet is about.

"Mind your monkey manners" means you will NOT act in ways that make monkeys mean.

The monkey problem is NOT because monkeys are mean. It is because human beings are short-sighted. Human beings have not managed other humans, forests and wildlife in such a way that there is enough space for all.

It is now high time we human beings learned *our* "Monkey Manners!"

What are Monkey Problems and their cause?
1. Today - modern times - there is less space between wild animals like monkeys and where people live. Monkeys find it easier to raid crops and eat garbage around homes and other human habitations, in villages, towns and cities, than to forage in a shrinking or crowded forest. Therefore there are a growing number of monkeys coming into human localities.
2. Some places like temples and tourism sites encourage the feeding of monkeys for sake of pilgrims obtaining blessing and for entertaining tourists. Today there are just too many monkeys, and they have learned bad habits.
3. These monkey groups thrive on the easily accessible, rich food and their numbers increase, thus increasing the problem. So Monkey Manners Rule # 1 is Don't feed monkeys or leave food where monkeys can get it easily.
4. Mischievous monkeys are not popular. Sometimes people try and solve the problem themselves by killing them regardless of their unique type. It is not good for the maintenance of biodiversity as some of the rare unique ones are being killed and shifted in addition to the numerous common ones.
5. Mischievous monkeys destroy crops, creating hardships for farmers and their families. Government panics and uses

wrong method to control them, which makes the problem worse.
6. The longer the problem persists, the bolder the animals become through familiarity.
7. Disease can be passed from people to monkeys to people. Such diseases are called "zoonoses". This is very bad for both people and monkeys.

Things to do as a student, as a family member, & as a concerned citizen
At home, offer to be "garbage monitor", insuring that garbage cannot be accessed by monkeys or other animals.
At school make signboards telling how destructive it is to feed monkeys and places around areas where this happens.
Encourage your parents, teachers, & their clubs to support the city government purchasing incinerators so that they get rid of garbage entirely instead of simply moving it from one area to another. Also good for controlling rats and other pests.

Things that your government authorities should be doing:
Legislators should pass a legal ban on public feeding of monkeys.
Municipal authorities should create an action plan for combating monkey menace without harming the animals.
Forest authorities should provide training to wildlife staff to handle monkey menace.
Sanitation authorities should check that the garbage is being removed every day.
Temple authorities should find other ways for devotees to satifsy the need to feed monkeys without creating problem monkeys.

Monkey Drama
You can get your neighborhood together on what to do about the monkey problem by conducting a drama or a series of dramas with other kids. Get together as many of the kids in the neighborhood as you can. Divide them into two groups: householders and monkeys. Conduct a drama a day for several days. Use this method to teach the adults what they can do about the monkey problem. Here are some samples...make your own dramas from what you learn in this book.

Day 1: Demonstrate what happens when house-holders are careless with garbage or put out food for stray animals to eat. Show the monkeys demanding more and more food and becoming more and more aggressive. Show them entering houses where the shutters have been carelessly left open.
Day 2: Demonstrate how to wean the monkeys away from living off human houses. You can show monkeys hanging around the trash bins piteously begging and householders acting strong and refusing to give food.
Day 3: Demonstrate how kids should behave around monkeys. Show what happens when you ignore them and what happens when you tease them and give them treats.
Day 4: Conduct a debate between householders and monkeys. Let each give their point of view and figure out what to do.
Day 5: Bring government officials, animals welfare enthusiasts and forester and wildlife officers into the debate.

Monkey see ... monkey do...monkey do's ... monkey don'ts

MONKEY-DO's
1. Make a system for holding garbage away from home, so it doesn't attract monkeys.
2. Report destructive monkey individuals and troops to your wildlife department and animal welfare society.
3. If a wild monkey troop habitually visits your neighborhood, make your house secure.
4. Avoid being close to any wild monkey or monkey troop.
5. Avoid confrontation for both your safety and that of the monkey.

MONKEY- DONT's
1. Don't feed wild monkeys or eat in front of them … in parks, road, at home…anywhere.
2. Don't smile or show your teeth to monkeys – it means "danger" to them.
3. Don't taunt or tease wild monkeys anywhere (ex. Offering food then pulling it away).
4. Don't run from wild monkeys … if it threatens, stand your ground with a threat pose.
5. Don't ever try and fight if a monkey grabs something out of your hand.
6. Don't look monkeys directly in the eyes; that can be interpreted as a threat by them.
7. Don't snarl or even smile at monkeys - showing teeth means"hostile" to monkeys.
8. Don't act afraid... that is interpreted as weakness, meaning you are safe to attack.
9. Don't go close to them; don't run up to them or run from them.
10. Don't tease them ...for any reason anywhere.

Appendix III

Elephant Etiquette

Compiled and designed by Sally Walker
Sponsored by US Fish and Wildlife Service, Elephant Family, Twycross Zoo, Columbus Zoo, and Schonbrunn Zoo**.**
Typesetting, proofreading and other assistance -- ZOO staff
Produced and published by ZOO March 2010 **--** Education Booklet Number 43

Lets Look at our Elephant Etiquette for the well- being of elephant and man
Who has not heard of "man-animal conflict" these days? The newspapers are full of reports of domestic cattle lifting by big cats, depredation of crops by wildpig, monkeys invading orchards, etc. The conflict between human beings and elephants has become so pervasive that it has its own acronym, HEC - Human Elephant Conflict.

More attention is given to HEC in rural areas because elephants having been deprived of habitat and food by developmental works, are entering villages and agricultural fields to find eatables in kitchen gardens and fields.

In some countries, however, captive elephants even in cities and towns have their own problems with human beings -- in zoos, temples, public roads, etc. Some people don't know how to behave around them, sometimes resulting in injuries or fatalities though no fault of the elephant. The elephant may be punished however.

So, in this booklet, when we talk about Elephant Etiquette, we include all instances of human elephant contact: rural, city, captive and wild. Elephants are big and powerful. Don't risk either injury to yourself or putting the elephant into trouble.

Learn some rules and principles of Elephant Etiquette. Elephant etiquette means appropriate behaviour with elephants ... avoiding confrontations, refraining from annoying them, from exciting them, from goading or tempting them ... to put you and others in danger.

Elephants, as such, once lived in completely different parts of the world and in a very different form. They were from *Primelephas* that will include Loxodonta, mammuthus and *Elephas*. Instead of warm tropical forests their habitat was cold tundra such as in northern North America and northern Eurasia. These elephants have been extinct since 2000 BC and are called Wooly Mammoths. They existed as long as 20,000 years ago.

Elephants today are the subject of much scientific research. Like monkeys, our closest relatives, elephants have very interesting and intelligent minds, with thought and behavior processes which defy explanation.

Today's elephants have many problems.

Human Elephant Coexistence HECx
Many rural people that we met while assembling this booklet seemed to be more "successful" in dealing with HEC. These were people who had adjusted to the elephant presence, who willingly coexisted with the animals and accepted them as part of life. These people seemed to have no more and possibly many less irrevocable tragedies, such as loss of life or limb, than people whose way of behavior was fighting the elephants.

We sympathise with both people and animals in nature, so we adopted human elephant coexistence as our direction in education and philosophy. We have titled our programme "Getting Along with Elephants" meaning Human Elephant Coexistence, HECx.

This booklet is about HECx and the well-being of both human beings and elephants. We do not mean to belittle or dismiss the suffering or seriousness associated with crop and home loss or of the inconvenience and aggravation that adjustment often carries. We simply want to focus on minimising the loss of life and limb. That is why we include people living in cities where they come across captive elephants at zoos, temples, circuses, etc. Injury and loss of life happens to them also when they behave foolishly around elephants.

Etiquette means manners or people's customs of being polite, or what we call civilised. We don't break the queue; we don't push and shove; we try to be on time for engagements; we don't break our word; we try to speak nicely, etc.

When we speak of elephant etiquette, we don't mean good manners for elephants!. We mean good manners, eg. correct behaviour of humans toward elephants. And we define "correct" here as whatever will help you stay alive and in one piece and also keep elephants out of trouble.

Elephant etiquette helps both man and animal to survive. Elephant etiquette is when you agree NOT to act in ways that frightens or angers elephants, tempting them to misbehave.

This is for your well-being ***and*** for the well-being of elephants.

Etiquette for Elephants?
Elephants, as are all wild animals, are very unpredictable. Wild animals believed to be tame sometimes injure or even kill their trainers or owners, who trusted them. This is always because, although we know we mean the animal no harm, and the animal may return our love and trust, we can never know what in the immediate environment frightens or threatens the animal. As wild animals, they have a strong survival instinct which kicks in quickly, as if the animal were living in the wild.

Reports of elephants killing people for seemingly small offences don't give the whole picture ... the whole picture includes what the elephant sees and does... For example, the elephant may be warning his wayward mahout with a 'slap on the wrist' but - because they don't realise their strength, a slap could hurt or maim.

Fast movements are believed to frighten elephants ... it may be the reason behind the belief that elephants are afraid of mice. Rats and mice move extraordinarily quickly and this is probably the reason for the stories of elephants seeing a mouse and running amok.
This information should be useful to us ... we should be careful not to make fast or suspicious movements, or sharp loud noises when around elephants, even when they are securely tethered.

Elephant Quiz for people living in elephant areas. Just answer "yes" or "no"
1. Do you like elephants? Can you imagine what it would be like to be an elephant?
2. Do you ever get hungry?
3. Can you imagine what it would be like NOT to have anything to eat in your area?
4. Would you go to nearby areas and try to find food?
5. If people tried to keep you away from food when you were very hungry, would you be angry? Would you fight with them?

Thanks for taking this quiz. Now, if you replied "yes" to any questions 2-5, how do you think an elephant feels?

Elephant Quiz for people living in cities. Just answer "yes" or "no"
1. Would you like to be an exhibit in a zoo, or circus, or temple, to be restrained by a chain or cage and dependent on others for food?
2. Would you like to have people throwing peanuts at you? or to have people pointing and laughing at you? or offering food to you then pulling it back when your reach for it?
3. Do you like it when people deliberately try and upset you to see your reaction?
4. When your schoolmates tease you, or throw things at you, do you simply stand down?

Thanks for taking this quiz. If you replied "no" to these questions, how do you think an elephant feels?

Well, we don't know but it is likely that an elephant may not be able to empathize with a human being or to follow the Golden Rule of "Do unto others as you would have them do unto you." You, as a human being, have an advantage … you can empathize with humans or animals ... if you want to.

Even the most uneducated villagers in some villages we surveyed, empathized with elephants. Several villagers said: "the elephant has a very big stomach but we people with our small stomach get so hungry ... they (the elephants) need more food than us. They have to eat." The villagers thus "forgive" the elephants for trying to raid their crops. This is how they adjust.

What causes elephant problems anyway ?
1. In contemporary South Asia, there is less space for animals, particularly in rural areas near to forests, where people live. Elephants have been displaced by development ... clearing forests by humans. There is less forage and fruit for elephants because human beings are

gathering for themselves and their livestock. Elephants maintain their family ties, living in large herds. It takes a big area of forest to provide them with sufficient food and "breathing room" to survive.
2. People have infiltrated forests and collect forest delicacies for sale, reducing the variety and nutritional content of available foods for elephants.
3. The lure of "easy food" from crops, domestic stores, rural markets, etc. is overpowering to the hungry and frustrated elephants.
4. Elephants sheer size and the complexity of their social behaviour cause tremendous difficulties in finding a place to settle. In any case elephants move around a lot but now there is scant space to do so. In zoos and other captive situations, elephants really suffer.
5. Elephants are much more sensitive than people think, in captivity as well as in the wild. Many a visitor to a zoo or other captive elephant site has unwittingly provoked an elephant with some silly behaviour resulting in injury, death or a very bad scare. In the process sometimes the elephant, who just behaved like an elephant, is punished.

Who causes elephant problems ?
Some of you might be thinking: "it's not fair ! its not fair for us to have to adjust to elephants. They should adjust to us. They come in our living and work areas and take what they want. It is their fault ..." Well let's look at that.

The problem of HEC is not because elephants are greedy, or stupid or mean. It is because human beings have been shortsighted. We have developed most of the world with houses, industry, public services, etc. so that it is not habitable by large animals. Forests have shrunk because of human beings, not because of tigers or monkeys or elephants. Their number is growing smaller while our numbers are increasing.

We, who as a species had the intelligence to take over the Earth, do not have the intelligence or farsightedness to see that it was wrong. We went on breeding and building. Now we are in trouble. So how is it "not fair" really? If elephants could talk they would say we were at fault ... aren't they right, in a way? If elephants could read history and talk, they could say a lot about that.

Elephant gods and work horses -- Temple, camp and farm elephants
Throughout Asia elephants are utilised for temple duty and also heavy duty forest and farm work. Temple elephants are often taken to beg for alms by temple mahouts. Often they are out in hot part of the day without access to sufficient water. As one can imagine, elephants need a lot of water!

Elephants in forest department-owned elephant camps seem to get a better deal than privately owned work elephants. For one thing they live in camps or near the forest and are generally better treated than privately owned elephants. Privately owned work elephants may be used like a tractor without much concern for their welfare. Some of these may be owned by large farms, timber companies, and other commercial entities.

You may come into contact with temple or forest camp elephants. Although chained, they are still big and powerful. Be careful around any elephant.

Entertainment elephants -- Zoos and circuses
There are thousands of elephants owned by zoos and circuses. Many of these elephants have very hard lives. Elephants are social, smart and energetic. In nature, they move with a herd and interact with other elephants. They also have challenges such as finding food, dealing with carnivores and man. They spend a lot of time moving around, gathering a variety of foods, bathing, taking care of young, etc.

In a zoo or circus they are normally chained, and in many cases, they are all alone. So from a very rich life of interpersonal relationships and activity, they are lonely, bored and lethargic. Sometimes their mahouts mistreat them, as if standing chained in one place was not enough punishment. Elephants normally live a very long time and it is not unusual to hear of an elephant having spent half a century chained in a small stall or behind a building. Some zoos have seen the light about elephants and as a policy will not even keep them. Other have improved their standards of care quite a lot. Still, elephants on display for our pleasure have had to give up a lot. We owe it to them to behave in their presence and avoid irritating them.

Some Elephant Etiquette (rules) for being "near captive" elephants

Visiting a zoo or circus
- don't go close to the elephant.
- don't try to give food to moving elephants .
- don't give them food directly; give to their mahout.
- don't touch elephants unless their mahout or keeper is there.
- don't make threatening gestures near elephants.
- don't ridicule or laugh at elephants in their presence.
- don't make loud noises or fast movements in presence of elephants.
- don't run in front of elephants.

Visiting a temple
- don't harass chained elephants; it is a cruel.
- don't try to feed the elephant by offerings. Let the keeper do it.
- don't go too close or stay too long.
- don't do any of the "visiting a zoo" "don'ts".
- don't burst crackers at a temple or anywhere near elephants.

Encountering elephants in city traffic (Sometimes we see elephants on city roads. Their Mahout or "driver" has to obey traffic rules. If you are also in traffic, think!)
- don't put your hand outside car/bus window to wave to the elephant.
- don't try to attract the attention of the elephant from a two-wheeler.
- don't offer the elephant food in traffic even if the Mahout say you can.
- don't do anything that might frighten or anger the elephant.
- don't rev up your engine loud close to the elephant.
- don't blow your horn loudly around the elephant.
- don't cut in front of the elephant.
- don't go close, either back or sides.

Suggestions for people in elephant areas *from* people living in elephant areas
If you are habituated to doing some activity, and elephants start coming there at the same time, stand down! Do it some other time.
- Don't keep water, smelly food or garbage or fermenting liquours out in the open.
- Villagers of Anaikati village in India say "Don't talk ill of elephants, at least within their hearing. They can *feel* your bad words."
- Don't leave high smelling garbage around your home.

- Some villagers in Nepal, India and Banglaesh recommended fire to discourage elephants, particularly fire that produces much smoke.
- Other villagers at West Bengal (India), Nepal, Bangladesh said they had various ways of making noise at elephants, such as shouting, whistling, clapping, etc.
- Some Nepalese sing hymns, conduct worship, etc which makes then calm in their mind which also affects the sensitive elephant.
- Villagers in West Bengal, India changed all their habits ... they planted paddy during the night, harvested paddy very quickly, and stopped planting corn.
- If you find elephants trashing your house or garden, think before you act. They are bigger and stronger. You can't win a fight. Stand down.
- If elephants are taking something from you, think of its value!. Is it worthwhile to risk your life or your well-being for a basket of coconuts?
- There are many, many suggestions and rules for avoiding or minimising conflict with elephants in villages. The main one is to try and stay out of the way, no matter what.

Give up your rights!

All human beings are very attached to what they perceive as their "rights". Sometimes if we are very stubborn about our "rights". It leads us to do foolish things.

Demanding our rights when dealing with elephants is like shaking our fist at a *tsunami* or tornado, or terrorist attack. In some situations you have to do what is wise and what will help you survive, not what you think you are entitled to!

Imagine a man holding a coconut nearby an elephant. The elephant reaches for the coconut and the man hits out at the elephant, and the elephant hits back. Now, see the man in hospital, bandaged from head to toe still holding his coconut saying "I won!".

Giving an elephant the right of way is usually wise. Demanding your rights in some situations may cost you your life, or your backbone, or your leg.

What good are your rights then ?

Appendix 4

Conservation Conscious / Conservation Careless Zoos – *Contents only*

I. Why We have Zoos?
II. Conservation-Conscious Zoos v.s. Conservation-Careless Zoos.
III. Zoo Inspection: Improve Your observational Skills.
IV. Improvement, not Closure of Zoos.
V. Reasons NOT to close a Zoo.
VI. How to Help? What YOU can do.
VII. Pro's and Con's of Zoo Volunteers.
VIII. Principles for Positive Action – How to be a GOOD Zoo Volunteer.
IX. Drama at the Zoo including Sample dramas.
X. Frequently Asked Questions and Honest Answers!

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[4] (2010) AZA White Paper – Welfare Implications of intentional Inbreeding. http://www.google.co.in/url?sa=t&rct=j&q=aza%20white%20paper%20animal%20welfare%20committee&source=web&cd=2&ved=0CEgQFjAB&url=http%3A%2F%2Fwww.aza.org%2FuploadedFiles%2FAbout_Us%2FWhitePaperInbreeding_BoardApproved_%252028July11.pdf&ei=dzXLTqrhOY6urAetzaXgDA&usg=AFQjCNG7navbnfcwH93nfwZMVpAeSW-lwQ]
CBSG, News

Announcement

New IUCN vacancy:

Programme Officer, Aichi Biodiversity Targets and Key Biodiversity Areas, Biodiversity Conservation Group

The Programme Officer will report to and work closely with the Global Director, Biodiversity Conservation Group, given that this work spans the work of all constituent Programmes of the Group, and indeed will involve working with IUCN globally. The incumbent will also work extremely closely with the Programme Officer, Conservation Planning, based in the Global Species Programme, Cambridge, UK and also with the joint IUCN SSC (Species Survival Commission) - WCPA (World Commission on Protected Areas) Protected Areas and Biodiversity task force to support the technical deliverables of the position on sites of global biodiversity conservation significance.

To see the vacancy announcement, please use this link:
https://hrms.iucn.org/iresy/index.cfm?event=vac.show&vacId=325

Dysfunctional Zoos & What to Do?

Sally Walker – Director of Zoo Outreach Organisation and South Asian Zoo Association

Introduction

This paper proposes the term dysfunctional zoos to describe a type of captive wild animal facility that does not function adequately (or at all) for even the most essential canons of zoos, e.g., education, conservation or research. While no one knows precisely the exact number of zoos, or if you will, captive wild animal facilities permitting public viewing, globally, an educated guesstimate might suggest that easily more than 50–75% of such facilities that are known could be defined or described as dysfunctional.

WAZA has adopted a very practical and positive approach to the diversity of zoos in the world by welcoming Regional and National Zoo Associations as WAZA Association Members under certain conditions. WAZA and its member zoos work with the associations in a way that serves long-range goals for the improvement even of captive animal facilities that do not function as what is currently called zoos. WAZA accepted the need for action on behalf of institutions then described **as sub-standard zoos** but renamed by WAZA as **Zoos needing Improvement** for the sake of cultural sensitivity. The author suggests that even the best zoo in the world could use some improvement or other; just as no perfect human being exists on Earth, there is no perfect zoo, thus the term "zoos needing improvement" is embarrassingly inappropriate.

In 2003, at the Annual WAZA Conference held in San Jose, Costa Rica, there were multiple concerns raised about substandard zoos. Two presentations were given on this topic, one, entitled The Other Zoo World[1] by this writer and colleagues calling attention to the proliferation of sub-standard zoos which probably far outnumbered the **professional** zoos. The paper also called for a sub-committee to be set up by WAZA that would formulate a plan for addressing the issue. A second paper on substandard zoo was presented and in addition, much discussion occurred on the state of the host zoo of the conference and what could be done generally. Subsequently, in early 2006 a Drafting Committee was convened by WAZA the members of which produced a Resolution on needy institutions that was adopted by the WAZA membership in the annual conference held in Leipzig, Germany. The resolution declared: we as a community of organized zoos and aquariums have a moral, ethical and professional responsibility to engage with needy institutions in order to help them improve their standards, achieve conservation goals, and benefit the animals they hold.[2]

The following year, 2007, the Drafting Committee generated a WAZA **tool kit** for addressing the issue of needy zoos, or **zoos needing improvement**. The tool kit consisted of a set of minimum standards by which these zoos could be inspected and assessed for appropriate assistance, which could be undertaken by proficient zoos according to their interest and resources. The tool kit also included a complaint procedure for use by the regional and national associations or by member zoos. These tools were made available within the year and met with enthusiasm by the membership which officially approved them at the 62nd (2007) WAZA conference[3] Since then some individual zoos as well as zoo associations have undertaken projects assisting zoos that needed help, sometimes in localities where the assisting zoo was also running a field project. Other zoos have provided various kinds of help to needy zoos via the regional or national associations such as AZA, EAZA, PAAZAB, SAZARC, EARAZA, etc. In fact, several years before, AZA and EAZA addressed the issue of substandard zoos in their country or region, assessed them and made attempts to assist, often in serious, protracted and expensive exercises.

In the long term, however, the totality of the enterprise has not been very effective in addressing and correcting the issue, primarily due to the sheer enormity of the problem, the speed at which zoos are increasing and the rate and scope of recidivism. There are hundreds, even thousands of dysfunctional zoos in the world, many yet to be documented. These zoos need very drastic improvements in the most elementary and fundamental aspects, such as animal welfare, which covers the entire range of care of captive animal. Many of these establishments are **spurious**, without long-range plans, sustainability, trained and interested staff, an/or other characteristics that define a healthy, functional zoo.

Terminology of bad zoos

Dysfunctional zoos is a more accurate descriptor for what have been referred to as **substandard, needing improvement** or **needy** zoos. Although the latter terms are not wrong as such, neither do they convey a realistic picture. Dysfunctional zoos might be defined succinctly as: **animal collections open to the public which don't function as conservation facilities, rather just the opposite**. One might even be so bold as to say that dysfunctional zoos not only do not function as conservation facilities, but as purveyors of decline and extinction.

This term is more appropriate also because it does not imply that such zoos are troubled with just a few poor enclosures or merely ignorant and untrained owners and staff. Dysfunctional implies ill health (physical and/or mental) or a variety of deep-seated and elemental problems that prevent the institution (s) from improving without fundamental changes, or all encompassing transformation, at the governance and ground level, including, but not limited to closure and re-distribution of the animals.

The major difference might be said to be that **good** zoos are busy with conservation actions… research, breeding, field projects, education, marketing, etc. and **dysfunctional** zoos are busy generating species decline!

How do zoos generate species decline, and even extinction! They do it through such bad habits as were summarized in the previously cited presentation, The Other Zoo World by Walker et al in 2003.

- Waste of wild animal resources both animal and financial.
- Over breeding and release of surplus animals without monitoring which promotes disease, fighting and injury, over-population, over--grazing, etc.
- Creating wrong attitudes in visiting public
- Projecting a bad image of zoos worldwide with poor animal welfare practices
- Acquiring animals from certain unscrupulous animal dealers, other dysfunctional zoos, and local trappers and traders (wild).

This list was expanded and published in 2007 in the WAZA Guidelines for Improving Standards in Zoos, 2007 and again several times since by the author in other published documents.

Extinctions

Stating categorically that dysfunctional zoos cause extinctions may seem an extreme claim, however, the sheer number of non-organised zoos in the world reflects a gigantic number of wild animals in captivity without purpose or responsible management. It is not beyond reason to assume that certain species' numbers have been severely reduced by captures for zoos, deaths through mismanagement, etc. One zoo known by the author admitted to having caught six wild Pallas' Cats *(Felis manu)* in the last few years, not all together as a breeding effort but one at a time. When an individual died zoo authorities ordered another captured. Pallas' Cat is a relatively rare and highly delicate species: zoos that obtain them without a systematic plan and expertise in their care are most probably driving them to extinction in their country or region.

Another example in a very different scenario involves herd animals or large herbivores that are surplus stock as they are easily bred and populations are not controlled except by wrong releases! This happens in a great many zoos in South Asia. When released in a forested area without sufficient study of the carrying capacity and appropriateness of the habitat, they can lay waste the entire vegetation of the area, thus leading to extinctions of endemic and indigenous niche-oriented organisms. Disease from the once captive animals may also infect resident animals as testing usually includes only TB.[4]

There are countless scenarios of this type. This example is difficult to prove, as no department or organisation wants to admit to this having happened, or perhaps has not even noticed!

How many Zoos

The number of facilities that are called zoos has been estimated at as many as 10,000 worldwide. The source of that estimate is vague, but if you consider that there are about 1000 roughly documented zoos that are in some way related to WAZA (either members as such or members of member regional and national associations and/or wannabe members then it is not difficult to imagine a few more thousand off the grid. This many dysfunctional zoos is too many for our small world and its biodiversity due to impacts mentioned above and in the Appendix.

The number of zoos in the world is moot, because no single agency or authority knows for certain how many captive wild animal facilities exist in their country, unless they have a rigorous registration system. For example, in 1982, years before the establishment of the Central Zoo Authority in India, the Department of Environment, Government of India brought out a booklet which listed zoos and botanic gardens of the country as a total of 44.[5] Suspecting the accuracy of this number, the writer conducted a very simple survey consisting of a stamped postal card sent to all state forest, wildlife and animal husbandry departments, offices and ministries; all environmental, conservation and animal welfare oriented non-governmental organizations; and a variety of individuals and state officials of the states. Returned postcards yielded a list of 122 zoos, safari parks, deer parks, mini-zoos, etc. in various states in India.[6] Two years later, in 1989 S. K. Patnaik, Director and L. N. Acharyo, Veterinary Surgeon of Nandankanan Biological Park published a Directory of 49 Indian Zoos, having conducted a survey through the forest departments and colleagues and including a great deal of information on each facility.[7] Combined, these lists got the attention

of the Ministry of Environment who began to discuss a zoo policy that, some months or years later, morphed into legislation, and a good thing that was! The Zoo Act was passed in 1991[8], and in 1992[9], when the Ministry of Environment announced that all operating zoos of any size had to register with CZA, there many more facilities! In 1994, ZOOS' PRINT magazine published a list of 312 existing zoos and another 13 registered to be established, a total of 342 **then**[10]. In fact a primary objective of the Act was to limit or regulate the mushroom growth of zoos by introducing a legal process which included obtaining permission government, having a sustainable economic base and authorities. By the time seemingly all zoos had registered the list had mushroomed indeed to 450! [11]

In formulating their legislation, the Government of India did a very clever thing. The drafting committee contrived to define "zoo" in such a way that it would include almost any wild animal facility, even travelling menageries. As much of the impetus to have zoo legislation in the first place was animal welfare and the miserable conditions of many spurious animal facilities as well as the habit of wild captures, it was important to be able to control all of them with legislation. The term "stationary institution" is bedrock to the definition of zoos in other countries but that did not fit India's situations.

South Asian Zoos – India

South Asia till date includes 8 countries, (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) of which all but Maldives has at least one zoo and one with more than 200.

India, for example, now has 200-plus zoos which is many times the number of zoos of any other country and even of all the other countries' zoos put together. In area India is far larger, so that number of zoos fits the country. Of these, 25% are standard but different sized zoos called Large, Medium and Small according to several different values, and 75% are mini-zoos and deer parks. CZA inspected the zoos, gave them each a list of undesirable constructions or practices, and provided funds and time to improve before conferring recognition or refusal. CZA closed over 200 additional zoos that were deemed hopeless for want of finance and a sufficiently interested patron over the years. In comparison there are about 30–50 known zoos throughout the rest of South Asia. This number includes other captive wild animal centers which are open to the public for viewing, such as the Takin Centre (*Budorcas taxicolor*) of Bhutan, a rescue and conservation breeding facility, as well as spurious facilities known to be operating. The vague number and the fact that no numbers have been assigned to countries reflects a certain variation in facts which changes every year or two!

India was the first country in whole Asia to pass **effective** zoo legislation. As mentioned earlier Sri Lanka had passed a National Zoological Gardens Act 1982,[12] but it was primarily an administrative tool. In 1991 the Government of India via the Ministry of Environment and Forest passed the Indian Zoo Act as an amendment to the Wildlife (Protection) Act. (op. cit.) The Zoo Act first featured broad regulatory legislation that also provided for setting up an autonomous Central Zoo Authority (CZA) to implement the Act. A year later (1992) after formation of CZA, detailed Norms and Standards were added as an additional amendment to the Zoo Act, which, itself was an amendment to the Wildlife (Protection) Act, 1975. Every year or two, additional amendments and corrections have been included in the Act, which reflects the evolution in thinking and experience of CZA and its member zoos, and to an extent, some global zoo trends. This flexibility to change ineffective or un-implementable laws and replace them with improved legislation is very good as generally the time-frame for amendments is far shorter than the initial cumbersome and painful act of passing legislation. It provides a fix for standards proven to be inadequate, for whatever reason, and a methodology for integrating ongoing changes taking place both in and outside the country addressing zoo animal welfare, wildlife biology, conservation education, etc.

The Ministry of Environment and Forests, Government of India does not have absolute power or oversight over all those zoos. CZA staff is not large, and these 200 zoos are operated by a range of state, municipal, private, and non-governmental organizations and institutions. They can all get out of tune quite easily for a variety of reasons. Nevertheless, it can be said quite accurately that India has, by adopting very strong zoo legislation backed up with a well-funded CZA as well as much hope and good will, has significantly improved more zoos than any other effort in the history of zoos, and also closed more zoos! Even the backslider zoos which become complacent after having been inspected and recognized, do not slide back nearly so far as they were originally. Backsliding may occur temporarily when a new director or veterinarian is transferred to the zoo as per India's draconian administrative system, and in any case, all zoos are re-inspected every three years by CZA.

Other South Asian Zoos

Another promising example is Nepal, which claimed only one zoo, the Central Zoo, located in Lalithpur, Kathmandu. Casual information indicated to this author that there may be more zoos, so R. Marimuthu, Education Officer of Zoo Outreach Organisation, visiting Nepal for purpose of conducting a training workshop, was deputed do a survey. The result of this effort was a list and short description of 14 facilities published in ZOOS' PRINT Magazine.[13] The Government of Nepal responded immediately, sending a team from Central Zoo to survey the facilities, of which 10 were categorized as zoos.[14] Some months later the Government of Nepal set up a team to formulate legislation using, among other references, the CZA Norms and Standards, and it is currently moving through the various, tedious steps at a reasonable pace.[15] Prospects for passage of zoo legislation in Nepal are very good. There is a proposal for the Central Zoo to function as a sort of coordinating institutions for all the rest of the zoos in Nepal which is very sensible.

In South Asia, Bangladesh and Pakistan are now more or less actively working on zoo legislation to cover the wild animal facilities open to public in their country. Pakistan is working provincially as some provinces do not have zoos or are not interested, and has a good number of wildlife regulations which could be tapped for certain zoo issues. Sri Lanka is aware of the need for norms and standards to strengthen their existing National Zoological Gardens Act, the primary purpose of which was perhaps to confirm the National Zoo as a Department to set up more zoos; it also includes a few simple rules for visitors. The new and powerful Ministry of Economic Development, that was recently made responsible for the Department of Zoos, has taken a decision to seriously upgrade all existing facilities and establish several new zoos in different areas of the country. It is hoped that strict legislation including high standards will precede this plan.

Bhutan and Afghanistan have only one known or acknowledged wild animal facility at present. Afghanistan has a single zoo in Kabul which was opened August 17th, 1967,[16] but for all practical purposes was destroyed during the bombings a few years ago. Now, as the nation's capital gets back on its feet the zoo is being rebuilt and improved by the Municipal Corporation. Even suggestions are afoot for expansion into adjoining area as well as another zoo just outside the city. Afghanistan National Assembly approved an Environmental Law published in Official Gazette No. 912, 25 January 2007.[17] The document has been unofficially translated from Dari and Pashto to English and carries many provisions, which, for the present, might be interpreted in such a way as to protect species and provide amenities such as education and training.

In the past, Bhutan has listed a both Mini Zoo and a Gharial Breeding Centre that are now not listed, but there is a Takin Centre (*Budorcas taxicolor*) in need of improvement, as public visitation is permitted. This centre is located just on the outskirts of Bhutan's capitol, Thimpu, and is one of the few nature-oriented attractions near the city. Since Bhutan has a short history of creating mini-zoos and permitting public in breeding centres, some form of legislation to direct or regulate these practices is required. There are big holes (some for photography) in the rusty fencing around the Centre. If not for the essential goodness of virtually all Bhutanese people, surely some unfortunate event might have taken place.

South Asian Zoo Association for Regional Cooperation SAZARC

The South Asian Zoo Association for Regional Cooperation SAZARC was founded in 2000 for the purpose of creating a link between zoos in the different South Asia countries as well as a kind of affiliation with global zoos and, most of all, to encourage them to get zoo legislation along the lines of the Indian Zoo Act. SAZARC meets every year in a different South Asian country 100% funded by Western Zoos. Every so often SAZARC substitutes a small group with each from a different South Asian country to attend a conference in one of the South East Asian countries.

In all the South Asian countries the model of the Central Zoo Authority Zoo Act, Recognition of Zoos Rules, Norms and Standards (1991, 1992 and amendments thereafter) is an influence. In three SAZARC conferences, in 2002 (Dhaka, Bangladesh), 2008 (Ahmedabad, India) and 2009 (Dehiwala, Sri Lanka) zoo legislation was the major training theme with CZA legislation as an example. In the first instant, Bangladesh, host of the conference, convened a working group and drafted standards for their country using the CZA model. Subsequently, the transfer system worked its black magic in Bangladesh resulting in this important topic being dropped because new officials did not know about it. After a few years, Bangladesh zoo legislation was taken up and followed and is now in the Law Ministry being assessed. It still has a long road to travel and many obstacles but there is some hope that it will go through in the correct format.

At the Ahmedabad SAZARC conference, Resource Person Brij Kishore Gupta, an official from CZA gave several excellent presentations about Indian zoo legislation, including how it had evolved and was being implemented, as well as its pitfalls. Very good work in groups was done there. In Sri Lanka, in 2009, Dr. Miranda Stevenson, Director, BIAZA (formerly an experienced zoo keeper, curator and director), Dr. Kris Vehrs, (Director, AZA and an attorney holding the post of legislative council to AZA for over two decades), and Mike Jordan, formerly Curator, Chester Zoo, now Conservation Advisor, National Zoological Gardens, South Africa presented information on zoo animal welfare and legislation and sat with countries in working groups to assist them in working on these topics. In these conferences, working groups for all the countries were set up to take legislation and animal welfare forward with Indian participants advising.

It is worth a mention that at the 10th Annual SAZARC Conference recently held in Nepal, the theme of Emergency Protocols was linked to 21st Century Crises of Climate Change, Emerging Diseases and Terrorism. In the past year, CZA had taken up the topic of emergency response and required their zoos to create one appropriate for their zoo contained within their Management Plan, without which their recognition might suffer. CZA also commissioned a Disaster Management Plan, a manual[18] compiled from a variety of sources by former Director, Kanpur Zoo. CZA Member Secretary permitted SAZARC to use their document and donated 20 copies to the conference. Again CZA got there first with disaster response as, until this past year, no zoo in South Asia and probably even in all Asia had a systematic response plan in print. In the conference all countries formed their own working groups but combining Afghanistan, Pakistan and Bhutan as the latter two countries had only one attendee. Non-Indian countries used the CZA model plan, which covered everything aside from the 21st century crises, which Indian participants were requested to cover. Participants were requested to submit the idea to their governing body, which, hopefully, would be influenced to set up an official committee to formulate a detailed plan that fits each country respectively.

Getting down to business

So, what business is it of WAZA and WAZA member zoos, which work hard to effectively promote and protect wildlife conservation using their institutions in different ways, to worry about the **other** zoos. Increasingly more WAZA zoos are busy contributing to conservation by supporting field projects, training, education, etc. However, here is a view that while many WAZA zoos are hard at work on conservation, dysfunctional or even some semi-functional zoos may be cancelling this good work animal for animal. Many WAZA zoo personnel have indicated it is "a good thing but not a priority" to help dysfunctional zoos improve. If you look at this situation honestly, however, it may be more of a priority than anyone currently thinks. Because these zoos are off the grid, no one really has a clear idea of their impact. Its like climate change … hard to convince people because they do not want to believe all those bad things are or might be true. No one in the established zoo world wants to compare the good done by well-meaning zoos and the damage done by indifferent or otherwise non-productive facilities, each group for their own reasons.

Dysfunctional zoos occur in almost all countries. Surprisingly the United States, for example, which has perhaps the most outstanding zoos, has a shocking number of dysfunctional animal holding facilities (anti-AZA institutions, mini-zoos, rescue centres, orphanages, etc.) that are considered **zoos** by their visiting public, if they allow. Some years ago, AZA conducted a study and came up with a figure in the low thousands.

Down to the why

The **why** requires a book, not an article, as reasons vary between and even among countries and regions. The focus of this particular discussion however is overwhelmingly on zoos in formerly colonized continental areas, such as the former Indian subcontinent, now officially South Asia. The **whys** for zoos in South Asian countries as well as several other continental areas have a large number of things in common, many of which seem to be colonial leftovers! In addition to lack of exposure to avant-garde zoos and decades experienced and knowledgeable zoo personnel, a few, only three, of the most destructive of these are summarized here:

- Out-dated administrative systems with cumbersome bureaucratic features which actually hinder progress, but particularly with respect to complex institutions, such as zoos
- Dramatically hierarchical departments, services, ministries, in which senior-most officials are so much revered or feared that often they cannot be approached with the facts of a situation.
- A draconian system of transfer of mid- and senior level officials from seemingly related departments to zoos where they spend six months (or less) to a very few years getting some orientation, and then being transferring back to their parent department instead of to another zoo where they could use their experience and enhance their skills.

There is almost total blindness to the dramatic negative impacts on institutional quality this system produces. It is **institutional blindness** because there seems to be no solution possible, particularly in India, Pakistan and Bangladesh. This system seems to be more prevalent in forest, wildlife and animal husbandry services than in Municipal or city bureaucracies that have their own problems. To be fair to CZA, a couple of years after establishment, CZA investigated how this system might be changed in India and learned that in order to toss the transfer system, even in one department or discipline, 50% of the states of India have to agree! Almost impossible to get even two Indian individuals to agree so 50% of states is pretty much out of the question. The parent ministry or department would not like to approve because they would almost certainly lose some senior posts if the zoos were declared a separate service. Naturally individual officers and their families would not be happy with this state of affaires.

The outdated administrative structure is tragic, because the countries which laid this on its colonies have moved on with more streamlined and sensible administrative systems, while their offspring, their former colonies, remain the same as centuries ago. The hierarchical nature of these systems is close to military, particularly in certain departments connected with forests and wildlife. It prevents honest and healthy exchange of information and ideas and produces a sort of psychological disease, akin to Dr. Wilhelm Reich's **emotional plague**, which, instead of being passed from generation to generation in families, it is passed from superior to subordinate with similar dynamics.

The transfer system is the most destructive of these examples. In the transfer system, there seems virtually no forethought of which individuals might make the best zoo directors or curators. All personnel are considered equally qualified for the job since they are either foresters or veterinarians. Transfers are not based on merit, although an officer held in some esteem can be transferred to a particular city or town on his request because the schools are good and he has school-going kids, or some other personal reason. Also in some places transfers are considered a punishment post. In India some of the negative impacts have lessened since legislation and CZA were established, as they have brought much needed prestige as well as money and more flexibility to zoos.

The transfers transpire are not from zoo to zoo but from zoo to an only mildly related disciplines (such as eucalypus or coffee plantations, administration, etc. in the parent department). Parent departments may be forest or animal husbandry, environment, municipality, sometimes wildlife conservation or economic development. One thing in common – the decision makers for the zoos are rarely from zoos.

In South Asian zoos as a whole, this system translates into a shifting, drifting zoo non-community where genuine expertise rarely develops before another transfer takes place, even in India, despite the amazing input of the Central Zoo Authority.

The strength of the destructiveness often lies with the hierarchical system Ministers, Secretaries and other very prestigious officials who often relate naïve or counter-productive suggestions for zoos. Knowledgeable zoo personnel are afraid to correct their seniors. The press loves it when a very senior official makes a suggestion for the zoo – it is as if he or she conferred eternal life for everyone. In fact, many of the problems of zoos of this region starts with senior officials and politicians who do not understand the subtle problems, requirements or current ideology of the world's zoos and of the established and organized contemporary zoo community. Trying the education is difficult because it is not a priority and as soon as or even before one gets a Minister or Secretary sufficiently trained up, its time for them to go.

Is there a fix?

Using the resources of WAZA, members with sufficient experience in zoos and exposure to low-income countries could make a difference by taking interest and engage the governments of these countries at different levels. Such help and the encouragement of strong principles in managing zoos could help South Asian and other countries zoos to come out of their problems. The prestige value of WAZA is immense in the global zoo community, with virtually all the mainstream zoos aware of the global association and arguably influenced by it. The mainstream zoos possibly could play a significant role also in ferreting out the dysfunctional zoos and determining their future either with training and help or making a case for closure.

Much of the difficulty in improving zoos globally is the cultural dissonance existing between so-called developed and developing countries. For example, the WAZA Drafting Committee created a Zoo Assessment Tool, a form that ostensibly listed the minimum acceptable standards, for the purpose of evaluating substandard, or as they euphemistically came to be called **zoos needing improvement**. This tool and a set of guidelines for improving zoos were approved by WAZA membership in the 67th Annual conference in 2007. At a certain regional conference, which shall remain anonymous for reasons that will become obvious, the topic of zoo legislation was the theme and the Assessment Tool handed out as an aid to discussion. Participants of the conference snapped it up and innocently adopted it as their accepted, instead of minimum, standard. This was allowed to stand for the time being by the association director in view of the fact that the larger percentage of even the region's best zoos would have to work for some time to meet these minimum criteria. Also this fact itself makes a strong statement in confirmation of the diversity of norms of the zoos of the world.

Why everyone in WAZA should care about this

Dysfunctional zoos bring a bad name to the greater zoo community. It is perhaps the responsibility of all of us to do what we can to either improve or help remove these destructive facilities. Lobbying for zoo/wild animal facility legislation that includes standards, a procedure for registration, inspection, recognition and de-recognition and protocol for closure of hopeless and non-compliant institutions is one way to help, although it can be soul-destroying as per the writer's personal experience of last quarter century. Verily, the process proceeds at a snail's pace. Investing funds in one-off individual zoo improvements can be risky unless the investing zoo or organisation is committed for its. One CAN if committed, make things happen, but much patience is required. Serious backsliding is almost certainly inevitable unless there is strong legislation, an implementing authority and effective penalties in place.

Thirty five years in the **other zoo world** has convinced the writer that without strong legislation and its components, there may be no way to improve or close dysfunctional zoos on a permanent basis. There are thousands of facilities ...it is a job for all of us. WAZA has developed a series of documents to help with this task. Tackling governments and lobbying for legislation is a slow and painful process but worth the investment long term.

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Species Conservation Toolkit Initiative

Working Group Briefing Materials

2014 CBSG Annual Meeting
New Delhi, India

Species Conservation Toolkit Initiative Working Group

Convenors: Bob Lacy and Jon Ballou

AIMS

- Describe this new initiative to develop and maintain advanced digital tools for conservation risk assessment and population management.
- Identify priorities for enhancements to the existing set of species conservation modeling tools.
- Identify new software tools that are needed to enable effective species conservation.
- Identify collaborators who will be able to contribute to the developing the science and providing the conceptual design for species conservation tools.
- Discuss what training and support will be needed to build capacity of the conservation community to use the tools effectively, and how this initiative can be expanded to include the needed capacity building.

BACKGROUND

A description of the initiative is provided as a separate document in the briefing materials. We expect to be able to announce the launch of this initiative at the CBSG and WAZA annual conferences in Delhi. Significant sponsorship has already been offered by CBSG, Chicago Zoological Society, Smithsonian Conservation Biology Institute, Auckland Zoo, St Louis Zoo, and a private individual. A few more sponsors are needed to make sure that the initiative can begin with the hiring of a conservation scientist/programmer. Many more sponsors are needed to ensure that the initiative can fill the needs not only to develop tools but also to provide necessary support and training in the use of the tools.

PROCESS and OUTCOMES

We will start this Working Group with an initial overview of the initiative. We will briefly describe the new features currently being added to some of the core software tools used by CBSG and others. We will then identify the priority areas of work that need to be tackled by this initiative. We will also identify who can contribute as collaborators by developing the science, designing new tools, and providing rigorous testing,

PREPARATION

Please read the description of this initiative, provided in the meeting Briefing Materials.
Then think about needs for (1) further enhancements to existing software tools, (2) better integration of analysis and planning methods across the spectrum of levels of intensity of management, and (3) new tools to assist with threat analysis and conservation management. For any needs that you identify, come to the meeting with specific examples of species conservation activities that require the new innovations to be successful.

Species Conservation Toolkit Initiative

(name still subject to change)

A partnership to ensure that the new innovations and tools needed for species risk assessment and conservation actions to counter risk are available, distributed, and used effectively

The Vision:

To develop and maintain advanced digital tools for conservation risk assessment and population management that help secure the future of wildlife species in a changing world.

The Need:

The past 30 years have seen major advances in the use of computer modeling to assist with the assessment of risks to wildlife populations, evaluation of conservation options, and guiding active management. With increasingly rapid and widespread environmental changes, the need for such proactive modeling is becoming ever greater. To date, the conservation community has relied on a very few people who have the combination of expertise in population biology, computer programming, and species conservation planning to build and support the modeling tools. Yet these tools are essential to assessing risks and possible conservation actions for 1000s of threatened species in the wild, guiding intensive management of 100s of species that are being protected within *ex situ* programs, and integrating conservation efforts across the spectrum of management approaches. It is essential that the toolkit of software used by the conservation community be expanded to meet new needs and respond to new opportunities (including evolving computer technologies), supported, disseminated, and wisely used.

Chicago Zoological Society (CZS), the Smithsonian Institution/National Zoo (NZP), and the IUCN SSC Conservation Breeding Specialist Group (CBSG) have been leaders in providing species conservation tools to the world, and can continue in this vital leadership role. However, to ensure the continuity and further development of tools for wildlife conservation, it urgent that a broader partnership of foundation, non-governmental, governmental, industry, and private sources support this effort with funding, expertise, and application of the methods.

Existing Tools:

Modeling tools for guiding species conservation have been developed, refined, and widely used over the past few decades, resulting in the current suite of software packages (all available freely at www.vortex10.org) including:

- *Vortex* – A stochastic simulation of the extinction process, used by 1000s of conservationists, wildlife managers, researchers, and students throughout the world to help guide species risk assessments and conservation planning. *Vortex* simulates the range of possible fates of wildlife populations subjected to the threats and uncertainties of environmental change, declining and fragmented habitats, wildlife harvest, genetic decay, the randomness of demographic fates of individuals, and the interactions among these and other threats. *Vortex* can project the future trajectories of populations under various scenarios of alternative threats and specific proposed management actions (such as translocation or releases from captivity, habitat enhancement, and reduced harvest). A new module is being developed to identify optimal management strategies under uncertainty about key variables. Developed by RC Lacy (CZS), with assistance from JP Pollak (Cornell University). Initial funding from CZS.

- *Outbreak* – An epidemiological simulation model of infectious disease in wildlife populations. *Outbreak* is used for analysis of the dynamics and threats of disease in wildlife populations, with options to explore the efficacy of management actions such as surveillance, vaccination, or removal of infected individuals. Developed by RC Lacy (CZS), JP Pollak (Cornell), PS Miller (CBSG), and others. Initial funding from Morris Animal Foundation and CBSG.
- *MetaModel Manager* – A platform for building and using integrated "metamodels" that combine any number of simulation or analytical models into representations of the combined and interacting effects of processes affecting wildlife populations. *MetaModel Manager* facilitates exploration of the interactions among species interactions (e.g., predator-prey systems, invasive competitors, or mutualistic dependencies), disease, habitat degradation, habitat fragmentation and barriers to dispersal, animal social systems, global environmental change, and human activities. Developed by JP Pollak (Cornell) and RC Lacy (CZS). Initial funding from the US National Science Foundation (NSF) and CZS.
- *PMx* – Software package for the demographic and genetic analysis and management of wildlife breeding programs. *PMx* is used to guide the breeding programs for almost all cooperatively managed programs by zoos around the world, many domestic rare breed conservation programs, and some wildlife populations that are intensively monitored and genetically managed. Developed by JD Ballou (NZP), RC Lacy (CZS), and JP Pollak (Cornell). Initial funding from Institute of Museum and Library Services, and Association of Zoos and Aquariums (AZA).

Additional programs under development include a simulation of spatial movements of animals on landscapes, a model of animal social systems and their effects on demography and genetics, and links of global climate models to their impacts on wildlife habitats and populations.

Goals of the proposed initiative:

1. Continue innovation of the science of computer modeling and digital tools to help clarify conservation priorities and options, integrate risk assessments, assess threats, and identify measures of success in wildlife conservation.
2. Ensure access to these tools by the conservation community, by providing adequate training, and support to be able to use the tools effectively in global wildlife conservation efforts.

Operational Objectives to meet the Goals:

1. Develop and support the next generation of tool developers with skills in population biology, computer programming, and conservation science. While ensuring that the core software tools continue to be validated, well-tested, thoroughly documented, and supported by the core initiative, publish the algorithms and make source codes available so that a broader community of conservation scientists can offer extensions to the tools or develop other such tools.
2. Continue the evolution of *Vortex* as a highly flexible population modeling tool that can be used to integrate conservation assessment and planning across the spectrum of levels and kinds of intensive wildlife management. Extend Vortex with new packages and interfaces to provide further analyses to meet diverse needs.
3. Ongoing development of the innovative metamodeling framework for linking analyses into comprehensive, integrated assessments of the many threats affecting wildlife populations. This includes building and supporting new modules for assessing effects of disease, disruption of animal social systems, climate change, and landscape change.
4. Continue to expand the analytical capabilities in *PMx* to guiding the optimal use of new technologies such as gamete banks, molecular genetic data, and various levels of metapopulation management.

5. Provide resources for conservationists using the toolkit, via websites, manuals, professional publications, user forums, and training materials. Provide training and support in the use of the conservation modeling tools to the practitioners and students, through workshops, mentoring, and technical support.

Outcomes:

1. Innovation in species conservation methodologies will be sustained and accelerated.
2. The modeling tools for guiding wildlife conservation will be available to the global community.
3. Methods for assessing and managing risks to wildlife will evolve to keep ahead of the emerging threats.
4. Integration of methods across disciplines and across the spectrum of management intensity will be enhanced, and the effectiveness of comprehensive conservation planning and action will be increased.
5. Capacity to effectively use these tools will increase among conservation practitioners, scientists, and students.

Implementation:

1. A partnership between Chicago Zoological Society, Smithsonian Institution, and the IUCN SSC Conservation Breeding Specialist Group agrees to define and then guide this initiative.
2. A small consortium of conservation organizations consisting of the above partnership and others commits the support for the first 3 years. The investments need to be adequate to:
    a. Provide the expertise (time) of the key conservation scientists who have led the development of species risk assessment and population management tools. This includes Lacy at CZS and Ballou at NZP, and also collaborators at CBSG and colleagues in other organizations (AZA PMC, SPMAG, EPMAG, IUCN SSC, etc.).
    b. Provide programming services by professional(s) with skills in both conservation science and software development, who will work closely with the above network of colleagues.
    c. Provide opportunity for collaborative meetings among contributors and partners.
    d. Provide tool support – in terms of documentation, testing, and technical support.
    e. Assure broad dissemination, accessibility, and wise use – through websites, training, and support for conservation applications by partners.
3. A post-doctoral level conservation methods scientist will be hired. This person will have a strong background in population biology and skills in modern object-oriented computer languages and interface design. He or she will work with Lacy and Ballou to learn the structure of the current computer software, and will work with CBSG and others to learn how the tools are used in conservation planning.
4. Chicago Zoological Society and Smithsonian/National Zoo will commit 20% time by Lacy and Ballou, respectively, to work with the post-doc and to coordinate activities of the initiative on behalf of all partners.
5. The initiative will host one or more professional workshops per year to exchange ideas among the initiative staff, the partners, and the broader community of practitioners.
6. Agreements related to ownership, use, and dissemination of the software products will be developed among all partners, with the purpose being to ensure that the tools are globally and freely available. Each partner will be provided access to the source codes of all products, while not restricting the rights of other partners. If the initiative terminates, or if any product of the initiative ceases to be supported, then the orphaned products can continue to be used by the partners in any of their work, provided that proper acknowledgements are made.

7. Develop an estimate of cost of this initiative for the first 3 years and an estimate of medium- and long-term costs. Preliminary calculations are that at least US$100,000/year plus substantial in-kind support through contributed expertise will be required to start the initiative working on further tool development, while double that level of funding will be required to provide also the full support and training that is needed by the global conservation community.
8. Much but not yet all of the start-up funding has been committed by core partners. Proposals will be developed to obtain further funding from foundations and additional partners.
9. Timing. For several years, various groups have discussed the need for an initiative such as this; further delay would not serve conservation or the organizations well.
    a. CZS will lead the refinement of this proposal in consultation with key partners, so that the proposal can be taken in summer 2014 to organizations likely to join the initiative.
    b. The partners providing the initial core resources will be identified and necessary agreements for ratification of the partnerships will be in place by the fall 2014 meetings of CBSG, World Association of Zoos and Aquariums, regional zoo associations, and the International Species Information System.
    c. By January 2015, we will hire a full-time postdoc level conservation tool developer.
    d. As a second phase of the initiative, as soon as resources permit, we will hire a coordinator of training and support, and develop a training program that builds capacity through workshops at the host site, at partner institutions, and in other hosted venues around the world, and other mechanisms.

What is unique about this initiative? How does it fit with the other efforts by partners and others?

1. This initiative develops, sustains, and supports the tools for assessing and managing the risks that species face in a rapidly changing global environment.
2. This initiative is global. Its contributions are made without restrictions of membership, geographic mandates, or organizational realm (government, NGO, zoo, academia, etc.).
3. This initiative will advance the conceptual development of methods for species conservation, the creation of the modeling tools to implement the methods, and training of professionals in the use of the tools to achieve conservation. But that is certainly not all that is needed to ensure that species are conserved in a changing world. Other partners and allied organizations provide critical further support to conservation in some of these areas or in mutually supportive roles, such as:
    a. The IUCN Species Survival Commission and its components (esp. Conservation Breeding Specialist Group, and Species Conservation Planning Subcommittee) provide assistance in the implementation of conservation assessments and planning – but they rely on contributions from volunteers and allied organizations to provide the advances in conservation science that are used in those efforts.
    b. The IUCN RedList and Species Information Service provide a database for documenting the assessments of threat to the species of the world – but they do not do the threat assessments and the subsequent necessary conservation planning.
    c. International Species Information System provides the global, shared database on managed captive populations, on which management of these populations critically depends – but does not employ the scientific staff to develop new approaches to analysis and management.
    d. The AZA Population Management Center and similar programs of EAZA (for Europe) and ZAA (for Australasia) provide expertise to their members in applying tools to the management of their zoo populations – but they do not have on staff the programmers to advance to the tools and they don't have a global reach, in geographic scope, in

responsibilities beyond their memberships, and in reaching beyond the zoo community to the full captive to wild spectrum of intensity of species management.

e. Governmental agencies develop policies and have responsibilities for implementing conservation measures within their jurisdictions – but they rely on the best scientific practices that are developed elsewhere.
f. Academic conservation scientists develop and test new science that is critical for successful conservation – but they don't focus on building the capacity of the world to use the science.
g. For-profit software and environmental risk assessment companies produce tools and conduct analyses – but their business models necessarily cater to the organizations and governments that have the most financial resources, and this limits access to their services by the rest of the world. Their software code is proprietary and confidential, and use requires expensive licenses.

Clearly, the above roles are inter-dependent, and the key participants in this new initiative are very active contributors also to many of the above realms. Thus, the various efforts of organizations are very strongly mutually supportive, rather than in conflict or redundant.

4. Important efforts are underway to define effective conservation strategic planning methods, project management, and clearly documented measures of success (e.g., Conservation Measures Partnership, Miradi). This new initiative provides the rigorous quantitative tools that those efforts need to move from being conceptual frameworks to being able to truly measure and document what works in conservation.
5. Why not rely on a volunteer, community-driven (e.g., loosely managed, open-source) process to provide the tools for conservation?
    a. That is essentially the model we have used for the past 30 years. It is inadequate to ensure that the tools continue to be developed and available to meet the needs of conservation.
    b. Such initiatives work well when there is a very large base of contributors with the necessary skills (which is not the case within the rather specialized world of species risk assessment), and when there is a core team managing the project (which would require more resources to implement than what we are proposing).
    c. We need a level of quality control for species conservation that is not possible with an unmanaged initiative. Untested, minimally documented software with diverse variants is good for scientific exploration and for games; it is not OK for providing rigorous tools for guiding conservation action and managing irreplaceable populations.

Help make this happen! We need partners willing to join with us by providing support ranging from US$5,000 to US$100,000 annually, with commitments for the first three years.

Joint Taxon Advisory Group (TAG) Chairs Meeting, 1-3 June 2014, Alphen, The Netherlands

The following is the summary report of an *ex situ* conservation capacity building workshop held at the Joint TAG Chairs Meeting in June 2014. The complete Joint TAG Chairs meeting proceedings can be found at: http://www.eaza.net/News/Alphen%202014%20Proceedings/Forms/AllItems.aspx

Session 6: Integration of Conservation Activities
Workshop 2: *Ex Situ* Conservation Capacity Building

Convenors: Kathy Traylor-Holzer (CBSG) and Bengt Holst (Copenhagen Zoo/ CBSG Europe)

There is an ever increasing need for innovative tools and skilled population managers to scientifically manage *ex situ* populations for sustainability and conservation benefit. Increased capacity is needed in all regions if we are to effectively manage all of the species in the world's zoos and aquariums in need. For this discussion, capacity building needs were divided into three categories:

1. Increased competency within those regions with a strong population management framework in place;
2. Expansion of population management expertise in other regions; and
3. Development of new tools/science/population management strategies to address emerging challenges.

This short workshop sought to capture the perspectives and expertise of international participants attending the Joint TAG Chairs Meeting to brainstorm needs, priorities, and recommendations for each of these three capacity building areas.

Participants divided into three sub-groups, each addressing one of the capacity building areas above. After spending time in their core group to delineate issues and needs, group members rotated as a unit to each of the other two topics in turn to review and contribute their own views. Facilitators remained with their assigned topic to promote efficient incorporation and consolidation of additional thoughts. After all participants had provided input into all three topics, everyone reconvened in a plenary session for sub-group summary presentations. The final step was a group prioritization of capacity building needs across all three areas. Summaries of these discussions and prioritizations are given below.

Priority Issues

Each group identified five main areas in need of capacity building efforts. These 15 areas were ranked by all workshop participants based on the criterion:

What efforts are most important for global ex situ population management?

Highest Priority (13-17 dots)

- Conduct training efforts in those regions without strong population management programmes (i.e., those with no in-country training courses, no population advisors, etc.).

- Provide mentoring and conduct leadership training for programme leaders/population biologists, including those in regions with existing population management programmes.
- Develop best practices in husbandry and share this information across regions.

Moderate Priority (7-10 dots)

- Formalize and standardize participation in inter-regional programmes (e.g., develop guidelines/handbook for inter-regional population management).
- Develop best practices for molecular genetics techniques and tools for zoos and aquaria.
- Gain support and buy-in for population management from directors and boards.
- Develop tools for managing meta-populations (e.g., across regions, between *in situ* and *ex situ*).

Lower priority (0-4 dots)

- Secure funding for training, meetings, and travel.
- Consider establishing a lead institution to gather information in a region.
- Use mentorships to lead by example.
- Identify and develop local expertise mentors.
- Establish accountability and evaluation across all layers.
- Improve communication.
- Develop strategies to address lifetime reproductive/breeding planning, including both natural and artificial breeding options.
- Improve options for group and highly fecund species management.

Topic 1: Increasing Competency in Existing Programs

Regional associations such as EAZA, AZA and ZAA have a long history of studbooks, species programs, population management advisors, and training courses, yet the demand for skilled management exceeds current expertise in these regions. The following needs or issues were identified by the working group:

- Too many programmes for the number of staff available
- Population biology advisor connected to population/species
- Consistency with population biologist and species coordinator
- Relationship between population biologist and species coordinator
- Support and buy-in from directors/board
- Population management as part of job description/part of zoo organizational structure
- Accountability meeting timelines
- Advisor accountability – have job descriptions
- Clear process for securing advisors (e.g., veterinary advisor, nutrition advisor, etc.)
- Develop a list of blocks/mistakes before population planning (and provide to new leaders)
- New programme leaders need a road map
- Make regional studbook classes more affordable and easier to get into class

- Web-based studbook training
- Staff for population evaluation: need more professional staff and also more training at lower levels (i.e., not the population biologist)
- Mentoring as a tool for training new leaders
- Leadership training
- Communication training
- Mentoring at TAG level
- Mentoring at institutional level
- Husbandry for frontline keepers
- Part of accreditation for AZA/EAZA/ZAA: required to have a population biologist on staff
- Evaluate population management structure across regions and look for best practices
- Coordinator knows the biology of the species
- Skills needed for success in a programme at each level
- When zoos do not have participation, engagement drops; this becomes a circle of less management and decreased participation
- Programmes have become a commodity to zoos – an expected service
- Do Yellow SSP/Red programmes work due to lack of full participation requirements?
- Conduct an assessment every five years to see if what we are doing improves population
- Hire an individual from another association to help build links between the regions
- New population managers should be equally sensitive to demographics and husbandry
- We need to understand husbandry challenges across different regions
- Inventory of challenges to be shared with other regions/best practices
- Encourage other regions to attend TAG meetings to maintain understanding/ best practices/ husbandry.
- Currently, a minority of the membership is doing the majority of the work. Make it a mandatory requirement for each member to run a programme; if not, the institution gets a 'tax' that could go toward paying for more association staff
- Make population management a condition for membership
- Maintain strong evaluation system of quality
- Needs of different regions are very different
- Short-term breed-to-release programmes have different needs (software, etc.)
- Greater engagement of ALL membership
- Stronger face-to-face relationships with other regions (travel training teams)

Topic 2: Regional Expansion of *Ex Situ* Population Management Programs

About 75% of studbooks and species management programs are held by EAZA, AZA and ZAA, yet other areas of the world (e.g., Southeast Asia, Latin America) are the hotspots for biodiversity threat. Zoos in these other regions play key roles in the initial records and founding events of *ex situ* populations and in developing links with *in situ* conservation efforts for their native species. Development of effective

population management programs in all regions will not only benefit these regions but also *ex situ* programs in other regions as well as overall species conservation.

Issues/Challenges:

- May have interest and human resources but no funds
- Courses can be provided, but getting people to the course is still difficult
- Different members don't know what each other has – share inventory?
- Information sharing needs to increase
- Cost of membership in associations is a barrier
- Different barriers in different regions
- Too few administrators/biologists and too much work to do
- No historic information without tracking back to keepers
- Husbandry issues are sometimes more important than population management
- Internet access is sometimes a problem
- Need to increase the culture of collaboration
- Turnover of staff means more training is needed
- Culture within a region can be very different
- Even without an association, projects can lead to improvement in basic population management/ captive management
- There is a need for continuing education for trainers
- Training needs to target different goals of the different regions (populations are managed for different goals)
- Continue to collaborate between different regions to share changing information

Potential Solutions:

- Use sponsors/mentors to move programmes forward before there is a structure
- Use resources of "lead" institutions to bring others in the region forward (e.g., JAZA joined ISIS so all institutions can be on SPARKS)
- "Twinning" may be a good solution. Provides face-to-face mentoring and problem solving
- Meetings need to be subsidized to bring people together
- Traveling coordinator could reach out to multiple locations
- Create a list of experts to address specific problems
- WAZA could provide member services back to members
- Start programmes at a modest level and it will expand if it has value
- Mentor by species or taxa
- Collaborative funding of online courses. Language can be a barrier, need translation.
- Train people in existing courses and they can go back to their region and teach.

Topic 3: Development of New Tools and Management Strategies

Science-based population management strategies and software tools currently exist to support *ex situ* population management to achieve demographic and genetic goals. However, current science and tools are not sufficient to address all management challenges across a diverse breath of taxa, life histories, and program goals. Emerging issues, needs, and technologies will demand new approaches and tools for the evolving needs of regional and global population management.

Science and Tool Needs:

- Artificial breeding techniques (How? Which species? How to deal with cultural differences and opinions?)
- Molecular genetics – includes issues such as: taxonomy; techniques/tools; development of standards (appropriate samples, questions, results into guidelines for starting a project); integration into management /SPARKS/ studbook; agreed upon practices
- Educating ourselves on species concepts (in relation to taxonomy and how this related to management)
- Changing strategies to focus on effective population sizes
- Determining kinship among founders
- Pedigree vs allelic diversity; mtDNA (verifying, re-checking)
- Is there a way to plan reproduction/contraception for a female's entire lifespan, considering the species' reproductive physiology and social structure, to provide a framework for reproductive planning? Need more organised research into this
- What is needed to make global planning easier? Includes combining studbook data; scheduling transfers, logistics; and managing species as meta-populations (regionally and globally)
- Link *in situ* and *ex situ* populations. Issues/needs include:
    - Research on both
    - How best to help both
    - How to successfully release from a fully tracked population into a less tracked wild population
    - Harvesting scenarios
    - Educating on how to use PMx
    - Disease risk assessment – cheaper (find funding)
- Common framework/standards/MoUs for participation globally
    - Share regional collection planning documents, studbooks, species masterplans, etc.
    - Make websites open to other regions
- Group management
- Highly fecund species management
- Guidelines for applying zoo management to wild populations
- Define needs for each specific programme (role, purpose)
- Link academic and *ex situ* research, with more applied zoo/aquaria population questions
    - Link people in these different fields (improve communication)

    - Link labs/research with zoos (within or out of zoos)
    - Link labs and different research in different regions
    - Develop better relationships with nearby universities
- Mate choice: understand better and incorporate
- Genome Resource Banking: samples, research questions
- Education on sampling techniques
- Cooperate/organize w/ institutions holding the species

Existing Efforts:

- Reproductive technologies (e.g., AZA); need more regional cooperation
- Lifetime reproductive planning (KTH is investigating with tigers/select carnivores; need more working on this and for other species)
- Maintain relationships with other regions (population biologists, reproductive physiologists, animal managers, other experts, etc.)
- Molecular genetics workshop to be held October 2014; will address guidelines and sample collection needed (AZA- now has one format for research -> standardized IACVC)
- Release strategies and how they affect zoo/aquaria population (ongoing AZA research)
- C2S2 (finding alternative strategies; genomics)
- Turtle Survival Alliance
- Amphibian Ark
- Group management
- Existing bio-banks

IUCN Guidelines on the Placement of Confiscated Animals Working Group Briefing Materials

2014 CBSG Annual Meeting
New Delhi, India

IUCN Guidelines on the Placement of Confiscated Animals

Convenor: Neil Maddison

AIM

IUCN is re-drafting the current 'Guidelines on the Placement of Confiscated Animals'. The aim of the group is to comment on the latest draft (with a proposed amended title of 'Guidelines for the Management of Confiscated Species') and make suggestions for change, such that the Guidelines can be used as a PRACTICAL tool for managing authorities (MAs).

BACKGROUND

Whilst the current Guidelines appear to have been consulted widely, there appears nonetheless to be a tension between the management of confiscated species from a purely *conservation* perspective, and that from an *individual animal* (welfare) aspect, which can give rise to practical challenges. IUCN's remit is to conserve the world's biodiversity, but it acknowledges that individual attitudes, as well as cultural differences, will play a large part in day-to-day decision making for confiscated species and that these factors need to be taken into account if the Guidelines are to be used even more widely.

Ideally, agreement will be found whereby cultural differences can be accommodated such that threats to biodiversity, such as the release of species outside of their natural range, are minimized. It is envisaged that a 'decision-tree' approach (which was introduced in the current Guidelines to great effect) will be confirmed. In order to prove useful as a practical tool, it is intended for the decisions trees to be produced into wall-charts, in several languages, for daily use by the MAs.

PROCESS

The group will review and make recommendations for amendment of draft text, and make recommendations on changes (if any) to the decision tree analysis, using the group attendees' knowledge and experience of working in different cultures around the world. The process will be to first of all review the decision tree, then recommend amendments to the text of the Guidelines.

OUTCOMES

Recommendations of changes to the latest draft text for the IUCN Guidelines for the Management of Confiscated Species such that they can be utilized by the MAs as a day-to-day operating tool.

PREPARATION

Review of the latest draft Guidelines NB. The current draft will undergo a review on 24th October, so there will be limited opportunity beforehand for the group attendees to comment on – I will try and circulate the amended Guidelines over the weekend of 25/26 October. It would help to read the existing (2002) Guidelines (attached) in order to understand the reasons for the re-write of some sections.

IUCN Guidelines for the Placement of Confiscated Animals

APPROVED BY THE 51ST MEETING OF THE IUCN COUNCIL, GLAND, SWITZERLAND, FEBRUARY 2000

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International Union for Conservation of Nature

SSC
Species Survival Commission

IUCN GUIDELINES FOR THE PLACEMENT OF CONFISCATED ANIMALS

Approved by the 51st Meeting of the IUCN Council, Gland, Switzerland, February 2000

EXECUTIVE SUMMARY

Live wild animals are confiscated by local, regional, and national authorities for a variety of reasons. Once they have taken possession of these animals, these authorities must dispose of them responsibly, in a timely and efficient manner. Prevailing legislation, cultural practices, and economic conditions will influence decisions on appropriate disposition of confiscated animals. Within a conservation context, there are several possible options from which to choose:

1) to maintain the animals in captivity for the remainder of their natural lives;
2) to return the animals to the wild;
3) to euthanize the animals, i.e., humanely destroy them

The IUCN Guidelines for the Placement of Confiscated Animals discuss the benefits and risks involved in each of these options. These Guidelines should be read in conjunction with the IUCN Guidelines for Re-introductions (IUCN 1998). They should also be read with reference to the CITES Guidelines for the Disposal of Confiscated Live Species of Species Included in the Appendices (Resolution Conf. 10.7) and the IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species.

Returning confiscated animals to the wild is often considered the most popular option for a confiscating agency and can garner strong public support. However, such action poses real risks and problems and generally confers few benefits. These risks and problems include, but are not limited to, the following.

1. The mortality of animals released from captivity is usually high. Confiscated mammals and birds captured as juveniles have not learned the skills they need to survive in the wild. Other animals may be weakened or otherwise affected by their time in captivity and, thus, less able to survive. Finally, there is little chance of survival if the animals are released at a site that is not appropriate for the ecology or behavior of the species.
2. Animals released into the wild outside of their natural range – if they survive at all – have the potential to become pests or invasive. The effects of invasive alien species are a major cause of biodiversity loss, as such species compete with native species and in other ways compromise the ecological integrity of the habitats in which they have become established.
3. Having been in trade or a holding facility often in association with other wild animals and, in some instances, domesticated ones, confiscated wild animals are likely to have been exposed to diseases and parasites. If returned to the wild, these animals may infect other wild animals, thus causing serious, and potentially irreversible, problems.
4. In many instances, confiscated wild animals have been moved great distances from the site of capture and changed hands several times, such that their actual provenance is unknown. It may, therefore, be impossible or very difficult to establish an appropriate site for return to the wild that takes into account the ecological needs of the species, the animals' genetic make-up, and other attributes that are important to minimize risks (e.g., competition, hybridization) to wild populations at a release site.
5. in cases where the provenance is known, the ecological niche vacated by that animal may already be filled by other individuals and replacing the animal could result in further undesired disturbance of the ecosystem
6. Responsible programs to return animals to the wild (c.f. IUCN 1998) are long-term endeavors that require substantial human and financial resources; hence, they can divert scarce resources away from other more effective conservation activities.

If returning confiscated animals to the wild is to be consistent with conservation principles and practice, it should a) *only* be into a site outside of the species' natural range if such an action is in accordance with the IUCN Guidelines for Re-introductions for a conservation introduction; and b) only be practiced in cases where the animals are of high conservation value and/or the release is part of a management programme. Any release to the wild must include the necessary screening and monitoring to address potential negative impacts, as set forth in the IUCN Guidelines for Re-introductions (IUCN 1998).

Retaining confiscated wild animals in captivity is a clear – and, in most cases, preferable - alternative to returning them to the wild. Clearly, returning animals to their owners will be required in cases of theft. There are a number of options for keeping animals in captivity; however, each of these also has costs and risks.

- As confiscated animals are likely to have been exposed to diseases and parasites, if held in captivity, they may infect other captive animals, causing serious, and potentially irreversible, problems.
- Finding an appropriate home for confiscated animals can be time-consuming, and caring for the animals during that time can be expensive.
- Wild animals have specific nutritional requirements and require specific care. Short-term and long-term humane care of confiscated wild animals requires space, finances and expertise not readily available in many countries.
- Transfer of ownership from a confiscating government authority to a private entity – individual or non-commercial or commercial care facility – can raise complicated legal and ethical issues, which are difficult – and time-consuming - to address. Sale or transfer of ownership may – or may be seen to - stimulate demand for these animals and exacerbate any threat that trade may pose to the species. It may also give the appearance that the government condones illegal or irregular trade or, in the case of actual sale, is benefiting from such trade.

In addition to avoiding risks to wild populations engendered by return to the wild, keeping confiscated animals in captivity provides other benefits, for example:

- Confiscated animals can be used to educate people about wildlife and conservation, as well as the consequences of trade in live wildlife.
- Confiscated animals placed in captivity can provide breeding stock for zoos, aquariums, and other facilities, thus potentially reducing the demand for wild-caught animals although the opposite effect may also occur.
- In specific instances where the provenance of the confiscated specimens is known, these animals can provide the nucleus, and breeding stock, for possible reintroduction programs.
- Confiscated animals can be the subject of a range of non-invasive research, training and teaching programs with important potential benefits for conservation.

Euthanasia must be considered a valid alternative to placing animals in captivity or returning them to the wild. Although it may appear counter-intuitive to employ euthanasia, it is by definition a humane act and can be wholly consistent with both conservation and animal welfare considerations. Further, although many confiscating authorities may be wary of criticism elicited by a decision to euthanize confiscated animals, there are a number of reasons to justify its use, including the following:

- In many, if not most, circumstances, euthanasia offers the most humane alternative for dealing with confiscated wild animals.

- Euthanasia eliminates the genetic, ecological, and other risks that release to the wild may pose to wild populations and ecosystems.
- Euthanasia eliminates the serious risk of spreading disease to wild or captive populations of animals.
- Euthanasia will often be the least costly option.

Establishment of an overall policy framework, with specific procedures for confiscating authorities, will facilitate consideration of the above three options for disposition, including the logistical, legal, and ethical questions that these authorities must address.

IUCN Guidelines for the Placement of Confiscated Animals

Statement of Principle

When live wild animals[1] are confiscated by government authorities, these authorities have a responsibility to dispose of them appropriately. Within a conservation context, and the confines of national and international law, the ultimate decision on placement of confiscated animals must achieve three goals: 1) to maximise the conservation value of the animals without in any way endangering the health, behavioural repertoire, genetic characteristics, or conservation status of wild or captive populations of the species[2] or any other wild living organism; 2) to discourage further illegal or irregular[3] trade in the species; and 3) to provide a humane solution, whether this involves maintaining the animals in captivity, returning them to the wild, or employing euthanasia to destroy them.

Statement of Need

Increased regulation of trade in wildlife and enforcement of these laws and regulations have resulted in an increase in the number of live wild animals that are confiscated by government agencies as a result of non-compliance with these regulations. In some instances, the confiscation is a result of patently illegal trade; in others, it is in response to other irregularities. While in some cases the number of confiscated animals is small, in many others the number is in the hundreds or greater. The large numbers involved, and the need to care for and dispose of them responsibly, have placed serious pressures on confiscating authorities, many of whom lack the technical, financial or human resources or the necessary frameworks to address these situations adequately.

In many countries, the practice has generally been to donate confiscated[4] animals to zoos or aquaria. However, this option is proving less viable. Zoos and aquaria generally cannot accommodate large numbers of animals that become available through confiscations. In addition to the resources required to house them and administer veterinary and other care, these institutions are usually less interested in the common species that comprise the vast proportion of wildlife confiscations. The international zoo community has recognized that placing animals of low conservation priority in limited cage space may benefit those individuals but may also detract from conservation efforts as a whole. Therefore, they are setting priorities for cage space (IUDZG/CBSG 1993), thus reducing their availability to receive confiscated animals.

There has been an increasing tendency to address the problem of disposition of confiscated animals by releasing them back into the wild. In some cases, release of confiscated animals into existing wild populations has been made after careful evaluation and with due regard for existing general guidelines (IUCN 1987, IUCN 1998). In other cases, such releases have not been well planned and have been inconsistent with general conservation objectives and

[1]In these Guidelines, unless stated otherwise, confiscated animals should be understood to refer to live wild animals, not those that have been captive-bred.
[2]Although this document refers to species, in the case of species with well-defined subspecies , the issues addressed will apply to lower taxonomic units.
[3]Irregular trade in a species refers to, for example, insufficient or incomplete paperwork from the exporting country or poor packing that has comprised the welfare of the live animals in the shipment.
[4]Although not discussed here, it should be understood that, depending on the statutory authority of the agencies involved, animals may first be seized and then confiscated only on completion of legal proceedings resulting in forfeiture by the individual having previously claimed ownership of the animals.

humane considerations. Animals released in inappropriate habitat are usually doomed to starvation or death from other causes that the animals are not equipped or adapted against. In addition to humane concerns, release into wild populations may also have strong negative conservation value by threatening existing wild populations for the following reasons.

1) Animals released into the wild outside their natural range can become pests or invasive, thus threatening agriculture and other sectors, native species, and the ecological integrity of the area in which they become established. The effects of invasive alien species are a major cause of global biodiversity loss.
2) The former home range of a confiscated animal may be quickly occupied by other individuals and releasing the confiscated animal could lead to further disruption of the animal's social ecology.
3) Diseases and parasites acquired by confiscated animals while held in captivity can easily spread into existing wild populations if these animals are released.
4) Individuals released into existing populations, or in areas near to existing populations, that are not of the same race or sub-species as those in the wild population, results in mixing of distinct genetic lineages.
5) Animals held in captivity, particularly immature animals, can acquire an inappropriate behavioural repertoire from individuals of other species, and/or lose certain behaviours or not develop the full behavioural repertoire necessary for survival in the wild. It is also possible that release of animals could result in inter-specific hybridisation, a problem also to be avoided.

In light of these trends, there is an increasing demand -- and urgent need -- for information and advice on considerations relating to responsible placement of confiscated animals. There is also a pressing need for technical expertise and assistance in assessing the veterinary, husbandry and other questions that must be addressed in this process. Recognizing this problem, the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) have adopted guidelines for Disposal of Confiscated Live Specimens of Species Included in the Appendices (Resolution Conf. 10.7), applicable to both plants and animals. These IUCN guidelines build on and supplement those drawn up by CITES to apply more broadly to confiscated animals and confiscation situations.

Disposition of confiscated animals is not a simple or straightforward process. Only on rare occasions will the optimum course be obvious or result in an action of conservation value. Options for disposition of confiscated animals have thus far been influenced by the public's perception that returning animals to the wild is the optimal solution in terms of both animal welfare and conservation. However, a growing body of scientific study of re-introduction of captive animals, the nature and dynamics of wildlife diseases, and the nature and extent of the problems associated with invasive species suggests that such actions may be among the least appropriate options for many reasons, including those enumerated above. This recognition requires that the options available to confiscating authorities for disposition be carefully reviewed.

Management Options

In deciding on the disposition of confiscated animals, there is a need to ensure both the humane treatment of the animals and the conservation and welfare of existing wild populations. Options for disposition fall into three principal categories: 1) maintenance of the individual(s) in captivity; 2) returning the individual(s) in question to the wild; and 3) euthanasia.

Within a conservation perspective, by far the most important consideration in reviewing the options for disposition of confiscated animals is the conservation status of the species

concerned. Where the animals represent an endangered or threatened species or are otherwise of high conservation value[5], particular effort should be directed towards evaluating whether and how these animals might contribute to a conservation programme for the species. The expense and difficulty of returning animals to the wild as part of a conservation (c.f. IUCN 1998) or management programme or pursuing certain captive options will generally only be justified for species of high conservation value. How to allocate resources to the large numbers of confiscated animals representing common species is one of the fundamental policy questions that confiscating authorities must address.

The decision as to which option to employ in the disposition of confiscated animals will depend on various legal, social, economic and biological factors. The "Decision Tree" provided in the present guidelines is intended to facilitate consideration of these options. The tree has been designed so that it may be used for both threatened and common species. However, it recognizes that that conservation value of the species will be the primary consideration affecting the options available for placement. International networks of experts, such as the IUCN Species Survival Commission Specialist Groups (see Annex 3 for contact details), should be able to assist confiscating authorities in their deliberations as to the appropriate disposition of confiscated animals.

In some instances, in the case of international trade, there may be a demand for confiscated animals to be returned to their country of origin, and the government authorities of that country may request their return. CITES has established guidelines on this question through Resolution Conf. 10.7. It should be noted that it is often difficult to establish the true origin (including country of origin) of many animals in trade. Moreover, final disposition of confiscated animals upon their return to the country of origin will require consideration of the same options presented here. There is a need for cooperative efforts to review these options in order to ensure that repatriation is not undertaken simply to shift the burden of addressing the problem to the country of origin.

Option 1 -- Captivity

Confiscated animals are already in captivity; there are numerous options for maintaining them there. Depending on the circumstances and the prevailing legal or policy prescriptions, animals. can be donated, loaned, or sold, to public or private facilities, commercial or non-commercial, and to private individuals. Placement can be in the country of origin (or export), country of confiscation, or a country with adequate and/or specialized facilities for the species or animals in question. If animals are maintained in captivity, in preference to being returned to the wild or euthanized, they must be afforded humane conditions and ensured proper care for their natural lives.

Zoos and aquaria are the captive facilities most commonly considered for placement of animals, but these institutions are generally less willing and available to receive such animals than is assumed. As most confiscated animals are common species, the full range of captive options should be considered. These include zoos and aquaria as well as the following:

- **Rescue centers**, established specifically to treat injured or confiscated animals;
- **Life-time care facilities** devoted to the care of confiscated animals;

[5] It is recognized that “conservation value” may not always be easy to assess and may be a function of species’ status at national or regional level as much as international level (e.g., listed as threatened by IUCN).

- **Specialist societies** or clubs devoted to the study and care of single species or species groups (e.g., reptiles, amphibians, birds) have provided an avenue for the disposition of confiscated animals through placement with these societies or individual members.

- **Humane societies** established to care and seek owners for abandoned animals may be in a position to assist with placement of confiscated animals with private individuals who can provide life-time care.

- **Commercial captive breeders** may be willing to receive and care for animals as well as to incorporate them into captive breeding activities. Such facilities, although commercial in nature, are likely to have the technical expertise and other resources to care for the animals. In addition, production of animals from captive breeding operations may reduce the demand for wild-caught animals.

- **Research institutions** maintain collections of exotic animals for many kinds of research (e.g. behavioural, ecological, physiological, psychological, medical and veterinary). Some research programmes have direct relevance to conservation. Attitudes towards vivisection or, in some instances, the non-invasive use of animals in research programmes as captive study populations vary widely from country to country and even within countries. These attitudes are likely to affect consideration of such programmes as an option for confiscated animals. However, it should be noted that transfer to facilities involved in research conducted under humane conditions may offer an alternative - and one that may eventually contribute information relevant to the species' conservation.

Choosing amongst these options will depend on the conservation value of the animals involved, the condition of the animals, the circumstances of trade in the species, and other factors. As a general rule, where confiscated animals are of high conservation value, an effort should be made to place them in a captive facility that ensures their availability for conservation efforts over the long term, such as with a zoo, ex-situ research programme, or an established captive breeding program or facility.

Captivity – Sale, Loan or Donation

Animals can be placed with an institution or individual in a number of ways. It is critical to consider two issues: the ownership of the animals and/or their progeny, and the payment of any fees as part of transfer of ownership. Confiscating authorities and individuals or organizations involved in the placement of confiscated specimens must clarify ownership, both of the specimens being transferred and any progeny. They must also consider the possible implications of payment of fees in terms of public perception and for achieving the purpose of confiscation, which is to penalize and, in so doing, deter illegal and irregular trade. The following points should considered.

Transfer of ownership/custody**.** Unless specific legal provisions apply, the confiscating authority should consider including in an agreement to transfer ownership or custody the conditions under which the transfer is made, such as any restrictions on use (e.g., exhibition, education, captive breeding, commercial or non-commercial) or obligations concerning use (breeding efforts), that the animals may be put to. Such an agreement may set forth conditions relating to:

- subsequent transfer of ownership or custody;
- changes in the use of the animals by the new owner or custodian; and
- consequences of violation of the terms of transfer by the new owner or custodian.

Payment of fees. There may be cases where captive facilities are willing to receive and commit to care for confiscated animals providing payment is made by the confiscating authority against those costs. More frequently, the confiscating authority may seek to recoup the costs of caring for the animals prior to placement by levying a fee as part of transfer of ownership. Such payment of fees is problematic for many reasons, including the following:

- it may weaken the impact of the confiscation as a deterrent;
- it may risk creating a public perception that the confiscating authority is perpetuating or benefiting from illegal or irregular trade; or
- depending on the level of the fees proposed, it may work against finding a suitable option for maintaining the animals in captivity.

It is important that confiscating authorities be prepared to make public the conditions under which ownership of confiscated animals has been transferred and, where applicable, the basis for any payments involved.

Captivity – Benefits

In addition to avoiding the risks associated with attempting to return them to the wild, there are numerous benefits of placing confiscated animals in a facility that will provide life-time care under humane conditions. These include:

a) educational value in terms of possible exhibition or other use;
b) the satisfaction to be derived from the increased chances for survival of the animals;
c) the potential for the animals to be used in a captive breeding programme to replace wild-caught animals as a source for trade;
d) the potential for captive breeding for possible re-introduction or other conservation programmes; and
e) the potential for use in conservation and other valuable research programs.

Captivity - Concerns

The concerns raised by placing animals in captivity include:

A) DISEASE. Confiscated animals may serve as vectors for disease, which can affect con-specifics and other species held in captivity. As many diseases cannot be screened for, even the strictest quarantine and most extensive screening for disease cannot ensure that an animal is disease-free. Where quarantine cannot adequately ensure that an individual is disease-free, isolation for an indefinite period, or euthanasia, must be carried out.

B) CAPTIVE ANIMALS MAINTAINED OUTSIDE THEIR RANGE CAN ESCAPE from captivity and become pests or invasive. Unintentionally introduced exotic species have become invasive in many countries, causing tremendous damage to agriculture, fisheries, and transport, but also to native animal populations. The decline of the European mink (*Mustela lutreola*), listed as Endangered by IUCN, is in part a result of competition from American mink (*Mustela vison*) escaped from fur farms, while the negative effects of competition from introduced North American red-eared slider turtles (*Trachemys scripta elegans)*, originally imported as pets, have been raised in relation to European and Asian freshwater turtles.

C) COST OF PLACEMENT. Providing housing and veterinary and other care to confiscated animals can be expensive; as a result, it may be difficult to identify institutions or individuals willing to assume these costs.

D) POTENTIAL TO ENCOURAGE UNDESIRED TRADE. As is discussed above, transfer of ownership of confiscated animals to individuals or institutions, whether it involves loan, donation, or sale, is problematic. Some have argued that any transfer of ownership - whether commercial or non-commercial - of confiscated animals risks promoting a market for these species and creating a perception of the confiscating authority's being involved in illegal or irregular trade. These risks must be weighed in relation to the benefits, in particular that maintenance in captivity offers over return to the wild or euthanasia. Some factors that might be considered in assessing the degree to which transfer of ownership – and sale - might promoted undesired trade are:

1) whether the animals in question are already available for sale legally in the confiscating country in commercial quantities; and
2) whether wildlife traders under indictment for, or convicted of, crimes related to illegal or irregular trade in wildlife can be prevented from purchasing the animals in question.
3) the monetary/ commercial value of the animals in question

As regards the latter question, it should be noted that experience in selling confiscated animals suggests that it is virtually impossible to ensure that commercial dealers suspected or implicated in illegal or irregular trade are excluded, directly or indirectly, in purchasing confiscated animals.

In certain circumstances, transfer to commercial captive breeders may have a clearer potential for the conservation of the species, or welfare of the individuals, than non-commercial disposition or euthanasia. In the case of common species, commercial breeders may be a particularly attractive option; in the case of species of high conservation value, this option should be carefully assessed. There may be a risk of stimulating demand from wild populations through increased availability of the species, and it may be difficult to secure access to these animals for future conservation activities.

Option 2 -- Return to the Wild

Because of the serious risks posed to wild animal populations from released confiscated animals, return to the wild is considered here to be a desirable option in only a very small number of instances and under very specific circumstances. The IUCN Guidelines for Re-introductions (IUCN 1998) make a clear distinction between the different options for returning animals to the wild to meet conservation objectives and discuss the purposes, rationale and procedures relating to these options.

The present Guidelines do not consider a viable option the return of animals to the wild except in accordance with the IUCN Guidelines for Re-introductions. Poorly planned or executed release or (re-)introduction programmes are no better than dumping animals in the wild and should be vigorously opposed on both conservation and humane grounds.

A) **Re-introduction**: an attempt to establish a population in an area that was once part of the range of the species but from which it has become extirpated.

Some of the best known re-introductions have been of species that had become extinct in the wild. Examples include: Père David's deer (*Elaphurus davidanus*) and the Arabian oryx (*Oryx leucoryx*). Other re-introduction programmes have involved species that persist in some parts of their historical range but have been eliminated from others; the aim of these programmes is to re-establish a population in an area, or region, from which the species has disappeared. An

example of this type of re-introduction is the recent re-introduction of the swift fox (*Vulpes velox*) in Canada.

B) **Reinforcement of an Existing Population** (also referred to as Supplementation): the addition of individuals to an existing population of the same species.

Reinforcement can be a powerful conservation tool when natural populations are diminished by a process which, at least in theory, can be reversed. One of the few examples of a successful reinforcement project involves the golden lion tamarin (*Leontopithecus rosalia*) in Brazil. Habitat loss, coupled with capture of live animals for pets, resulted in a rapid decline of the golden lion tamarin. When reserves were expanded, and capture for trade curbed, captive-bred golden lion tamarins were then used to supplement depleted wild populations.

Reinforcement has been most widely pursued in the context of rehabilitation programmes, i.e., when individual injured animals have been provided with veterinary care and released. Such activities are common in many countries, and specific programmes exist for species as diverse as hedgehogs and birds of prey. However common an activity, reinforcement carries with it the very grave risk that individuals held in captivity, even temporarily, are potential vectors for the introduction of disease or infectious organisms into wild populations.

Because of disease and other risks to wild populations, as well as the costs of screening and post-release monitoring, reinforcement should only be employed in instances where there is a direct and measurable conservation benefit (demographically and/or genetically, and/or to enhance conservation in the public's eye), or, at least, where the presumed benefits clearly outweigh these risks.

C) **Conservation Introductions** (also referred to as Beneficial or Benign Introductions): an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range.

Extensive use of conservation introductions has been made in New Zealand, where endangered birds have been transferred to off-shore islands that were adjacent to, but not part of, the animals' original range. Conservation introductions can also be a component of a larger programme of re-introduction, an example being the breeding of red wolves (*Canis rufus*) on islands outside their natural range and subsequent transfer to mainland range areas.

Return to the Wild - Benefits

There are benefits of returning confiscated animals to the wild, providing the pre-requisite veterinary, genetic, and other screening is undertaken and post-release monitoring programmes are established (as per IUCN 1998).

a) In situations where the existing population is severely threatened, re-introduction might improve the long-term conservation potential of the species as a whole, or of a local population of the species (e.g., golden lion tamarins).

b) Return to the wild makes a strong political/educational statement concerning the fate of animals and may serve to promote local conservation values. However, as part of any education or public awareness programmes, the costs and difficulties associated with the return to the wild must be emphasized.

c) Species returned to the wild have the possibility of continuing to fulfill their biological and ecological roles.

Return to the Wild - Concerns

As indicated above, because of the risk of biological invasion, these guidelines do not consider it a viable option to return animals to the wild outside of their natural range in any but the most exceptional circumstances. Before return to the wild (as per IUCN 1998) of confiscated animals is considered, several issues of concern must be considered in general terms: welfare, conservation value, cost, and disease.

A) WELFARE. While some consider return to the wild to be humane, ill-conceived projects may return animals to the wild which then die from starvation or do not adapt to an unfamiliar or inappropriate environment. Humane considerations require that each effort to return confiscated animals to the wild be thoroughly researched and carefully planned. Re-introduction projects also require long-term commitment in terms of monitoring the fate of released individuals.

In order for return to the wild to be seriously considered on welfare grounds, some have advocated that the survival prospects for released animals must at least approximate those of wild animals of the same sex and age. While such demographic data on wild populations are rarely available, the spirit of this suggestion should be respected -- there must be humane treatment of confiscated animals when attempting to return them to the wild, and there should be a reasonable assessment of the survival prospects of the animals to justify the risks involved.

B) CONSERVATION VALUE AND COST. In cases where returning confiscated animals to the wild appears to be the most humane option, such action can only be undertaken if it does not threaten existing populations of con-specifics or populations of other interacting species, or the ecological integrity of the area in which they live. The conservation of the species as a whole, and of other animals already living free, must take precedent over the welfare of individual animals that are already in captivity.

Before animals are used in programmes in which existing populations are reinforced, or new populations are established, it must be determined that returning these individuals to the wild will make a significant contribution to the conservation of the species, or populations of other interacting species, or it must serve a purpose directly related to the conservation and management of the species or ecosystem involved. Based solely on demographic considerations, large populations are less likely to go extinct, and, therefore, reinforcing existing very small wild populations may reduce the probability of extinction. In very small populations, a lack of males or females may result in reduced population growth or population decline and, therefore, reinforcing a very small population lacking animals of a particular sex may also improve prospects for survival of that population. However, genetic and behavioural considerations, as well as the possibility of disease introduction, also play a fundamental role in determining the long-term survival of a population. The potential conservation benefit of the re-introduction should clearly outweigh the risks.

The cost of returning animals to the wild in a responsible manner can be prohibitive, suggesting that this option should only be pursued when species are of high conservation value. Exceptions to this rule may be instances where the confiscated animals are not of high conservation value, but the circumstances and technical and other resources are available to ensure re-introduction is undertaken in accordance with conservation guidelines (e.g., IUCN 1998)

C) DISEASE. Animals held in captivity and/or transported, even for a very short time, may be

exposed to a variety of pathogens. Release of these animals to the wild may result in introduction of disease to con-specifics or unrelated species with potentially catastrophic effects. Even if there is a very small risk that confiscated animals have been infected by exotic pathogens, the potential effects of introduced diseases on wild populations are often so great that this should preclude returning confiscated animals to the wild.

Release into the wild of any animal that has been held in captivity is risky. Animals held in captivity are more likely to acquire diseases and parasites. While some of these diseases can be tested for, tests do not exist for many animal diseases. Furthermore, animals held in captivity are frequently exposed to diseases not usually encountered in their natural habitat. Veterinarians and quarantine officers, thinking that the species in question is only susceptible to certain diseases, might not test for the diseases picked up in captivity. It should be assumed that all diseases are potentially contagious.

In assessing the possibilities for disease, it may be particularly helpful to consider the known or presumed circumstances of trade, including:

a) the time and distance from point of capture; the number of stages of trade and types of transport;
b) whether the animals have been held or transported in proximity to wild or domesticated animals of the same or other species and what specific diseases have been known to be carried by such animals.

D) SOURCE OF INDIVIDUALS. If the precise provenance of the confiscated animals is not known (they may be from several different sites of origin), or if there is any question of the source of animals, supplementation may lead to inadvertent pollution of distinct genetic races or subspecies. If particular local races or sub-species show specific adaptation to their local environments, mixing in individuals from other races or sub-species may be damaging to the local population. Where the origin and habitat and ecological requirements of the species are unknown, introducing an individual or individuals into the wrong habitat type may also doom them to death.

Given that any release incurs some risk, the following “precautionary principle” should be adopted: ***if there is no conservation value in releasing confiscated animals to the wild or no management programme exists within which such release can be undertaken according to conservation guidelines, the possibility of accidentally introducing a disease, or behavioural and genetic aberrations that are not already present into the environment, however unlikely, should rule out returning confiscated specimens to the wild as a placement option.***

Option 3 -- Euthanasia

Euthanasia -- the killing of animals carried out according to humane guidelines -- is a valid alternative to maintaining animals in captivity or returning them to the wild. Although it may appear counter-intuitive to employ euthanasia, it is, by definition, humane, and, thus can be wholly consistent with conservation and animal considerations. In many cases, it may be the most feasible option for conservation and humane, as well as economic, reasons. It is recognized that euthanasia is unlikely to be a popular option amongst confiscating authorities for disposition of confiscated animals. However, it cannot be overstressed that it may be the most responsible option. In many cases, authorities confiscating live animals will encounter the following situations:

a) In the course of trade or while held in captivity, the animals have contracted a

chronic disease that is incurable and poses a risk to other animals, whether held in captivity or in the wild.

b) The actual provenance of the animals is unknown, and there is evidence to suggest that there may be genetic or other differences between them and presumed con-specifics in the wild, which could compromise the integrity of wild and captive populations, including those involved in breeding or conservation research activities.

c) There are insufficient resources to return the animals to the wild in accordance with biological (e.g., IUCN 1998) and animal welfare (e.g., International Academy of Animal Welfare Sciences 1992) guidelines.

d) There are no feasible options for maintaining the animals in captivity.

In these instances, euthanasia may be the only responsible option and, thus, should be employed.

Euthanasia-- Benefits

a) With respect to the conservation of the species in question and of captive and wild populations of animals, euthanasia carries far fewer risks (e.g. disease, genetic pollution, biological invasion) than maintenance in captivity or return to the wild.

b) Euthanasia may be the best (and only) possible solution to an acute problem with confiscated animals. Many possibilities for maintenance in captivity may not guarantee the animals' welfare over the long term, and the survival prospects of animals returned to the wild are generally not high, as, depending on the circumstances, such animals often die of starvation, disease or predation.

c) Euthanasia acts to discourage the activities that gave rise to confiscation, as the animals in question are completely lost to the trade, with no chance of recovery by the traders involved. This removes any potential monetary gain from illegal trade. In addition, euthanasia may serve as a broader deterrent, in educating the public and other sectors about the serious and complex problems that can arise from trade in live wild animals.

d) The choice of euthanasia over maintenance in captivity or return to the wild offers an opportunity for confiscating authorities and other agencies to educate the public about more esoteric conservation problems, including those relating to invasive species and the potential negative consequences of releasing animals to the wild without adequate safeguards. Increased public awareness may generate additional ideas on placement of confiscated animals.

e) Euthanasia can be inexpensive as compared to other options. As such, it does not divert human and financial resources that could be allocated to other conservation or related activities, such as re-introduction or lifetime care of other animals, or the conservation of threatened species in the wild.

When animals are euthanized, or die in captivity, an effort should be made to make the best use of the dead specimens for scientific purposes, such as placing them in a reference collection in a university or research institute, which are very important for the study of biodiversity, or making them available for pathology or other research.

Euthansia- Risks

A) Just as there is potential positive educational value in employing euthanasia, there is a problem that it may give rise to negative perceptions of the confiscating authority for having taken that decision over other options. In such instances, there is a need to foresee such criticism and offer the rationale for the decision to euthanize.

B) There is a risk of losing unique behavioural, genetic and ecological material within an individual or group of individuals that represents variation within a species and may be of value for the conservation of the species.

Establishing the Necessary Frameworks

In order for prospective confiscating agencies to address the logistical, legal and other difficulties resulting from the seizure of wild animals, their eventual confiscation, and responsible disposition based on the above three options, there should be established an overall policy framework and specific procedures that *inter alia*:

- Identify the authority or authorities with responsibility for confiscation and placement of wild animals;
- Identify or provide the basis for establishing the facilities that will receive and, as necessary, quarantine, seized animals and hold them until final disposition is decided;
- Identify government or non-government agencies and experts that can assist in the identification, care, and screening of the seized or confiscated animals and assist in the process of deciding on appropriate disposition;
- Identify institutions, agencies, and private individuals and societies who can provide assistance to confiscating authorities in disposing of confiscated animals (including humane euthanasia) or can receive such animals;
- Elaborate on and provide for the implementation of the above guidelines in terms of specific legal and regulatory provisions and administrative procedures concerning transfer of ownership (including sale) of confiscated animals, short-term (e.g., upon seizure) and long-term (e.g., post-confiscation) care, levying of fees and other payments for care of confiscated animals, and other considerations that may be required to ensure that confiscated wild animals are disposed of responsibly in terms of both their welfare and the conservation.
- Produce and implement written policies on disposal of confiscated wildlife, taking steps to ensure that all enforcement personnel are provided the necessary resources to implement the policy.

Decision Tree Analysis

For decision trees dealing with “Return to the Wild” and “Captive Options,” the confiscating party must first ask the question:

Question 1: Will “Return to the Wild” make a significant contribution to the conservation of the species? Is there a management programme that has sufficient resources to enable return according to IUCN Re-introduction Guidelines?

The most important consideration in deciding on placement of confiscated specimens is the conservation value of the specimen in question. Conservation interests are best served by ensuring the survival of as many individuals as possible; hence, the re-introduction of confiscated animals must improve the prospects for survival of the wild population. Re-

introducing animals that have been held in captivity will always involve some level of risk to populations of the same or other species in the ecosystem, because there can never be absolute certainty that a confiscated animal is disease- and parasite-free. If the specimen is not of conservation value, the costs of re-introducing the animals to the wild may divert resources away from conservation programmes for other species or more effective conservation activities. In most instances, the benefits of return to the wild will be outweighed by the costs and risks of such an action. If returning animals to the wild is not of conservation value, captive options pose fewer risks and may offer more humane alternatives.

Q1 Answer: **Yes:** Investigate "Return to the Wild" Options.
NO: Investigate "Captive Options".

DECISION TREE ANALYSIS - CAPTIVITY

The decision to maintain confiscated animals in captivity involves a simpler set of considerations than that involving attempts to return confiscated animals to the wild.

Question 2: Have animals been subjected to comprehensive veterinary screening and quarantine?

Animals that may be transferred to captive facilities must have a clean bill of health because of the risk of introducing disease to captive populations. This should be established through quarantine and screening.

Q2 Answer: Yes: Proceed to Question 3.
No: Quarantine and screen, and proceed to Question 3

Question 3: Have animals been found to be disease-free by comprehensive veterinary screening and quarantine, or can they be treated for any infection discovered?

If, during quarantine, the animals are found to harbour diseases that cannot reasonably be cured, they must be euthanized to prevent infection of other animals. If the animals are suspected to have come into contact with diseases for which screening is impossible, extended quarantine, transfer to a research facility, or euthanasia must be considered.

Q3 Answer: Yes: Proceed to Question 4
No: If chronic and incurable infection exists, first offer animals to research institutions. If impossible to place in such institutions, euthanize.

Question 4: Are there grounds for concern that certain options for transfer will stimulate further illegal or irregular trade or reduce the effectiveness of confiscation as a deterrent to such trade?

As much as possible, the confiscating authority should be satisfied that:

1) those involved in the illegal or irregular transaction that gave rise to confiscation cannot obtain the animals proposed for transfer;
2) the transfer does not compromise the objective of confiscation; and
3) the transfer will not increase illegal, irregular or otherwise undesired trade in the species.

What options can guarantee this will depend on the conservation status of the species in

question, the nature of the trade in that species, and the circumstances of the specific incident that gave rise to confiscation. The payment of fees – to or by the confiscating authority – will complicate this assessment. Confiscating authorities must consider the various options for transfer in light of these concerns and weigh them against potential benefits that certain options might offer.

Answer: Yes: Proceed to Question 5a.
No: Proceed to Question 5b.

Question 5a: Is space available with a captive facility where the benefits of placement will outweigh concerns about the risks associated with transfer?

Question 5b: Is space available in a captive facility that offers particular benefits for the animals in question or the species?

There are a range of options for placement of confiscated animals in captivity, including public and private facilities, either commercial or non-commercial, specialist societies and individuals. Where several options for placement exist, it may be helpful to consider which offers the opportunity to maximize the conservation value of the animals, such as involvement in a conservation education or research programme or a captive-breeding programme. The conservation potential must be carefully weighed against the risk of stimulating trade that could exert further pressure on the wild population of the species.

Although placement with a commercial captive-breeding operation has the potential to reduce demand for wild-caught animals, this option should be carefully assessed: it may be difficult to monitor these facilities, and such programmes may, unintentionally or intentionally, stimulate trade in wild animals. In many countries, there are active specialist societies or clubs of individuals with considerable expertise in the husbandry and breeding of individual species or groups of species. Such societies can assist in finding homes for confiscated animals with individuals who have expertise in the husbandry of those species

When a choice must be made between several options, the paramount consideration should be which option can:

1) offer the opportunity for the animals to participate in a programme that may benefit the conservation of the species;
2) provide the most consistent care; and
3) ensure the welfare of the animals.

In instances, where no facilities are available in the country in which animals are confiscated, transfer to a captive facility outside the country of confiscation may be possible. Whether to pursue this will depend on the conservation value of the species or the extent of interest in it. An important consideration in assessing this option is the cost involved and the extent to which these resources may be more effectively allocated to other conservation efforts.

The confiscating authorities should conclude an agreement to transfer confiscated animals to captive facilities. This agreement should set forth the terms and conditions of the transfer, including:

a) restrictions on any use (e.g., exhibition, education, captive breeding), commercial or non-commercial, that the animals may be put to;
b) a commitment to ensure life-time care or, in the event that this becomes impossible, transfer to another facility that can ensure life-time care, or to euthanize the animals; and
c) conditions regarding subsequent transfer of ownership, including sale, of the

animals or their offspring.

Q5 Answer: Yes: Execute agreement and sell.
No: Proceed to Question 6.

Question 6: Are institutions interested in animals for research under humane conditions?

Many research institutions maintain collections of exotic animals for research conducted under humane conditions. If these animals are kept in conditions that ensure their welfare, transfer to such institutions may provide an acceptable alternative to other options, such as transfer to another captive facility or euthanasia. As in the preceding instances, such transfer should be subject to terms and conditions agreed with the confiscating authority; in addition to those already suggested, it may be advisable to include terms that stipulate the types of research the confiscating authority considers permissible. If no placement is possible, the animals should be euthanized.

Q6 Answer: Yes: Execute Agreement and Transfer.
No: Euthanize.

DECISION TREE ANALYSIS -- RETURN TO THE WILD

Question 2: Have animals been subjected to a comprehensive veterinary screening and quarantine?

Because of the risk of introducing disease to wild populations, confiscated animals that may be released must have a clean bill of health. The animals must be placed in quarantine to determine if they are disease-free before being considered for released.

Q2 Answer: Yes: Proceed to Question 3.
No: Quarantine and screen, and proceed to Question 3.

Question 3: Have animals been found to be disease-free by comprehensive veterinary screening and quarantine, or can they be treated for any infection discovered?

If, during quarantine, the confiscated animals are found to harbour diseases that cannot reasonably be cured, unless any institutions are interested in the animals for research under humane conditions, they must be euthanized to prevent infection of other animals. If the animals are suspected to have come into contact with diseases for which screening is impossible, extended quarantine, donation to a research facility, or ethanasia must be considered.

Q3 Answer: Yes: Proceed to Question 4
No: If chronic and incurable infection exists, first offer animals to research institutions. If impossible to place in such institutions, euthanize.

Question 4: Can the country of origin and site of capture be confirmed?

The geographical location from which confiscated animals have been removed from the wild must be determined if these individuals are to be used to re-inforce existing wild populations. As a general rule, animals should only be returned to the population from which they were

taken, or from populations that are known to have natural exchange of individuals with this population.

If provenance of the animals is not known, release for reinforcement may lead to inadvertent hybridisation of distinct genetic races or sub-species. Related species of animals that may live in sympatry in the wild and never hybridise have been known to hybridise when held in captivity in multi-species groups. This type of generalisation of species recognition under abnormal conditions can result in behavioural problems, which can compromise the success of any future release and also pose a threat to wild populations by artificially destroying reproductive isolation that is behaviourally mediated.

Q4 Answer: Yes: Proceed to Question 5.
No: Pursue 'Captive Options'.

Question 5: Do the animals exhibit behavioural abnormalities that might make them unsuitable for return to the wild?

Behavioural abnormalities as a result of captivity can render animals unsuitable for release into the wild. A wide variety of behavioural traits and specific behavioural skills are necessary for survival, in the short-term for the individual, and in the long-term for the population. Skills for hunting, avoiding predators, food selectivity, etc. are necessary to ensure survival.

Q5 Answer: Yes: Pursue 'Captive Options'.
No: Proceed to Question 6.

Question 6: Can the animals be returned expeditiously to their site of origin (specific location), and will benefits to conservation of the species outweigh any risks of such action?

Return of the animals to the wild through reinforcement of the wild population should follow the IUCN Re-introduction Guidelines and will only be an option under certain conditions, including:

a) appropriate habitat for such an operation still exists in the specific location that the individual was removed from; and
b) sufficient funds are available, or can be made available.

Q6 Answer: Yes: Re-inforce at origin (specific location) following IUCN Guidelines.
No: Proceed to Question 7.

Question 7: For the species in question, does a generally recognized programme exist the aim of which is conservation of the species and eventual return to the wild of confiscated individuals and/or their progeny? *Contact IUCN/SSC, IIUDZG, Studbook Keeper, or Breeding Programme Coordinator (See Annex 3).*

In the case of species for which active captive breeding and/or re-introduction programmes exist, and for which further breeding stock/founders are required, confiscated animals should be transferred to such programmes after consultation with the appropriate scientific authorities. If the species in question is part of a captive breeding programme, but the taxon (sub-species or race) is not part of this programme, other methods of disposition must be considered. Particular attention should be paid to genetic screening to avoid jeopardizing captive breeding programmes through inadvertent hybridisation.

Q7 Answer: Yes: Execute agreement and transfer to existing programme.
No: Proceed to Question 8.

Question 8: Is there a need, and is it feasible to establish a new re-introduction programme *following IUCN Guidelines*?

In cases where individuals cannot be transferred to existing re-introduction programmes, re-introduction following IUCN Guidelines, may be possible, providing:

a) appropriate habitat exists for such an operation;
b) sufficient funds are available, or can be made available, to support a programme over the many years that (re)introduction will require; and
c) sufficient numbers of animals are available so that re-introduction efforts are potentially viable.

In the majority of cases, at least one, if not all, of these requirements will fail to be met. In this instance, either conservation introductions outside the historical range of the species or other options for disposition of the animals must be considered.

If a particular species is confiscated with some frequency, consideration should be made as to whether to establish a re-introduction, reinforcement, or introduction programme for that species. Animals should not be held by the confiscating authority indefinitely while such programmes are planned, but should be transferred to a holding facility after consultation with the organization which is establishing the new programme.

Q8 Answer: Yes: Execute agreement and transfer to holding facility or new programme.
No: Pursue 'Captive Options'.

Relevant Documents

CITES. 1997. Resolution Conf. 10.7: Disposal of Confiscated Live Specimens of Species Included in the Appendices. Adopted at the Tenth Meeting of the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Harare, 1997).
(Available from CITES Secretariat or from http://www.cites.org)

IUCN. 1987. *The IUCN position statement on translocation of living organisms: introductions, re-introductions and restocking*. IUCN, Gland, Switzerland.
(Available from IUCN/SSC or from http://iucn.org/themes/ssc/PUBS/POLICY/INDEX.HTM)

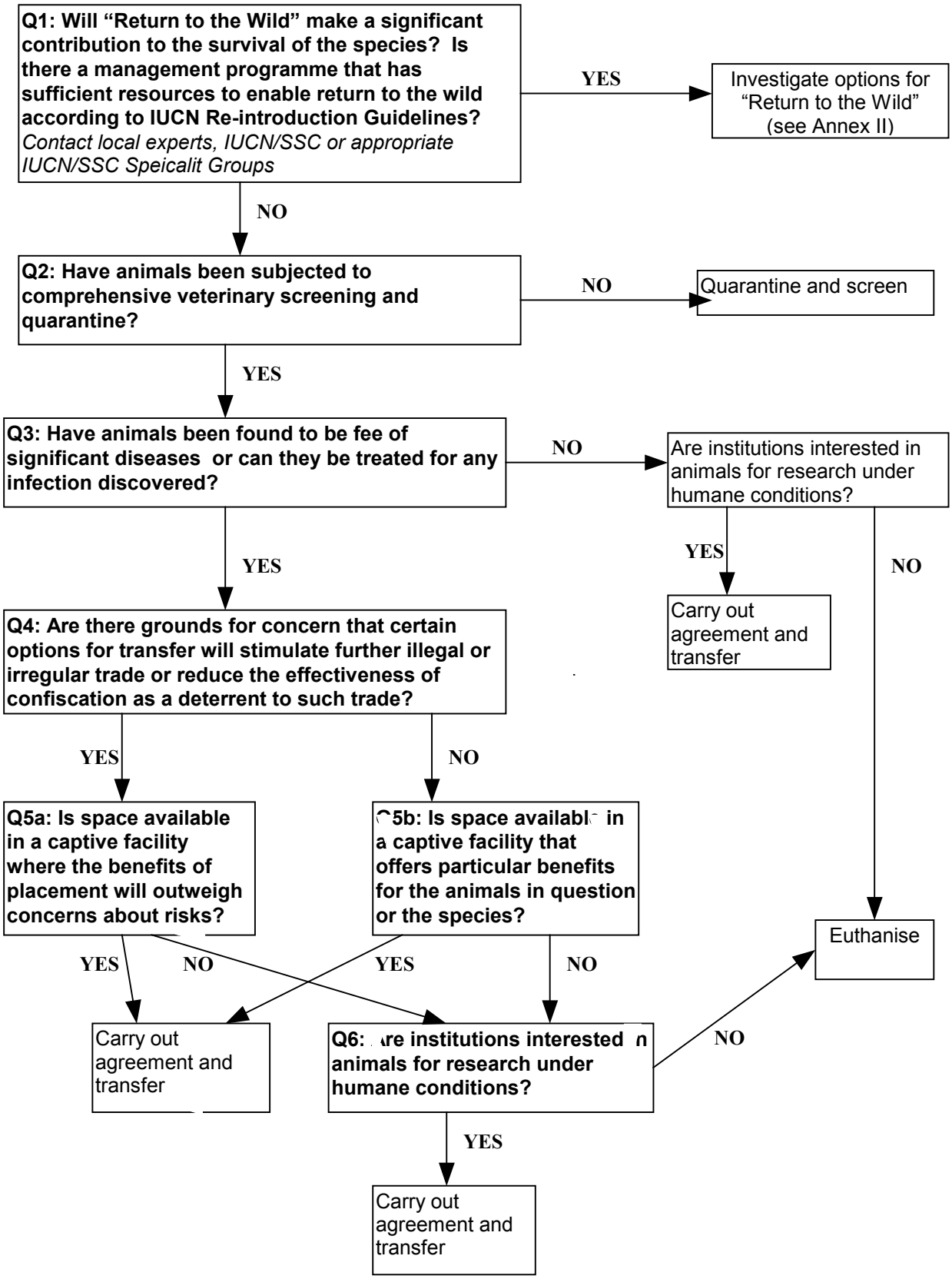
IUCN. 1998. *IUCN Guidelines for Re-introductions.* Prepared by the IUCN/SSC Reintroductions Specialist Group. IUCN, Gland Switzerland and Cambridge, UK.
(Available from IUCN Publications Services Unit or from http://iucn.org./themes/ssc/PUBS/POLICY/INDEX.HTM)

IUCN. IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species. Prepared by the IUCN/SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland.
Available from http://iucn.org/themes/ssc/pubs/policy/invasivesEng.htm

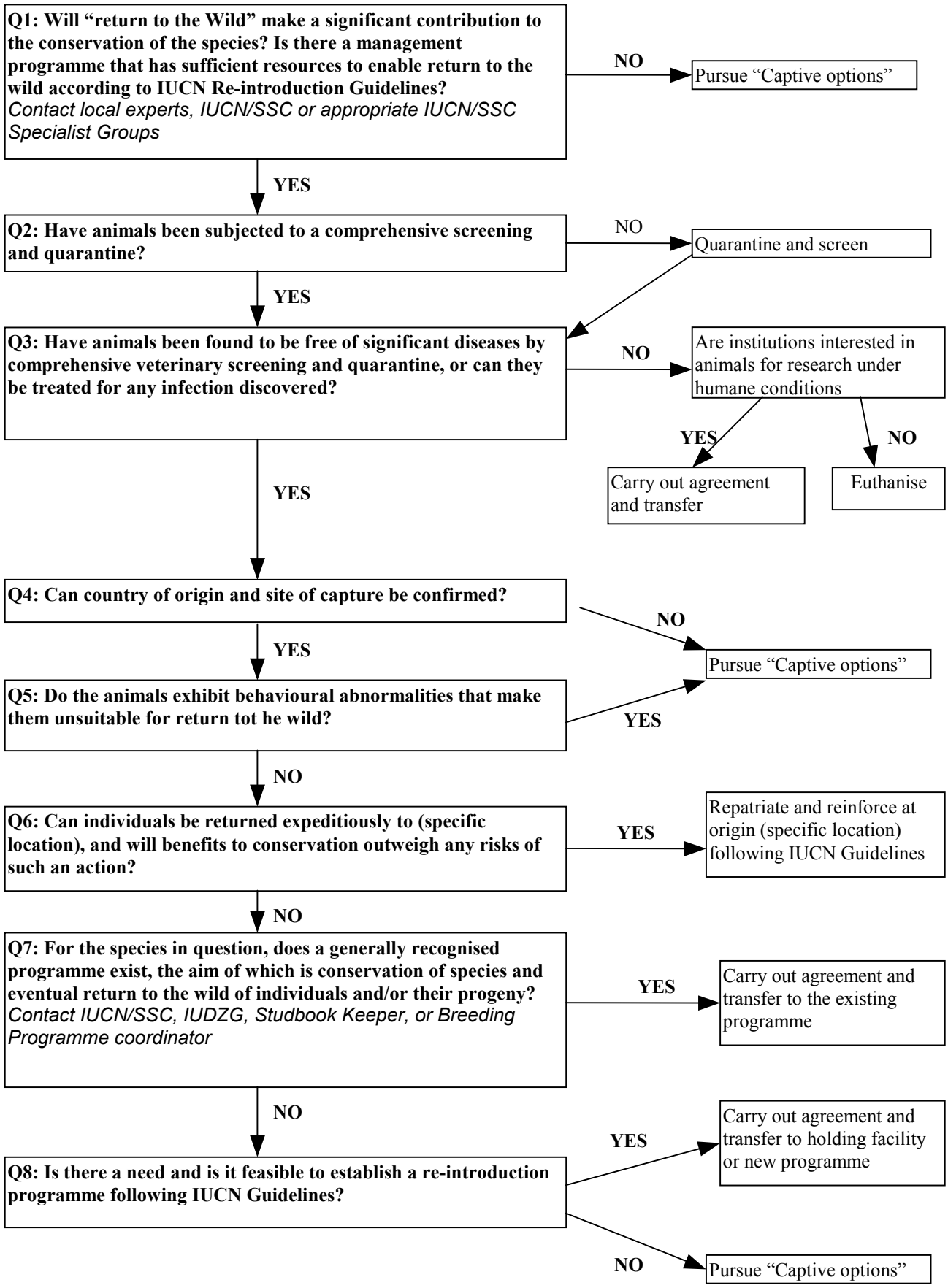
IUDZG/CBSG. 1993. *The World Zoo Conservation Strategy. The Role of Zoos and Aquaria of the World in Global Conservation*. IUDZG-the World Zoo Organization.

Annexes

Annex 1- Decision Tree for Captive Options



Annex 2 - Decision Tree for Return to the Wild



Annex 3 - Key Contacts

IUCN Species Survival Commission

Contact: Species Survival Programme
IUCN-The World Conservation Union
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1196 Gland
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Tel: 41/22.999.0153
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Email: ssc@iucn.org
Website: http://www.iucn.org/themes/ssc/index.htm

Taxonomic Specialist Groups

Contact details for individual taxonomic specialist groups of SSC are available through IUCN at the contact details and IUCN website address provided above.

Disciplinary Specialist Groups

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15 January 2002

IUCN Disease Risk Assessment Guidelines

Working Group
Briefing Materials

2014 CBSG Annual Meeting
New Delhi, India

IUCN Guidelines Working Group: Disease Risk Assessment

Convenor: Richard Jakob-Hoff

AIM: To become familiar with the new IUCN-OIE Wildlife Disease Risk Analysis (DRA) publications and how the DRA process can benefit conservation planning decision making.

BACKGROUND: Participants should be familiar with the first 9 pages of the Guidelines for Wildlife Disease Risk Analysis (see Preparation below)

PROCESS: Workshop participants will initially share some examples of disease threats involving wildlife they are aware of in their own country or geographic region. With this as a background they will then collaboratively apply the DRA process and some associated tools to a scenario involving disease risk to a threatened wildlife species. The session will culminate in a facilitated discussion of the potential for application of this process to the situations they are personally familiar with.

OUTCOMES: Participants will 1. Be aware of the new IUCN-OIE DRA publications, their availability and the potential application of the DRA process to conservation planning and decision making 2. Understand the structure of the DRA process including the purpose of each step and 3. Identify at least one situation of relevance to themselves in which this process could be of value.

Preparation: Think about and bring notes on conservation scenarios in their own region in which wildlife health is at risk (infectious and non-infectious causes) or where disease in wildlife is a threat to the health of domestic animals or people. As above, read the DRA Guidelines (at least pp 1-9).

IUCN

SSC
Species Survival Commission

Guidelines
for Wildlife Disease Risk Analysis

WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

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Guidelines for Wildlife Disease Risk Analysis

Co-published by OIE and IUCN

Contents

Contributors

The IUCN/OIE *Guidelines for Wildlife Disease Risk Analysis (DRA)* (hereafter '*Guidelines*') was compiled by the IUCN Species Survival Commission's (SSC) Wildlife Health Specialist Group (WHSG), working in concert with the Conservation Breeding Specialist Group (CBSG), Reintroduction Specialist Group (RSG) and Invasive Species Specialist Group (ISSG). EcoHealth Alliance and the Royal Veterinary College (RVC) provided administrative support for the project and staff time.

The IUCN/OIE *Guidelines for Wildlife DRA* was primarily developed under the leadership of Richard Kock (Royal Veterinary College), William B. Karesh (EcoHealth Alliance), Lee Skerratt (James Cook University), Matt Hartley (Zoo and Wildlife Solutions Ltd) and Dominic Travis (Ecosystem Health Initiative, University of Minnesota College of Veterinary Medicine). Rosemary Barraclough and Katharina Stärk provided technical review, and Lisa Starr and Catherine Machalaba provided editorial support for the document. Richard Jakob-Hoff (New Zealand Centre for Conservation Medicine, Auckland Zoo) served as the Lead Editor for the overall project leading to these guidelines and a comprehensive toolkit, the *Manual of Procedures for Wildlife Disease Risk Analysis* (hereafter *Manual*). The IUCN SSC groups provided invaluable information about the needs related to wildlife DRA tools through a survey of the SSC membership.

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Initial plans were developed at the Disease Risk Analysis Tools Workshop at the Auckland Zoo, New Zealand, 4–7 April 2011, sponsored by the Auckland Zoo, Landcare Research, the New Zealand Department of Conservation and the IUCN-SSC Conservation Breeding Specialist Group. It was decided at this meeting that a policy promotion document (this *Guideline*), as a standalone, would best support the future global dissemination and use of the main *Manual*.

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Executive summary

In this document 'wildlife' refers to the World Organisation for Animal Health (OIE) definition of wild animal – *an animal that has a phenotype unaffected by human selection and lives independent of direct human supervision or control*. To further clarify the discussion, the term 'disease' in this text refers broadly to any impairment of the normal structural or physiological state of a living organism resulting from its physiological response to a hazard. In this case a 'hazard' is defined as: 'a biological, chemical or physical agent in, or a condition of, an animal or animal product with the potential to cause an adverse health effect'.

Disease risk analysis (DRA) is an important tool for analysing the risks of disease introduction or emergence in a population (we use emerging disease to describe those that are caused by newly identified species or strains (e.g. SARS (severe acute respiratory syndrome), HIV/AIDS (human immunodeficiency virus/acquired immune deficiency syndrome) that may have evolved from a known infection (e.g. influenza) or spread to a new population (e.g. West Nile virus) or geographic area or be re-emerging infections, such as drug-resistant tuberculosis. A DRA can also help to assess the risk of disease spill-over (when a disease moves from one species to another). Often DRA methods are used to assess a disease risk, which is precipitated by a new or potential action, such as movement (intentional or accidental) of a species into a new habitat. The end-goal of the DRA is to provide efficient and cost-effective disease prevention and mitigation strategies.

DRA has increasingly been used to inform agricultural trade decisions and conservation-based species reintroduction or translocation efforts; however, especially as *human–wildlife* and *domestic animal interactions* increase, its potential use is much wider in the conservation field and beyond. Although international trade regulations for animals and animal products are already in place, a standard approach is still needed for assessing disease risks specific to conservation. The IUCN/OIE *Guidelines for Wildlife DRA* presents such an approach. The purpose of this document is to encourage readers to consider DRA as a planning tool and to direct readers to the technically comprehensive *Manual of Procedures for Wildlife Disease Risk Analysis* for implementation strategies.

These introductory Guidelines highlight the following key messages:

- *Wildlife disease risks have immediate implications for species conservation, as well as wider relevance* to other disciplines including human and livestock health, agriculture, economics, trade and ecosystems services.
- *Wildlife DRA can and should be applied to a variety of situations and disciplines,* including animal translocation or reintroduction scenarios but also in agricultural expansion, conservation planning and tourism, development of transport networks, urban and rural residential design, extractive industries, watershed and land-use planning, sanctuary planning, assessing bushmeat risks and even employee health.
- *The main components of wildlife DRA are hazard identification, risk assessment, risk management and risk communication.* Execution of these components is aided by the efforts of the technical team of wildlife managers and other stakeholders, the DRA tool selection, and data collection and analysis.
- *Wildlife DRA allows for great flexibility around the level of available or devoted resources* (i.e. financial, time or technical capabilities).
- *Wildlife DRA* provides an open, transparent process that can be easily followed for policy and risk management discussions.
- *Importantly, rather than risk elimination, wildlife DRA promotes risk reduction.* This allows for solutions that reduce risk while aiming to accommodate stakeholders' goals. This is predicated upon the fact that there is often no chance of obtaining 'zero' risk.

The IUCN/OIE *Guidelines for Wildlife DRA* intend to provide decision makers (e.g. wildlife managers, public and environmental health officials, government agencies, and industry representatives) with the information needed to integrate the wildlife DRA process into their work. It is hoped that the wildlife DRA process will be utilised on a wide scale to encourage risk mitigation strategies that are mutually beneficial to a variety of stakeholders.

Background and motivation

Disease plays an important role in the natural environment, serving as a regulator of the genetic fitness of wildlife through selective pressure in evolutionary processes. Conversely, it has been shown that the loss of certain microorganisms and parasites can be detrimental to the healthy functioning of ecosystems and species alike. Unfortunately, human-induced changes in our environment caused by habitat destruction or modification, industrial and urban development, population growth and global movement of people and animals have fundamentally changed the way disease affects not only wildlife but also entire ecosystems. These changes require a way of looking at disease that considers the biological, political and economic value of wildlife and the consequences of biodiversity loss. A process known as disease risk analysis (DRA) has been adopted by IUCN and other organisations to analyse and manage the possible outcomes of situations involving disease. These *Guidelines* demonstrate the importance of DRA specifically for wildlife and promote the use of the larger *Manual of Procedures for Wildlife Disease Risk Analysis*.

The most well recognised approaches to DRA are the processes set out in the World Organisation for Animal Health (OIE) *Terrestrial Animal Health Code* (www.oie.int/international-standard-setting/terrestrial-code/) and the Codex Alimentarius Commission (www.codexalimentarius.org). These documents focus primarily on import policy and food safety, respectively. Drawing on expertise across several disciplines, IUCN has built upon this existing OIE framework to address issues of biodiversity loss.

Wildlife DRA should be used in combination with other guidelines that promote evidence-based practices. For example, animal reintroduction planning should employ the use of the IUCN Reintroduction Guidelines as a source of practical information to supplement and guide DRA efforts (*Guidelines for Reintroductions and Other Conservation Translocations* (2013) can be found at http://www.issg.org/pdf/publications/RSG_ISSG-Reintroduction-Guidelines-2013.pdf).

Disease risk analysis – a means of conserving wildlife and biodiversity

Historically, DRA frameworks were applied *ad hoc* to situations involving wildlife often without a standardised approach. DRA for wildlife has been created to provide a consistent framework specifically targeted to situations that involve wildlife. The *Manual*, to which these *Guidelines* refer, describes the wide range of actions or events for which wildlife DRA might be appropriate.

When does DRA have value to decision makers?

A DRA has value to decision makers in all cases in which wildlife may be involved in, or affected by, disease occurrence. This can include the movement of animals or their products, exposure to toxins, investigations of wildlife population decline and analysis of risks associated with wildlife interactions with people or their domestic animals. DRA for wildlife is of value whenever wildlife, their products (e.g. hides, antlers, etc.) or their samples (e.g. blood, urine, etc.) are involved.

Who is affected in these cases?

- The animal or animals in question (exposure to a pathogen or toxin could cause disease outbreaks and/or decline in a population).
- Other animals exposed directly or indirectly during and after an event (the event could be animal movement, urban development, changing land-use).
- Other species of plants or animals that share the same habitat.
- Humans that come into contact with wildlife.

What type of organisation can benefit from using DRA?

- *Public health agencies* – to help formulate policies and develop programmes focused primarily on human health.
- *Conservation organisations* – to assist with designing wildlife protected areas, investigating wildlife population decline or guiding animal translocation or reintroduction efforts.
- *Strategic planners* – for economic development (e.g. ecotourism projects), agricultural extension, development of transport networks, extractive industries, watershed and land-use planning, and urban and rural residential design (e.g. to analyse the risks of Lyme disease emerging in a new park).
- *Government agencies* – to assist with the formulation of guidelines to be used at local, national or international levels.

In addition to its use prior to planned or intentional movement of wild animals or animal products, the wildlife DRA process is increasingly being applied to situations in which public health, domestic animal health or wildlife population health is at risk. In some cases, a thorough DRA will reveal that current risk reduction or risk management practices are either already adequate or could be easily adapted from other existing sources. These practices may include disease testing, quarantine, containment, disinfection or vaccination. In other cases, the DRA will reveal information or procedural gaps that need to be addressed prior to implementing actions involving the animals, people or habitat.

Steps in the disease risk analysis process

The DRA framework we propose is based on the one developed by the World Organisation for Animal Health (OIE), which is used to identify, assess and manage the risks posed by animal diseases with a focus on economic and human health impacts.

The term 'risk analysis' refers to the overall process regardless of the format used or how individual components are defined. The risk analysis begins with problem description (the process of describing and justifying the problem or question) and then consists of five interconnected components (Fig. 1): risk communication; hazard identification; risk assessment; risk management; and implementation and review. Each component of the risk analysis is focused on answering basic question(s).

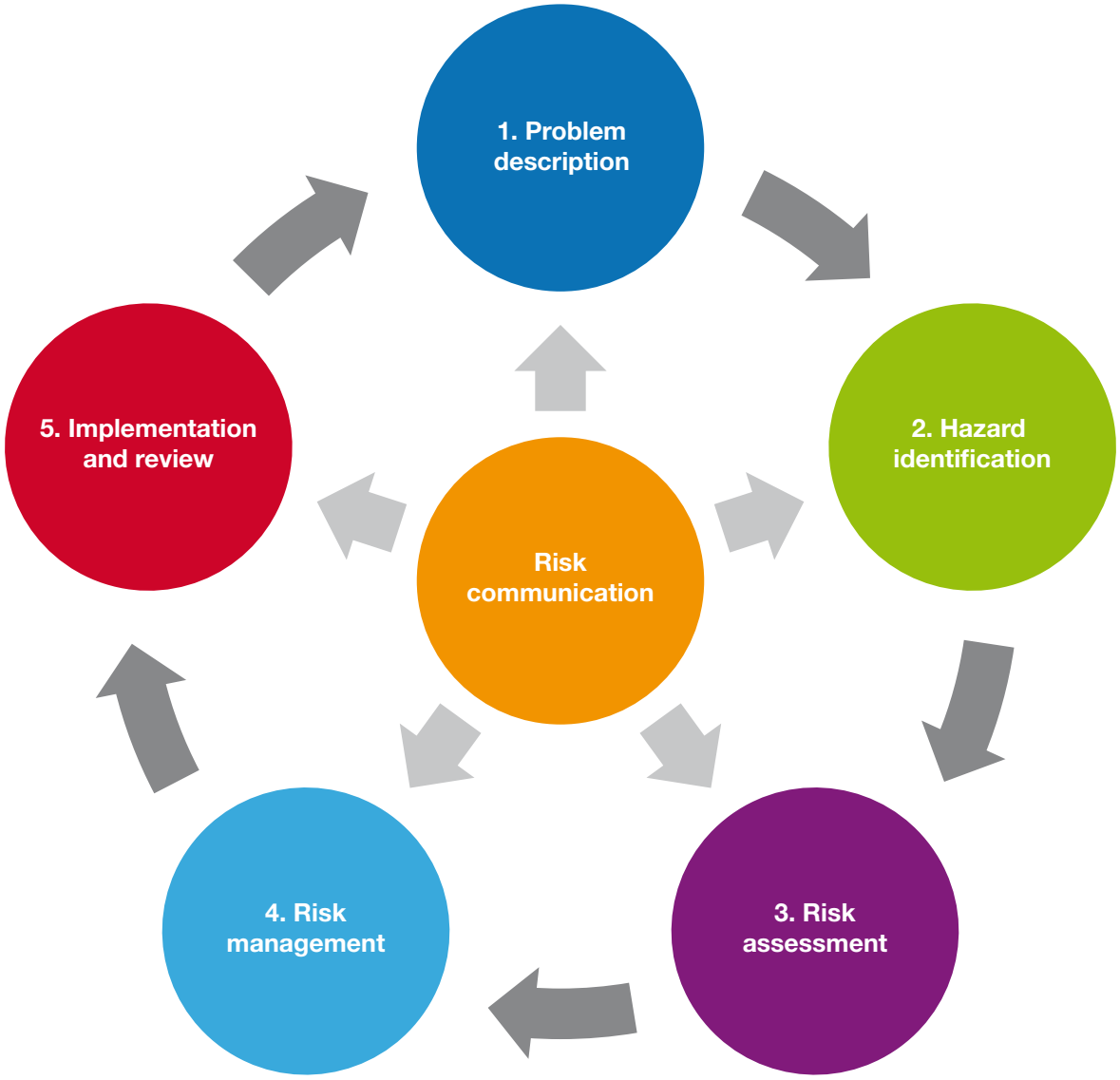

Fig. 1
Steps in the disease risk analysis process

Risk communication (applies throughout all disease risk analysis steps)

Purpose: Engage with a wide group of technical experts, scientists and stakeholders to maximise the quality of analysis and probability that recommendations arising will be implemented.

Questions: 'Who has an interest, who has knowledge or expertise to contribute and who can influence the implementation of recommendations arising from the DRA?'

1 Problem description

Purpose: Outline the background and context of the problem, identify the goal, scope and focus of the DRA, formulate the DRA question(s), state assumptions and limitations and specify the acceptable level of risk.

Questions: 'What is the specific question for this DRA, and what kind of *risk analysis* is needed?'

2 Hazard identification

Purpose: Identify all possible health hazards of concern and categorise into 'infectious' and 'non-infectious' hazards. Establish criteria for ranking the importance of each hazard within the bounds of the defined problem. Consider the potential direct and indirect consequences of each hazard to help decide which hazards should be subjected to a full risk assessment. Exclude hazards with zero or negligible probability of release or exposure, and construct a scenario tree for remaining, higher priority hazards of concern, which must be more fully assessed (Step 3).

Questions: 'What can cause disease in the population of concern?', 'How can this happen?' and 'What is the potential range of consequences?'

3 Risk assessment

Purpose: To assess for each hazard of concern:

a) the likelihood of release (introduction) into the area of concern;

b) the likelihood that the species of interest will be exposed to the hazard once released;

c) the consequences of exposure.

On this basis the hazards can be prioritised in descending order of importance.

Questions: 'What is the likelihood and what are the consequences of an identified hazard occurring within an identified pathway or event?'

4 Risk management

Purpose: Review potential risk reduction or management options and evaluate their likely outcomes. On this basis decisions and recommendations can be made to mitigate the risks associated with the identified hazards.

Questions: 'What can be done to decrease the likelihood of a hazardous event?' and 'What can be done to reduce the implications once a hazardous event has happened?'

5 Implementation and review

Purpose: To formulate an action and contingency plan and establish a process and timeline for the monitoring, evaluation and review of risk management actions. The review may result in a clearer understanding of the problem and enable refinement of the DRA.

Questions: 'How will the selected risk management options be implemented?' and, once implemented, 'Are the risk management actions having the desired effect?' and, if not, 'How can they be improved?'

Wildlife disease case studies – disease risk analysis put into practice

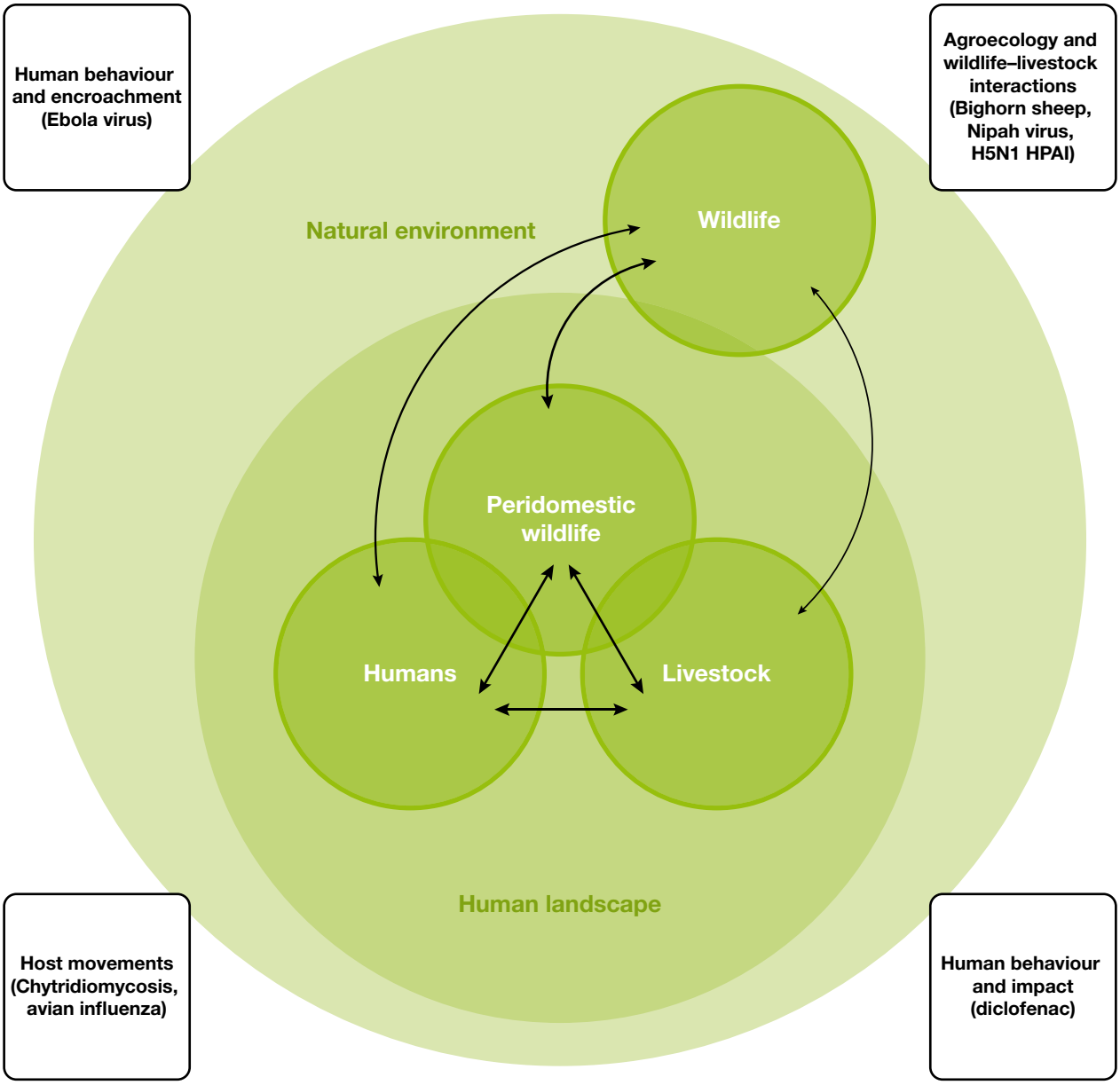

Fig. 2
Pathogen flow and drivers at the human–livestock–wildlife interface
The arrows in Figure 2 indicate direct, indirect or vector-borne pathogen flow
Each box represents a driver for which a case study is provided in the text

The case of the bighorn sheep reintroduction: not as easy as it seems

– Bighorn sheep (*Ovis canadensis*), a free-ranging species that was once very abundant throughout North America, has experienced population decline from over two million individuals at the turn of the century to only several thousand individuals decades later (Goodson 1982).

– Scientific studies have indicated that their populations have declined in large part as a result of diseases transmitted from domestic sheep that increasingly have shared the same grazing territory.

– Free-ranging bighorn sheep are susceptible to many diseases that domestic sheep can carry, including scabies, lungworm and pneumonia (Callan *et al.* 1991).

– Outbreaks of pneumonia, in particular, have been shown to influence the distribution of bighorn populations throughout North America, and there have been several large-scale die-offs due to pneumonia in both the United States and Canada (Shannon *et al*. 1995; Hobbs and Miller, 1992; Jorgenson *et al*. 1997; Valdez and Krusman, 1999).

– Disease has also been shown to compound the effects of other stressors that already threaten bighorn survival such as development on, or near, bighorn sheep habitat, internal and external parasites acquired from domestic animals, and overcrowding on rangeland (Garde *et al*. 2005).

– Reintroduction attempts for bighorn sheep have had mixed results owing to infectious diseases.

– Disease risk analyses are now being used by wildlife agencies to help guide future planning and to improve conservation outcomes for the reintroduction of bighorn sheep (USDA 2006).

Desert bighorn sheep being released in Southern California with a tracking collar
Bighorn sheep are at risk from diseases carried by domestic sheep that share the same grazing areas, so knowing where bighorn are and where they interface with domestic sheep is very valuable in developing management plans
Photo courtesy of Michael D. Kock

Amphibian population decline

– Chytridiomycosis (caused by the fungus *Batrachochytrium dendrobatidis*) has been associated with the extinction of approximately 100 amphibian species and the severe decline of many more from the late 1970s onwards (Skerratt *et al*. 2007).

– Amphibian species in protected, relatively pristine habitats have been particularly affected, showing that traditionally 'protected' areas are not immune to introduced diseases (Skerratt *et al*. 2007).

– Spread of the fungus may be related to increased international movement of amphibian species for use as laboratory animals, food or pets (Weldon *et al*. 2004).

– Large population sizes that are distributed through a range of climates and habitats are more resilient to infection and decline owing to environmental constraints on the pathogen. This is a good example of the positive correlation between high biodiversity and increased resilience to threats and change (Murray and Skerratt 2012).

– The global community is now responding to the threat of chytridiomycosis through improving the biosecurity of free-ranging amphibian populations, *ex situ* conservation (including captive breeding), and researching ways of mitigating disease transmission *in situ* (Australian Government 2006; Gagliardo *et al*. 2008; OIE 2011).

– A DRA could contribute to the success of both *ex situ* and *in situ* programmes for amphibians by identifying the most important risk factors for disease exposure and transmission and approaches to prevention and control.

Green-eyed tree frog **(Litoria genimaculata)**
The green-eyed tree frog is one of several species threatened by the chytrid fungus, a malady that may be responsible for declines in amphibian populations worldwide
Photo courtesy of Lee Skerratt, James Cook University, Townsville, Australia

Fatal consequences from changing land use: Nipah virus's deadly cycle

– The Nipah virus outbreak among pigs and pig farmers in Malaysia in 1998 and 1999 demonstrated that human-driven intensification of contact among wildlife, livestock and people can have deadly consequences.

– Nipah virus is carried by pteropid fruit bats, which do not show signs of the disease when infected (Field 2009).

– Swine production expanded rapidly in the 1990s in Malaysia, resulting in clearing of forest in pteropid bat habitat (Chua *et al*. 2002; Pulliam *et al*. 2012).

– Some swine producers maintained mature fruit trees over open pigsties, resulting in night-time feeding by pteropid bats and subsequent infection of pigs via bat urine and faecal or salivary contamination of partially eaten fruits that fell to the ground (Luby *et al*. 2009).

Little red flying fox **(Pteropus scapulatus)**
These little red flying foxes are one of many species of fruit bats affected by the deadly Nipah virus
Photo courtesy of Mdk572 Wiki Creative Commons (http://creativecommons.org/licenses/by-sa/3.0/)

– It is suggested that pigs, their semen and infected farm workers moving between pig farms have facilitated the movement of the virus among pig farms (CFSPH 2007; Goh *et al*. 2000).

– The World Health Organization (WHO) has estimated the number of people infected with Nipah virus that die (the case fatality rate for humans) at 40% to 75%. In addition to the effect on human health, agriculture in the region was severely affected as these outbreaks led to the culling of more than one million swine and the implementation of strict quarantine measures to prevent further human to human transmission (Ahmad 2000).

– Analysis of risk factors identified the removal of fruit trees from pig farms as a mechanism for preventing the future introduction of the disease, and this has become standard protocol in Malaysia (Nahar *et al.* 2010; Siembieda *et al*. 2011).

– The addition of wildlife DRA to agricultural and industrial development planning could help to identify potential disease risks, such as Nipah virus, and in turn guide appropriate risk mitigation strategies to prevent an outbreak.

Handling and consumption of wildlife: prevention is better than cure

- Human populations are increasingly encroaching into wildlife habitats and facilitating an increased trade in bushmeat and other wildlife products. This increases human contact with a diversity of wildlife and their pathogens.

- Annual bushmeat consumption in Central Africa alone has been estimated to be a billion kilograms, comprising millions of individual wild animals (Karesh *et al*. 2005).

- Diseases such as HIV infection/AIDS, Ebola haemorrhagic fever virus, monkeypox, and SARS have all been linked to the handling of wild animals for the purpose of human consumption (Greger 2007).

- Disease transmission can also occur from humans or domestic animals to wildlife, as documented for endangered mountain gorillas, which have experienced deadly respiratory infections from human metapneumovirus and human measles. Human-facilitated introduction of domestic species to an area may bring in diseases such as rabies or bovine tuberculosis (Bengis *et al*. 2002).

- DRA in this situation would be similar to the approaches used for determining risks from foodborne infections, including value chain analysis, i.e. determining all the steps from food source to consumption and identifying appropriate monitoring and intervention points.

- A full DRA for bushmeat and other wildlife products intended for trade would include the risk of acquiring animals, handling and transport, consumption and/or use, the implementation of disease prevention strategies, and identification of the relative risks of various products and uses.

From hunter to market table

Animals throughout Asia and Africa are sought for human consumption. This hunter pictured here (in Sudan) represents a common beginning of the wildlife trade cycle and the bushmeat on the market table in Asia a familiar end. As hunters reach deeper into the forest, seeking wildlife for food, both humans and wildlife can be exposed to disease

Photos courtesy of Richard Kock (left) and William B. Karesh, EcoHealth Alliance (right)

‘Bird flu’: disease risk analysis helping to direct resources

Local newspapers hypothesise that wild bird migration may contribute to the spread of avian influenza. Partially in response to popular media and some scientific reports, the culling of wild birds was proposed in some parts of the world as a solution to control the spread of the disease.

– For over a decade, wild birds have been implicated as a source or a vector of highly pathogenic avian influenza (HPAI) H5N1.

– While HPAI H5N1 has been found in wild birds, to date no long-term reservoir of HPAI H5N1 has been identified in wild bird populations, despite over a million samples tested from a wide range of species and habitats across the globe. It is rarely found in live wild birds, limiting its potential for spread through migration and contact with other animals (Scientific Task Force on Avian Influenza, 2008).

– Follow-up research has shown that domestic poultry and related trade and production and inadequate disease control methods were a primary driver of the HPAI H5N1 outbreaks (Hogerwerf *et al*. 2010).

– A DRA conducted after the initial outbreaks would have prompted research to quantify the risk that wild birds posed in terms of HPAI H5N1 transmission to other wild birds, humans and poultry. A retrospective DRA can still use information gathered from field research conducted to date to guide current control methods.

Collecting samples for avian influenza diagnostic testing from a whooper swan during an HPAI H5N1 outbreak in Mongolia
Photo courtesy of William B. Karesh, EcoHealth Alliance

Vulture mortality in India: an ecotoxicology case study

– Vultures serve a highly valuable ecological role through the removal of dead animal carcases and thereby contribute to the maintenance of public health (preventing the spread of disease agents) and the health of the ecosystem.

– From 1992 to 2007 several species of vultures, including the Oriental white-rumped vulture (*Gyps bengalensis),* Indian Vulture (*G. indicus*) and the slender-billed vulture (*G. tenuirostris*) experienced serious and rapid declines throughout Asia (Gilbert *et al*. 2002; Prakash *et al*. 2003).

– It was found experimentally that vultures ingesting cattle carcases recently treated with diclofenac, a popular non-steroidal anti-inflammatory drug, needed very little of the drug to succumb to kidney failure and eventually death (Oaks *et al*. 2004). Diclofenac residues in the tissues of dead cattle are highly toxic to vultures, resulting in up to 99% mortality in these birds (Prakash *et al*. 2005).

– This near extinction of *Gyps* species vultures was met with a resounding response from both governments and drug manufacturing companies. The national and local governments banned the veterinary use of diclofenac in 2006 and pharmaceutical companies have increased production of the alternative anti-inflammatory drug meloxicam (Cuthbert *et al*. 2011).

– Unfortunately, continued use of diclofenac in humans and animals has persisted.

– A DRA conducted now could help determine the potential impact of diclofenac in other species (particularly other scavengers) and help guide future production and licensing of similar compounds.

Oriental white-rumped vultures*, Gyps bengalensis*, feeding on a domestic water buffalo*, Bubalus bubalis*, in India
Photo courtesy of Munir Virani – The Peregrine Fund

***Gujarati cows:* cows throughout India are often treated with diclofenac, a veterinary drug that reduces pain and inflammation This drug is lethal to vultures that ingest the bovine carcases after death**
Photo courtesy of Richard Kock, Royal Veterinary College of London

Overview of disease risk analysis methodologies and tools

Selecting the most appropriate tool for your situation

Many tools are available to support the DRA process, ranging from simple to complex, and these are presented in detail in the *Manual*. They may employ a simple paper and pencil, widely available software packages or highly sophisticated quantitative modelling programmes. Tool selection for a given scenario varies according to the team's expertise, the quantity and type of data that exist, and the time and resources available to collect additional information. Figure 3 hereafter highlights some common tools used to address the different phases of the risk analysis process. This figure reflects experience and is not meant to provide an exclusive list of tools, nor is it an endorsement of any specific software programme or company. The following section provides some initial guidelines for tool selection, including circumstances that favour qualitative or quantitative tools for risk assessment and management.

A note on the use of the term 'model'

A 'model', in the context of DRA, is a simplified representation of something that exists in the real world. This is an especially valuable process when trying to understand and/or assess relationships between dynamic systems such as the ecosystem, individual or populations of animals and microbiological disease-causing agents. A simple model may consist of a picture or diagram to help a discussion of how a biological system works. Complex models often consist of quantitative and/or spatial analyses using complex layers of data. The point is that models are an attempt to simplify the real world into something both understandable and representative.

The risk analysis process creates a logical model that helps to work systematically through the different aspects of the overall analysis from a science-based policy perspective (Fig. 2).

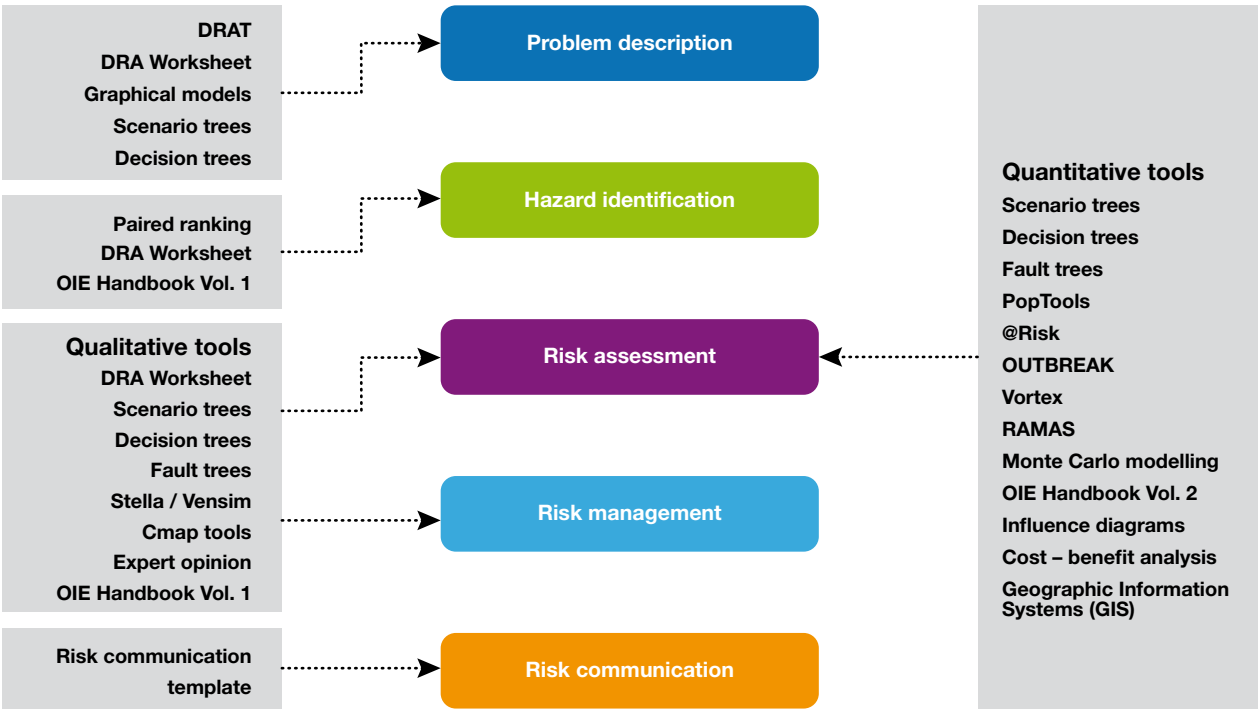

Fig. 3
Various tool types to assist the disease risk analysis process

The hazard identification step of the process involves the creation of scientifically explicit models of the disease hazards using qualitative or quantitative data. The risk assessment step results in an estimation of risk based upon the specific policy question while the analysis as a whole provides a scientific basis for the most appropriate policy response to minimisation of the identified risks. It is an iterative process and can be revisited at any time with new data or tools to improve the accuracy of the modelling and risk definition and quantification. Approaches for *post hoc* attention to risk assessment include the use of a Bayesian updating framework to identify both when and where new data are to be taken and how to incorporate these in updated assessments – this is part of SADA (spatial analysis for decision assistance) www.tiem.utk.edu/~sada/index.shtml.

Amount and quality of available data

Generally an insufficient amount or quality of data is available on wildlife to make meaningful *quantitative* risk assessments or precise estimates during the first iteration of the process. Therefore, the application of a structured qualitative approach is usually preferred as it readily incorporates lack of precision and it is the best way to use available information to analyse risks and generate the insights needed to make informed decisions about where to focus risk management actions.

Limited resources

Much can be accomplished with basic, easy to use tools such as pre-packaged programmes. Often qualitative tools are recommended for the first iteration of the process as they require fewer specialised resources (such as mathematical or programming skills and equipment) and can be conducted with the available information during group workshops.

Qualitative versus quantitative tools

Both qualitative and quantitative processes will highlight information gaps, which can be used to generate research priorities that can provide the quantitative data needed to further refine risk assessments.

In qualitative risk assessments the likelihood of the outcome, or the magnitude of the consequences, is expressed in pre-defined terms such as ‘high’, ‘medium’ or ‘low’. In quantitative risk assessments the likelihood is expressed in terms such as ‘one disease outbreak per 100 animal introductions’ or ‘failure to correctly identify one diseased animal out of 100’. Both qualitative and quantitative approaches to risk assessment are valid and, in practice, all risk assessment are usually first conducted qualitatively. Only if further insight is required is it necessary to attempt to quantify the risk. As North (1995) explains, quantitative ‘… risk analysis is best used to develop insights, and not to develop numerical results which might mistakenly be considered to be highly precise. The discipline of numerical calculation can help to sharpen thinking about risks involving high levels of complexity and uncertainty, and thereby enable conclusions to be drawn which could not have been reached solely on the basis of qualitative reasoning.’

Scale issues

Given the extensive impact that scale (temporal and spatial) has in ecological decision-making this needs to be addressed early on in DRA: not only increasing use of geographical information system (GIS) tools as decision support but also a broader context of conceptualising responses potentially occurring at different spatial scales, depending upon the species/communities/ ecosystems of concern, is needed (Fuller *et al.* 2008). An example might be a DRA around the development of fencing options for animal movement control that have broad ecological impacts and which can positively and negatively impact disease occurrence depending on the species and system considered. It is the broadening of the scope in DRA that wildlife DRA requires and which is very different from the conventional veterinary DRA, which is focused on the host and pathogen in the context of trade or animal movement.

Conclusion: wildlife disease risk analysis working in concert with other agencies

Varying DRA formats are currently being used by a diverse array of organisations. These separate guidelines originate from sectors including public health, agriculture, trade, the pharmaceutical industry and wildlife conservation. With a common theme in mind, the specific goals of each DRA may vary depending on the objectives of the individual organisation. IUCN's vision in presenting this approach to DRA is that it will be applied across all sectors concerned with wildlife disease and in doing so reinforce the 'One Health' principle that recognises that the health of people, animals (domestic and wild) and the environment are interconnected. IUCN further hopes that the application of these *Guidelines* will help to promote a standardised and consistent approach to the use of DRA and assist in effective, evidence-based decision making with respect to wildlife interventions and management of wildlife species.

Useful links

IUCN/SSC – Wildlife Health Specialist Group (WHSG). Available at: www.iucn-whsg.org/

IUCN/SSC – Conservation Breeding Specialist Group (CBSG). Available at: www.cbsg.org/cbsg/

IUCN/SSC – Reintroduction Specialist Group (RSG). Available at: www.iucnsscrsg.org/

IUCN/SSC – Invasive Species Specialist Group (ISSG). Available at: www.issg.org/

OIE *Terrestrial Animal Heath Code.* Available at: www.oie.int/international-standard-setting/terrestrial-code/

FAO/WHO Health Standards – Codex Alimentarius. Available at: www.codexalimentarius.net/web/index_en.jsp

Guidelines for the In Situ Reintroduction and Translocation of African and Asian Rhinoceros (IUCN AfRSG/AsRSG publication). Available at: www.rhinoresourcecenter.com/index.php?s=1&act=refs&CODE=ref_detail&id=1236875944

Conservation and Development Interventions at the Wildlife/Livestock Interface – Implications for Wildlife, Livestock and Human Health (IUCN/SSC Occasional Paper from the Animal and Human Health for the Environment and Development [AHEAD] Program). Available at: www.wcs-ahead.org/wpc_launch.html

Health Risk Analysis in Wildlife Translocations (OIE – Wildlife Disease Working Group). Available at: www.ccwhc.ca/wildlife_health_topics/risk_analysis/rskguidintro.php

FAO – EMPRES. Available at: www.fao.org/ag/againfo/programmes/en/empres/home.asp

IUCN/SSC AfESG Guidelines for the in situ Translocation of the African Elephant for Conservation Purposes. Available at: www.african-elephant.org/tools/trnsgden.html

IUCN Policy Paper: *Enhancing the Science and Policy Interface on Biodiversity and Ecosystem Services*. Available at: http://cmsdata.iucn.org/downloads/ipbes_position_paper_for_3rd_ipbes_meeting_may_2010_final_web.pdf

Centre for Evidence Based Medicine. Available at: www.cebm.net/

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Guidelines for Wildlife Disease Risk Analysis

Co-published by: the World Organisation for Animal Health (OIE) and the International Union for Conservation of Nature (IUCN)

The IUCN–OIE *Guidelines for Wildlife Disease Risk Analysis* will be of value to those policy-makers and decision-makers faced with the social, political and technical complexities involved in wildlife-disease-associated scenarios. It provides an overview of the science-based processes and tools available for wildlife disease risk analysis and their application to a broad range of contemporary issues, including human–wildlife interactions, domestic animal–wildlife interactions and the impacts of massive ecological change on biodiversity conservation. This is a companion volume to the *Manual of Procedures for Wildlife Disease Risk Analysis*.

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WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

Application of the New IUCN Guidelines for *Ex Situ* Management and for Reintroductions and Other Conservation Translocations

Working Group Briefing Materials

2014 CBSG Annual Meeting
New Delhi, India

Application of the New IUCN Guidelines for *Ex Situ* Management and for Reintroductions and Other Conservation Translocations

Convenors: Kathy Traylor-Holzer and Kristin Leus

AIM

For participants to become familiar with the new IUCN guidelines on *ex situ* management and on reintroduction/conservation translocations, and on how these guidelines might be applied as part of an integrated species conservation planning process.

BACKGROUND

Recently two complementary sets of IUCN guidelines have undergone major revision. In 2013 the IUCN SSC *Guidelines for Reintroductions and Other Conservation Translocations* were published. The newly revised IUCN SSC *Guidelines on the Use of Ex Situ Management for Species Conservation* were recently approved by the SSC and will be published soon. These guidelines outline a decision-making process that recommends factors to be considered before making a decision to implement these forms of population management for conservation purposes.

PROCESS

An overview of these two guidelines (scope, process, etc.) will be presented along with examples of how they have already been applied in several CBSG species conservation planning workshops. Group members will be encouraged to discuss how to disseminate and encourage implementation of these guidelines, especially in the context of One Plan approach integration of *in situ* and *ex situ* conservation activities.

OUTCOMES

Participants will have a good understanding of the recommendations in both sets of guidelines and how they might incorporate them into further conservation planning activities, both *in situ* and *ex situ*.

PREPARATION

Group participants would benefit from reviewing at least the executive summary and figures in the reintroduction guidelines, and the five-step process and figure in the *ex situ* management guidelines. They are encouraged to think about examples for possible application of these guidelines in current or upcoming conservation planning activities.

IUCN Species Survival Commission Guidelines on the Use of *Ex situ* Management for Species Conservation

Citation: IUCN/SSC (2014). Guidelines on the Use of *Ex situ* Management for Species Conservation. Version 2.0. Gland, Switzerland: IUCN Species Survival Commission, xx pp.

Contents

Guidelines

Section 1: Introduction

As habitats and ecosystems become increasingly altered and populations evermore impacted by human activities, a growing number of species will require some form of management of both individuals and populations to ensure their survival. Effective species conservation planning should consider all options when assessing what actions are necessary to address the conservation pressures facing a particular species. *Ex situ* management (see Section 2 for definition) is one possible option that can contribute to the conservation of threatened species. The range of *ex situ* scenarios and tools is diverse and can target different conservation needs and roles and, therefore, serve various purposes.

Ex situ management has been used to deliver conservation benefit for threatened species. Species extinctions have been prevented and for an increasing number of species there have been conservation restorations or introductions following periods of *ex situ* management. However, the need for, and suitability of, an *ex situ* programme must be carefully evaluated as part of an integrated conservation strategy. In order to be successful, *ex situ* programmes need to be carefully planned and implemented in a way that provides conservation benefit. In addition, as conservation challenges become more complex and urgent, the need to further develop scientifically based and innovative approaches to *ex situ* conservation will increase.

Not all species will require an *ex situ* component as part of their conservation strategy, and not all *ex situ* populations will have a direct conservation purpose. These guidelines are intended to be used in situations in which *ex situ* management is being considered as part of an overall integrated species conservation strategy.

The aim of these guidelines is to provide practical guidance on evaluating the suitability and requirements of an *ex situ* component for achieving species conservation objectives. They should not be misconstrued as promoting *ex situ* management over any other form of conservation action, and specific elements should not be selected in isolation to justify *ex situ* management for conservation. Indeed they are intended to ensure that proposals for any such activities are rigorously designed and scrutinised, whatever the taxon or scale of operation. Accordingly, the need for risk assessment and sound decision-making processes in all *ex situ* management for conservation is emphasised, but with the level of effort in proportion to the scale, risk and uncertainties around any such activity.

These guidelines replace the 2002 IUCN Technical Guidelines on the Management of *Ex Situ* Populations for Conservation. In addition, aspects of these guidelines merge with many other disciplines in contemporary conservation, which also have their own guidelines or policies. Within IUCN, these Guidelines should be seen as complementary to, and consistent with, the following key works:

- IUCN Guidelines for Reintroductions and Other Conservation Translocations (2013)[1]. In those cases where individuals are used for population restoration or conservation introduction following a period of *ex situ* management, these guidelines should be consulted together.

[1] http://www.iucn.org/about/work/programmes/species/publications/iucn_guidelines_and__policy__statements/

- IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (2000)[1].
- IUCN (2008). Strategic Planning for Species Conservation: A Handbook[1].
- IUCN (2000). The IUCN Policy Statement on Sustainable Use of Wild Living Resources[1]
- OIE and IUCN (2014). Guidelines for Wildlife Disease Risk Analysis[1]
- IUCN World Commission on Protected Areas (2012), Ecological Restoration for Protected Areas: Principles, guidelines and best practices[2]
- IUCN Red List[3]

It should also be noted that many other organisations have developed their own guidelines for activities in the spectrum from species reintroduction to ecosystem restoration.

These Guidelines are in line with the Convention on Biological Diversity and its Strategic Plan for Biodiversity (the Aichi Biodiversity Targets).

Section 2: Scope and definitions

The term "*ex situ*" can be problematic to define in some circumstances, just as it is sometimes difficult to distinguish precisely the conditions that define "wild" or "managed" in today's increasingly altered landscapes. Consequently, in many contexts there is now a gradient of management interventions between no management at one end and intensive management of individuals at the other, and between the traditional *in situ* and *ex situ* categories. Many populations both within and outside protected areas are subject to varying intensities of management such as anti-poaching interventions, predator or pathogen control, the provision of supplementary nutrition, habitat modification (e.g. controlled burning or flooding), the application of assisted reproduction, restriction of natural migration and dispersal, meta-population management, population regulation, etc., that show some characteristics in common with those used in the intensive management of *ex situ* populations. While we encourage the evaluation of the full "*in situ* to *ex situ*" spectrum of population management options in the process of identifying the most suitable conservation strategies for a species, these guidelines are designed to provide guidance for situations towards the *ex situ* end of the spectrum.

For the purpose of these guidelines, "*ex situ*" is defined as conditions under which individuals are spatially restricted with respect to their natural spatial patterns or those of their progeny, are removed from many of their natural ecological processes, and are managed on some level by humans. In essence, the individuals are maintained in artificial conditions under different selection pressures than those in natural conditions in a natural habitat. These are generally circumstances in which humans exercise control over many of the natural dynamics of a population, including control of climate and living environments, access to nutrition and water, shelter, reproductive opportunities, and protection from predation or certain other natural causes of mortality. *Ex situ* management may take place either within or outside the species' geographic range, but is in a controlled or modified environment. This may include highly artificial environments where individuals are stored as dormant in subzero conditions (e.g. seedbanks, genome resource banks), or semi-natural conditions where individuals are subject to near natural environments.

[2] http://www.iucn.org/about/work/programmes/gpap_home/gpap_capacity2/gpap_bpg/?10734/Ecological-Restoration-for-Protected-Areas

[3] http://www.iucnredlist.org/

These guidelines are specifically intended for situations in which *individuals (or live bio-samples) of any species (or other taxonomic unit) are present* ex situ *for any period of time for a clearly defined conservation purpose.*

For simplicity, the guidelines use the terms of "individual" to represent both individuals and live bio-samples and "species" to represent any taxonomic unit of conservation interest. These guidelines apply to:

Ecological contexts
- All taxonomic groups (animals, plants, fungi, bacteria, protozoa, etc.);
- All taxonomic levels (e.g. species, subspecies or different groupings of these);
- All population levels (e.g. all individuals of a species, single population, multiple populations);
- All live entities (not only whole living organisms, but also gametes, seeds, living cell lines, etc.); and
- All geographic levels (e.g. local, national, global).

Management contexts
- Both situations in which individuals need to be taken from the wild and brought under *ex situ* management, and situations in which the management of existing *ex situ* populations may be utilized or adapted for conservation benefit;
- The complete spectrum of very short term to very long term *ex situ* phases that may or may not include all life stages or reproduction; and
- Only *ex situ* populations with clearly defined conservation goals and objectives that contribute to the viability of the species as a component of its overall conservation strategy. While many different types of *ex situ* populations exist, with many different and sometimes overlapping roles and contexts, *ex situ* management for conservation only applies to those *ex situ* populations that have conservation as their primary aim. The *ex situ* activities must benefit a population, the species, or the ecosystem it occupies and the primary benefit should be at a higher level of organisation than the individual. The conservation goals and objectives can be diverse and may include not only providing individuals for reintroduction or other conservation translocations, for genetic rescue or as insurance against extinction, but also for allowing tailored conservation education, conservation research and training that targets the reduction of threats or the accruement of conservation benefits for the species. This does not preclude these *ex situ* populations for conservation from having additional roles that are not necessarily, or only indirectly and generally, related to conservation.

Section 3: *Ex situ* management as a conservation tool

Not all species conservation strategies will require an *ex situ* component, in the same way that other management interventions may or may not be required to conserve a species. In some cases *ex situ* management will be a primary part of a conservation strategy and in others it will be of secondary importance, supporting other interventions. It is necessary, therefore, to consider how *ex situ* management may contribute to the overall conservation objectives set for the species and to document this clearly.

Often primary threats such as habitat loss, invasive species, or overexploitation lead to small isolated populations, which then in turn become highly susceptible to additional stochastic threats that can lead to a feedback loop of population decline and eventual extinction (often referred to as the 'extinction vortex'). It is in such instances that intensive

management, including but not restricted to *ex situ* management, can be of particular conservation value if deemed appropriate for the species and situation.

Ex situ conservation has the potential to:

- *Address the causes of primary threats*: *Ex situ* activities can help reduce primary threats such as habitat loss, exploitation, invasive species or disease when specifically designed conservation research, conservation training or conservation education activities directly and effectively impact the causes of these threats (e.g. training in the recognition of specific life stages or gender characteristics for preferential exploitation, education to limit the spread of an invasive species, or research into disease epidemiology or treatment).

- *Offset the effects of threats: Ex situ* activities can improve the demographic and/or genetic viability of a wild population by ameliorating the impacts of primary or stochastic threats on the population. Small populations that are vulnerable to primary threats and stochastic processes may require some form of intensive management of individuals and populations to improve demographic and genetic viability and avoid extinction. Challenges faced by small populations (e.g. reduced survival, reduced reproduction, decreased population size, and genetic isolation) can be counteracted by a range of population management options, such as head start programmes to address high juvenile mortality, or population reinforcement to balance age and sex distribution.

- *Buy time*: Establishment of a diverse and sustainable *ex situ* rescue or insurance population may be critical in preventing species extinction when wild population decline is steep and the chance of sufficiently rapid reduction of primary threats is slim or uncertain or has been inadequately successful to date. Examples include *ex situ* populations in response to severe disease threat, catastrophic events or continued habitat degradation.

- *Restore wild populations*: Once the primary threats have been sufficiently addressed, *ex situ* populations can be used for population restoration (reinforcement or reintroduction) or conservation introduction (assisted colonisation or ecological replacement). As such, these Guidelines should be seen as complementary to, and consistent with, the IUCN Guidelines for Reintroductions and Other Conservation Translocations[2], and any *ex situ* programme for conservation that includes a return of individuals from *ex situ* conditions to natural conditions must equally refer to these.

For a growing number of taxa *ex situ* management may play a critical role in preventing extinction as habitats continue to decline or alter and become increasingly unsuitable. Furthermore, it should be acknowledged that even under the most optimistic of climate change impact and adaptation scenarios, an increasing percentage of species (for example, polar and mountain species; reef corals and their dependent species) may have little likelihood of long-term persistence in the wild, despite the option of assisted colonisation in certain carefully selected cases. At present, many threat assessment processes are inadequate in predicting the complex impacts of climate change and ocean acidification on the potential persistence of a species *in situ* (either within its current or a new range).

Section 4: Integrating *in situ* and *ex situ* conservation planning

There is an increasing need to ensure the integration of *in situ* and *ex situ* conservation planning to ensure that, whenever appropriate, *ex situ* conservation is used to support *in situ* conservation to the best effect possible. These guidelines would therefore ideally be

used as an integral part of, and complementary to, existing species conservation planning processes (Figure 1). Any *ex situ* conservation support should follow a logical process from initial concept to design, feasibility, risk assessment, decision making, implementation, monitoring, adjustment and evaluation. Furthermore, the Species Survival Commission's approach to conservation planning for species[4] requires the specification of goals, objectives and actions:

- A goal is a statement of the intended result in terms of conservation benefit;
- Objectives give clear and specific details for how the goal will be realised; and
- Actions are statements of what should be done to meet the objectives.

When used strategically *ex situ* conservation can be a potent tool for species conservation that does not undermine, but complements, the imperatives of field conservation. Potential *ex situ* goals, objectives and actions should therefore be evaluated alongside potential *in situ* activities in the process of conservation planning to ensure that they are used appropriately and to best effect. More specifically, before an *ex situ* conservation programme is developed or continued, it is important to consider the roles it can play, the characteristics and dimensions it should take, and what factors will impede or likely contribute to conservation success. As is the case for conservation planning in general, these evaluations are ideally made by a multi-stakeholder group, including both *in situ* and *ex situ* expertise and experience.

These guidelines outline five steps (Figure 1) to evaluate the appropriateness of *ex situ* management as part of a comprehensive species conservation strategy. They explore the conservation role and design, feasibility, and risk assessment, and guide a final decision on whether or not to proceed with an *ex situ* programme for conservation. The five-step process also provides input for the formulation of clear goals, objectives and actions for any *ex situ* conservation programme undertaken after the decision-making process.

FIVE-STEP DECISION-MAKING PROCESS TO DECIDE WHEN *EX SITU* MANAGEMENT IS AN APPROPRIATE CONSERVATION TOOL

Ex situ management should be applied to the conservation of a species where, on balance, stakeholders can be confident that the expected positive impact on the conservation of that species will outweigh the potential risks or any negative impact (which could be to the local population, species, habitat or ecosystem), and that its use will be a wise application of the available resources. This requires an assessment of the potential net positive impact, weighted by how likely it is that this potential will be realised, given the expertise, level of difficulty or uncertainty, and available resources.

The following five-step outline provides a logical decision-making process that can be applied to evaluate the appropriateness of *ex situ* management as a tool to support the conservation of a species and to identify the form that such management would need to take. All steps of the process should be documented for transparency and clarity.

STEP 1. Compile a status review of the species, including a threat analysis.

A detailed review should be undertaken of all relevant information on the species, both in the wild and ex situ*, with the aim of assessing the viability of the population(s) and to identify and understand threats that affect the species. This is a normal step in any conservation planning process and may therefore for some species already be available in existing conservation strategies or action plans. If not, this process would ideally be conducted in the wider framework of the creation of one integrated conservation strategy for a species.*

a. The status review should contain information on all factors that are appropriate to the life history and taxonomy, current population status, and other factors that are relevant to the demographic and genetic viability and ecosystem function of the species being considered. The structure of the status review (and threat analysis – see b. below) should, wherever possible, be consistent with IUCN processes that also compile information on status, such as the IUCN Red List Assessments[8] and the IUCN/SSC Species Conservation Planning approach[4]. The character and scale of the status review will vary depending on the precise circumstances, including data availability and relevance. Important information gaps concerning the status should be noted.

b. A threat analysis should be undertaken to identify the specific historical, current and likely future primary direct and indirect threats as well as stochastic threats facing the species in the wild and the constraints limiting its viability and conservation. This analysis should, wherever possible, utilise the rapidly growing data knowledge on anticipated climate change scenarios to predict likely changes in status. This provides the framework for evaluating specifically how *ex situ* management of the species may contribute to its conservation.

c. Genetic and demographic modelling should where possible be used to assess the viability of the wild population. This can be very valuable to guide population management by identifying the effects and relative importance of threats (including stochastic processes) and the strategies that may address them effectively.

d. The status of any free-living populations living outside of the species' indigenous range, as well as the status of existing *ex situ* population(s) (if any), should be reviewed, including current population size, demographic and genetic characteristics, provenance and history, taxonomy, and any programme goals and management methods if applicable.

e. In the absence of sufficient data for a thorough assessment, other information may be considered as evidence suggestive of current or impending population decline or reduced viability, such as population trends, likelihood of future habitat loss, vulnerability to climate change, projected impact of invasive species, and restricted range to one or few locations.

STEP 2. Define the role(s) that *ex situ* management will play in the overall conservation of the species.
The potential ex situ *management strategies proposed should address one or more specific threats or constraints to the species' viability and conservation as identified in the status review and threat analysis, and target the improvement of its conservation status.*

a. There should be a clear statement on how the proposed *ex situ* programme will contribute quantifiable benefits to the conservation of the species and address certain specific threat(s) and/or constraints to its viability as identified in the status review and threat analysis. This should include quantifiable goal(s) and objectives, and how success towards those objectives will be measured and assessed. When sufficient data and expertise are available, population modelling can be effective in assessing the potential impact of the *ex situ* programme on the viability of the wild population.

b. Potential roles (purpose/function) that an *ex situ* programme might serve for the conservation of a species generally fall into the four categories of *Addressing the causes of primary threats, Offsetting the effects of threats, Buying time, and Restoring wild populations* (see Section 3), and more specifically include, but are not restricted to:

- Insurance population (maintaining a viable *ex situ* population of the species to prevent predicted local, regional or global species extinction and preserve options for future conservation strategies);
- Temporary rescue (temporary removal from the wild to protect from catastrophes or predicted imminent threats, e.g. extreme weather, disease, oil spill, wildlife trade). This could be appropriate at either local or global scale;
- Maintenance of a long term *ex situ* population after extinction of all known wild populations and as a preparation for reintroduction or assisted colonisation if and when feasible;
- Demographic manipulation (e.g. head-start programmes that remove individuals from the wild to reduce mortality during a specific life stage and then subsequently return them to the wild);
- Source for population restoration, either to re-establish the species into part of its former range from which it has disappeared, or to reinforce an existing population (e.g. for demographic, behavioural or genetic purposes);
- Source for ecological replacement to re-establish a lost ecological function and/or modify habitats. This may involve species that are not themselves threatened but that contribute to the conservation of other taxa through their ecological role;
- Source for assisted colonisation to introduce the species outside of its indigenous range to avoid extinction;
- Research and/or training that will directly benefit conservation of the species, or a similar species, in the wild (e.g. monitoring methods, life history information, nutritional requirements, disease transmission/treatment); and
- Basis for an education and awareness programme that addresses specific threats or constraints to the conservation of the species or its habitat.

c. One *ex situ* programme may serve several conservation roles – either simultaneously or consecutively.

It is recognised that an *ex situ* population can also serve to avoid extinction of a species that has no chance in the foreseeable future for persistence in the wild (for example in the face of climate change). In such circumstances a careful appraisal of the allocation of available resources should be made, and a prioritization based on conservation benefits and other values may assist in the decision making.

STEP 3. Determine the characteristics and dimensions of the *ex situ* population needed to fulfil the identified conservation role(s).
The identified conservation purpose and function of the ex situ *programme will determine its required nature, scale and duration.*

a. Biological factors that are important in assessing requirements for achieving the programme's aim and objectives include:

- The number of founders (unrelated individuals of wild origin) required to attain the genetic and demographic goals of the *ex situ* population. This may involve making use of founders (and their descendants) of existing *ex situ* populations and/or sampling (additional) individuals (and where appropriate propagules or biomaterials from individuals) from the wild, across different habitat types, populations, etc.;
- The number of individuals or bio-samples to be maintained or produced *ex situ*;
- Whether reproduction or propagation is required during the duration of the programme;
- The likely required length of programme (in generations and in years) where possible;
- The relative risk for artificial selection/adaptation (genetic, phenotypic, etc.) during consecutive generations in *ex situ* conditions;

- Whether the *ex situ* phase is envisaged to be followed by a release (which has consequences for the required characteristics of the *ex situ* environment); and
- The type of environment required to maintain the individuals in a suitable condition during the length of the programme.

b. These lead to the following practical considerations that should be evaluated:

- The most suitable geographic location and scale for the *ex situ* activities (for example, inside *vs.* outside of the current/indigenous range; a centralized *vs.* a multi-facility programme; etc.). Where possible *ex situ* management should be undertaken within the range states and under similar climatic regimes to the wild population. However, because the current distribution of *ex situ* facilities and professional capacity generally does not match with the geographic areas of greatest species loss, the need for capacity building and the availability of material resources and suitably trained and committed personnel requires consideration;
- Whether whole living organisms and/or live bio-samples (e.g. tissue or gametes/seeds /spores) will need to be maintained *ex situ*;
- Whether whole living organisms and/or live bio-samples will need to be marked and tracked and if so, how;
- Whether individuals from existing *ex situ* populations (potentially with other, or additional, roles than conservation) can be included in the *ex situ* conservation programme, thus reducing the risks to the wild population associated with the removal of individuals;
- The intensity of genetic and demographic management required to achieve the roles and goals of the *ex situ* programme;
- The potential bio-security risks associated with the project, both at the *ex situ* location(s) and in any subsequent population restoration or conservation introduction if this is planned;
- The welfare issues associated with the programme;
- The potential options for, and benefits of, maintaining individuals on public display *vs.* in non-public facilities that restrict access, visibility or disturbance;
- The degree of human proximity and interaction that can be allowed in terms of the potential for habituation of *ex situ* individuals to people, due to the management approach chosen and/or exposure to the public;
- The legal and regulatory requirements for removing individuals or biomaterials from the wild and/or transporting them regionally, nationally or internationally;
- The ownership of, and access to, individuals and bio-samples and the degree of assurance of ongoing commitment to the programme by both holding and owning parties; and
- The fate of any individuals or bio-samples remaining in the *ex situ* programme when its purpose has been achieved.

Population models may be used to determine the necessary population size, composition and level of management needed to meet the conservation role(s) of the population.

STEP 4. Define the resources and expertise needed for the *ex situ* management programme to meet its role(s) and appraise the feasibility and risks.

It is not sufficient to know the potential value of an ex situ *programme designed to meet a specific conservation role – it is also critical to evaluate the resources needed, the feasibility of successfully managing such a programme, the likelihood of success at all steps of the programme, including where relevant any subsequent return to the wild, and the risks, including risks to the species in the wild and to other conservation activities. These should be balanced against the risks of failing to take appropriate conservation action.*

a. It is essential to assess the resources required to establish and maintain an *ex situ* population with the characteristics defined in Step 3 in order to achieve the aims and objectives stated in Step 2. These should be considered in detail at this stage. Some of the practical factors that will determine the overall scale of resources required include:

- The facilities, infrastructure and space required;
- The staffing required (in terms of numbers, skills and continuity);
- The risk for the spread of disease (need for biosecurity, quarantine, diagnostics, research on pathogens and disease, etc.).
- The risk of catastrophes impacting the *ex situ* programme (natural or human-caused catastrophes, such as fire, civil unrest, etc.); and
- The finances required for all essential activities over an adequate period of time (in proportion to the expected total length of the programme).

b. Other factors that need to be determined to investigate the feasibility and risks of the proposed project include:

- The probability of obtaining the required resources, including technical experts and project managers with the required skill sets. Effective *ex situ* management for conservation will require effective multidisciplinary teams with the biological, technical and social skill sets;
- Competition for resources with other programmes for the same or other taxa as well as opportunities for cost sharing;
- Available expertise in husbandry/disease control/cultivation/propagation/banking for relevant life stages for this and/or for related/comparable taxa. In some areas of the world, particularly in regions facing the highest rates of biodiversity loss, the capacity for skills in *ex situ* conservation may need to be strengthened. Similarly, the increasingly diverse range of candidate species and challenges to be addressed may require additional tools and techniques;
- The degree of stability in, or level of agreement about, the taxonomy of the taxon in question and the degree of knowledge on evolutionary significant units, genetic population structure and risks for inbreeding and outbreeding depression;
- The critical governmental and non-governmental partner institutions and the probability of successful collaboration among these (including partners responsible for field conservation);
- The degree of compatibility of the ecological, demographic, behavioural or other characteristics of the species with the type of *ex situ* management proposed;
- Requirements to ensure the welfare of any living individuals *ex situ*. *Ex situ* conservation programmes should adhere to internationally accepted standards for welfare, and efforts should be made to reduce stress or suffering;
- All legal and regulatory requirements for the project (so that the intended *ex situ* management is approved and supported by all relevant agencies) and how likely they can be fulfilled. An *ex situ* conservation programme may need to meet regulatory requirements at any or all of the international, national, regional or sub-regional levels. This may among others involve regulations for the capture or collection of individuals from the source populations, for the movement of individuals across international borders (e.g. CITES) and across jurisdictional or formally recognised tribal boundaries, for dealing with benefits arising from the use of genetic resources and/or traditional knowledge (e.g. Nagoya Protocol), for veterinary and phyto-sanitary aspects, and for the holding of wild individuals in *ex situ* conditions;
- Any formal endorsements required for the project from relevant *in situ* and/or *ex situ* entities, and how likely they can be obtained;
- Where relevant, assessment of the impact of the removal of individuals from the wild on the remaining wild source population (e.g. through modelling);

- The likely impact on the remaining wild population and its habitat of establishing, or not establishing, an *ex situ* population. Special consideration may be given to situations in which all remaining wild individuals may need to be removed due to a very high probability of extinction in the wild that cannot be mitigated in time;
- The ecological risks (e.g. containment of potentially invasive species, hybridisation risks) and what is required to minimise them;
- Any health and safety risks (for people and/or other species) and what is required to minimise them; and
- Any potential political, social or public conflicts of interest and how they can be dealt with. A review of the cultural status of the species should be conducted to ensure that any *ex situ* conservation management is compatible with local traditions and values and supported by local communities at the source location(s) and/or the *ex situ* location(s). Mechanisms for communication, engagement and problem-solving between the public (especially key individuals most likely affected by or concerned about the removal of individuals from nature or the maintenance of individuals *ex situ*) and *ex situ* managers should be established.

A review of the factors mentioned above will allow the assessment of an overall probability of the *ex situ* programme achieving the intended results in terms of conservation benefit. The scope of the risk assessment should be proportional to the level of identified risk. Where data are poor, the risk assessment may only be qualitative but it is necessary, as lack of data does not indicate absence of risk.

STEP 5. Make a decision that is informed (i.e. uses the information gathered above) and transparent (i.e. demonstrates how and why the decision was taken).
The decision to include ex situ *management in the conservation strategy for a species should be determined by weighing the potential conservation benefit to the species against the likelihood of success and overall costs and risks of not only the proposed* ex situ *programme, but also alternative conservation actions or inaction.*

The relative importance (weight) of potential conservation benefit *vs.* likelihood of success, costs and risks will vary for each species and situation, according to factors such as, but not limited to:

- The severity of threats and/or risk of extinction of the wild population;
- The significance of the species (ecological, cultural, sociological, economic or evolutionary distinctness, value of the species in leveraging large scale habitat conservation, etc.); and
- Legal and political mandates.

In general, a conservation management strategy including *ex situ* management is warranted when potential conservation benefit is both high and likely to be achieved. Similarly, *ex situ* management is not warranted if there is little conservation benefit, feasibility is low, and costs and risks (especially to the wild population) are high.

If the decision to implement *ex situ* management of a species is left until extinction is imminent, it is frequently too late to implement effectively, thus increasing the chance of failure and risking permanent extinction of the species. This reinforces the need for comprehensive strategic planning for species to be undertaken as early as possible.

Documentary evidence of information gathered and decisions made for Steps 1 through 5 is highly important, *regardless of whether the decision to proceed with the* ex situ

management is positive or negative. Archiving of documents in publicly accessible libraries and on public web sites is recommended.

SECTION 5: Programme implementation, monitoring, adjustment and evaluation

Implementation

If a decision is made to establish or continue an *ex situ* management programme, further considerations that are important in the development of this programme include:

- Actions needed to achieve the identified goals and objectives of the programme should be formulated and implemented (including actions to mitigate the most important risks identified in Step 4). Actions should be specific, measurable, have time schedules attached, and indicate the resources needed and parties responsible for their implementation;
- Data collection and management protocols for all important aspects of the programme should be developed in order to enable adequate monitoring;
- Any *ex situ* management programme should be developed within national, regional and international conservation infrastructure, recognizing the mandate of existing agencies, legal and policy frameworks, organisational conservation strategies, national biodiversity action plans or existing species recovery plans. Of noteworthy mention in the context of these guidelines are the Convention on Biological Diversity (CBD), the International Agenda for Botanic Gardens in Conservation, the Global Strategy for Plant Conservation, the International Treaty on Plant Genetic Resources for Food and Agriculture, the World Zoo and Aquarium Conservation Strategy, the Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration;
- Any *ex situ* conservation programme should adhere to national and international obligations with regard to access and benefit sharing (as outlined in the CBD);
- The *ex situ* programme should consult during its planning, implementation, monitoring and evaluation stages with all relevant stakeholder groups, professional associations and organisations, both with regard to the indigenous range of the species and the location of the *ex situ* programme;
- The *ex situ* programme personnel should stay up to date with relevant scientific work and scientific publications;
- Where multiple bodies such as government agencies, non-government organisations, academia, private organisations, informal interest groups, etc. all have statutory or legitimate interests in an *ex situ* programme, it is essential that mechanisms exist for all parties to play constructive roles. This may require establishment of special teams working outside formal, bureaucratic hierarchies that can guide, oversee and respond swiftly and effectively as management issues arise. Different parties involved in an *ex situ* project may have their own mandates, priorities and agendas that need to be aligned through effective facilitation and leadership in order not to undermine the success of the project. A memorandum of understanding with appropriate parties defining the collaboration structure, ownership issues and responsibilities may be beneficial. Inter-project, inter-regional or international communication and collaboration is encouraged as relevant. The programme should consult with external experts as needed;
- The *ex situ* project should have a clear and appropriate time frame established.

Monitoring, adjustment and evaluation

There should be regular evaluations of the *ex situ* programme, not only of its own success, but also of its role within the overall conservation strategy for the species, which is likely to change over time.

The management of an *ex situ* programme is a cyclical process of implementation, monitoring, feedback and adjustment of both biological and non-biological aspects until either the goals are met or the *ex situ* programme is deemed unsuccessful. Despite thorough planning and design, inherent uncertainty and risk will lead to both expected and unexpected situations. The monitoring is the means to measure the performance of the *ex situ* programme against objectives, to assess conservation impacts, and provide the basis for adjusting objectives or adapting management regimes or activating an exit strategy. In addition to refining an ongoing *ex situ* programme, the conclusions from monitoring may guide other *ex situ* programmes.

Adequate resources for monitoring should be part of financial feasibility and commitment. The purpose and duration of monitoring of the *ex situ* populations and the species' situation in the wild (especially those aspects that the *ex situ* population is trying to address) should be appropriate to each situation.

Learning from *ex situ* conservation programme outcomes can be improved through application of more formal adaptive management approaches, whereby alternative models are defined in advance and are tested through monitoring. This process means that the models used to decide management are based on the best possible evidence and learning.

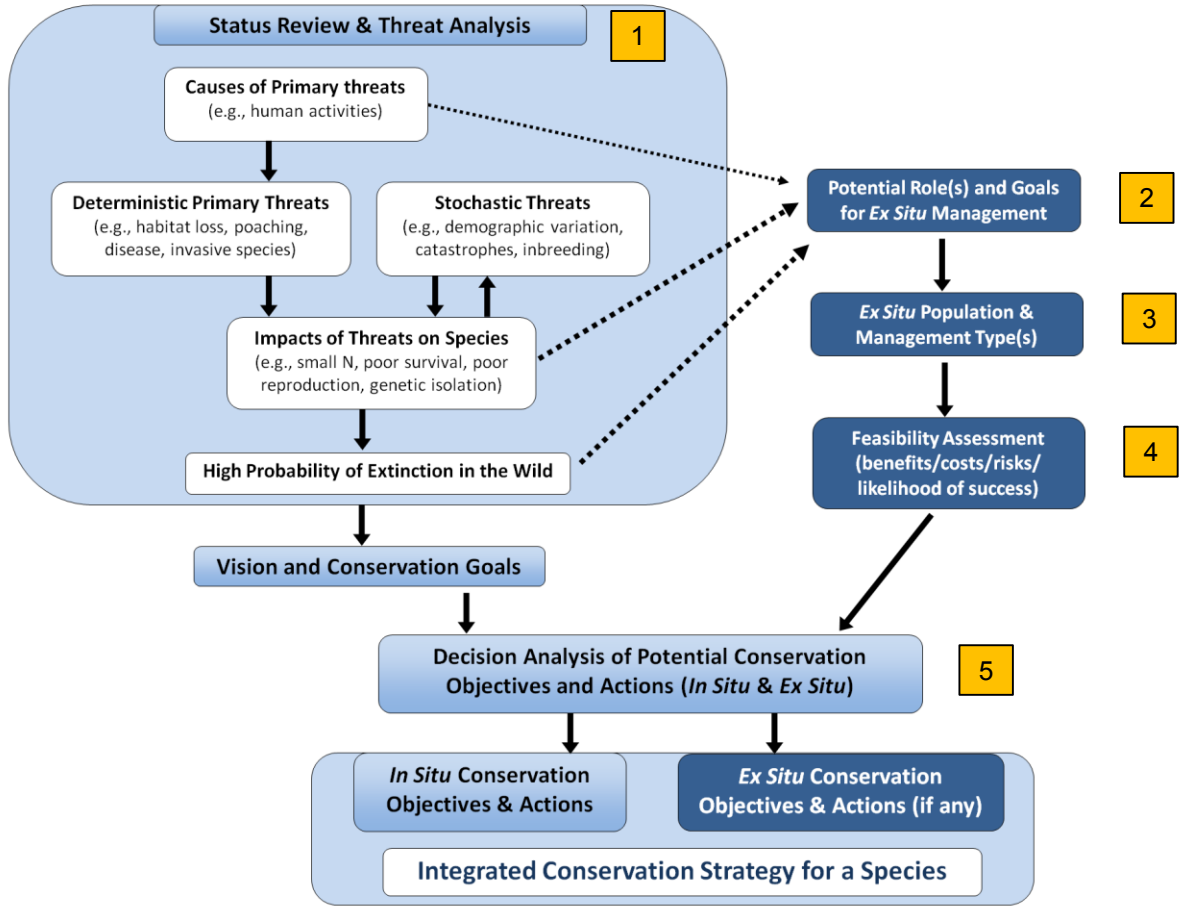
SECTION 6: Dissemination of information

Regular reporting and dissemination of information should start from the intention to initiate *ex situ* activities for conservation and throughout subsequent progress. It serves many purposes both for each *ex situ* project and collectively:

1. To create awareness and support for the *ex situ* programme amongst all parties;
2. To meet any statutory requirements; and
3. To contribute to the body of information on, and understanding of, *ex situ* management for conservation. Collaborative efforts to develop *ex situ* management science are helped when reports are published in peer-reviewed journals (as an objective indicator of high quality), and include well-documented but unsuccessful *ex situ* projects or methods as well as successful ones.

The means of dissemination are many (e.g. publications, press, interpretation in public institutions). The media, formats and languages used all should be appropriate for the target audience.

Figure 1: Incorporation of the five-step decision process outlined in these Guidelines (yellow numbers) into the species conservation planning process to develop an integrated conservation strategy for a species.



Guidelines for Reintroductions and Other Conservation Translocations

Version 1.0

REINTRODUCTION AND INVASIVE SPECIES SPECIALIST GROUPS' TASK FORCE ON MOVING PLANTS AND ANIMALS FOR CONSERVATION PURPOSES

SSC Species Survival Commission

ISSG Invasive Species Specialist Group

Guidelines for Reintroductions and Other Conservation Translocations

Version 1.0

Guidelines for Reintroductions and Other Conservation Translocations

The Reintroduction and Invasive Species Specialist Groups' Task Force on Moving Plants and Animals for Conservation Purposes

Version 1.0

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Contents of Guidelines

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Guidelines

For Reintroductions and Other Conservation Translocations

Version 1.0

Executive summary

Conservation translocation is the deliberate movement of organisms from one site for release in another. It must be intended to yield a measurable conservation benefit at the levels of a population, species or ecosystem, and not only provide benefit to translocated individuals.

Conservation translocations - ***Figure 1*** - consist of (i) reinforcement and reintroduction within a species' indigenous range, and (ii) conservation introductions, comprising assisted colonisation and ecological replacement, outside indigenous range.

Translocation is an effective conservation tool but its use either on its own or in conjunction with other conservation solutions needs rigorous justification. Feasibility assessment should include a balance of the conservation benefits against the costs and risks of both the translocation and alternative conservation actions.

Risks in a translocation are multiple, affecting in many ways the focal species, their associated communities and ecosystem functions in both source and destination areas; there are also risks around human concerns. Any proposed translocation should have a comprehensive risk assessment with a level of effort appropriate to the situation. Where risk is high and/or uncertainty remains about risks and their impacts, a translocation should not proceed.

Translocations of organisms outside of their indigenous range are considered to be especially high risk given the numerous examples of species released outside their indigenous ranges subsequently becoming invasive, often with massively adverse impacts.

Any translocation will impact and be impacted by human interests. Social, economic and political factors must be integral to translocation feasibility and design. These factors will also influence implementation and often require an effective, multi-disciplinary team, with technical and social expertise representing all interests.

Design and implementation of conservation translocations should follow the standard stages of project design and management, including gathering baseline information and analysis of threats, and iterative rounds of monitoring and management adjustment once the translocation is underway - ***Figure 2***. This ensures that process and progress are recorded; changes in translocation objectives or management regime can then be justified, and outcomes can be determined objectively. Finally, translocations should be fully documented, and their outcomes made publicly and suitably available to inform future conservation planning.

Guidelines
Section 1
Introduction and scope of Guidelines

These Guidelines are designed to be applicable to the full spectrum of conservation translocations. They are based on principle rather than example. Throughout the Guidelines there are references to accompanying Annexes that give further detail.

The background and rationale for developing these Guidelines are described in ***Annex 1.***

Translocation is the human-mediated movement of living organisms[1] from one area, with release in another. These Guidelines focus on conservation translocations, namely a translocation that yields quantifiable conservation benefit. For this purpose the beneficiaries should be the populations of the translocated species, or the ecosystems that it occupies. Situations in which there is benefit only to the translocated individuals do not meet this requirement.

Conservation through intervention is now common, but with increasing evidence and appreciation of the risks. Consequently, any conservation translocation must be justified, with development of clear objectives, identification and assessment of risks, and with measures of performance. These Guidelines are designed to provide guidance on the justification, design and implementation of any conservation translocation.

But, they should not be construed as promoting conservation translocation over any other form of conservation action, and specific elements should not be selected in isolation to justify a translocation.

These Guidelines are a response to the present era of accelerating ecological change: there are increasing and acute pressures on much of the world's biodiversity due to loss of habitats and reduction in their quality, biological invasions, and climate change. The latter is the main force behind the proposition to move organisms deliberately outside their indigenous ranges (defined in **Section 2**), an exercise of greater potential risks than a reinforcement or reintroduction. While such 'assisted colonisation' is controversial, it is expected to be increasingly used in future biodiversity conservation.

Because of such anticipated developments, these Guidelines emphasise the need to consider the alternatives to translocation, to appreciate uncertainty of ecological knowledge, and to understand the risks behind any translocation. Many conservation translocations are long-term commitments, and every case is an opportunity to research the challenges for establishing populations, in order to increase the success rate of these interventions.

1 'organism' refers to a species, subspecies or lower taxon, and includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce *(After: Convention on Biological Diversity Decision VI/23* ***http://www.cbd.int/decision/cop/?id=7197****).*

Guidelines
Section 2
Definitions and classification

Figure 1 shows a typology of conservation translocations, based on the following definitions. Annex 2 provides further details.

Translocation *is the human-mediated movement of living organisms from one area, with release*[2] *in another.*

Translocation is therefore the overarching term. Translocations may move living organisms from the wild or from captive origins. Translocations can be accidental (e.g. stowaways) or intentional. Intentional translocations can address a variety of motivations, including for reducing population size, for welfare, political, commercial or recreational interests, or for conservation objectives.

Conservation translocation *is the intentional movement and release of a living organism where the primary objective is a conservation benefit: this will usually comprise improving the conservation status of the focal species locally or globally, and/or restoring natural ecosystem functions or processes.*

A translocation involves releasing organisms. Release here specifically excludes the act of placing organisms into conditions that, for management purposes, differ significantly from those experienced by these organisms in their natural habitats. These differences may include the density under which individuals are kept, their sex ratio and group size, breeding system, environmental conditions, dependence on provisioning and, consequently, the selection pressures imposed.

Conservation translocations can entail releases either within or outside the species' *indigenous range*. The indigenous range of a species is the known or inferred distribution generated from historical (written or verbal) records, or physical evidence of the species' occurrence. Where direct evidence is inadequate to confirm previous occupancy, the existence of suitable habitat within ecologically appropriate proximity to proven range may be taken as adequate evidence of previous occupation.

1. Population restoration is any conservation translocation to within indigenous range, and comprises two activities:

a. Reinforcement *is the intentional movement and release of an organism into an existing population of conspecifics.*

Reinforcement aims to enhance population viability, for instance by increasing population size, by increasing genetic diversity, or by increasing the representation of specific demographic groups or stages.

2 'release' is applicable here to individuals of any taxon.

Guidelines
Section 2
Definitions and classification

[Synonyms: Augmentation; Supplementation; Re-stocking; Enhancement (plants only)]

b. Reintroduction *is the intentional movement and release of an organism inside its indigenous range from which it has disappeared*.

Reintroduction aims to re-establish a viable population of the focal species within its indigenous range.

2. Conservation introduction is the intentional movement and release of an organism outside its indigenous range.

Two types of conservation introduction are recognised:

a. Assisted colonisation *is the intentional movement and release of an organism outside its indigenous range to avoid extinction of populations of the focal species.*

This is carried out primarily where protection from current or likely future threats in current range is deemed less feasible than at alternative sites.

The term includes a wide spectrum of operations, from those involving the movement of organisms into areas that are both far from current range and separated by non-habitat areas, to those involving small range extensions into contiguous areas.

[Synonyms: Benign Introduction; Assisted Migration; Managed Relocation]

b. Ecological replacement *is the intentional movement and release of an organism outside its indigenous range to perform a specific ecological function.*

This is used to re-establish an ecological function lost through extinction, and will often involve the most suitable existing sub-species, or a close relative of the extinct species within the same genus[3].

[Synonyms: Taxon Substitution; Ecological Substitutes/Proxies/Surrogates; Subspecific Substitution, Analogue Species]

3 An organism might be released into indigenous range to perform an ecological function, but this would be considered a reintroduction.

Guidelines
Section 3
Deciding when translocation is an acceptable option

1. A conservation translocation has intended conservation benefit, but it also carries risks to ecological, social and economic interests - Annex 3.1.

2. There should generally be strong evidence that the threat(s) that caused any previous extinction have been correctly identified and removed or sufficiently reduced - Annex 3.2.

3. Assessment of any translocation proposal should include identification of potential benefits and potential negative impacts, covering ecological, social and economic aspects. This will be simpler for a reinforcement or reintroduction within indigenous range compared to any translocation outside indigenous range.

4. Global evidence shows that introductions of species outside their indigenous range can frequently cause extreme, negative impacts that can be ecological, social or economic, are often difficult to foresee, and can become evident only long after the introduction.

5. Conservation translocations outside indigenous range may, therefore, bring potentially high risks that are often difficult or impossible to predict with accuracy.

6. Hence, although risk analysis around a translocation should be proportional to the presumed risks (Guidelines **Section 6**), justifying a conservation introduction requires an especially high level of confidence over the organisms' performance after release, including over the long-term, with reassurance on its acceptability from the perspective of the release area's ecology, and the social and economic interests of its human communities.

7. In any decision on whether to translocate or not, the absolute level of risk must be balanced against the scale of expected benefits.

8. Where a high degree of uncertainty remains or it is not possible to assess reliably that a conservation introduction presents low risks, it should not proceed, and alternative conservation solutions should be sought - Annex 3.3.

Guidelines
Section 4
Planning a translocation
4.1 Goals, objectives and actions

1. Every conservation translocation should have clearly defined goals.

2. Any conservation translocation should follow a logical process from initial concept to design, feasibility and risk assessment, decision-making, implementation, monitoring, adjustment and evaluation.

3. Planning for a conservation translocation can usefully follow the Species Survival Commission's approach to conservation planning for species[4], requiring specification of a goal, objectives and actions. Reference to the commonly observed phases of translocated population development may aid planning - Annex 4.

4. Progress reviews are encouraged at all stages, so that the goal(s) is reached through a cyclical process - ***Figure 2***, which allows adjustment in objectives or in time frames based on observed progress (Guidelines **Section 8**).

5. A **Goal** is a statement of the intended result of the conservation translocation. It should articulate the intended conservation benefit, and will often be expressed in terms of the desired size and number of populations that will achieve the required conservation benefit either locally or globally, all within an overall time frame.

6. There may be more than one goal, although clarity of purpose may suffer as goals increase in number.

7. **Objectives** detail how the goal(s) will be realised; they should be clear and specific and ensure they address all identified or presumed current threats to the species.

8. Actions are precise statements of what should be done to meet the objectives; they should be capable of measurement, have time schedules attached, indicate the resources needed and who is responsible and accountable for their implementation. Actions are the elements against which translocation progress will be monitored and assessed (Guidelines **Section 8**).

4 http://cmsdata.iucn.org/downloads/scshandbook_2_12_08_compressed.pdf

Guidelines
Section 4
Planning a translocation
4.2 Monitoring programme design

Monitoring the course of a translocation is an essential activity (Guidelines **Section 8**). It should be considered as an integral part of translocation design, not to be merely added on at a later stage.

The effort invested in developing realistic goals and objectives is the starting point for a monitoring programme; its design should reflect the phases of translocated population development - Annex 4 - and answer at least the following:

- What evidence will measure progress towards meeting translocation objectives and, ultimately, success or failure?
- What data should be collected, where and when, to provide this evidence, and what methods and protocols should be used?
- Who will collect the data, analyse it and ensure safe keeping?
- Who will be responsible for disseminating monitoring information to relevant parties?

4.3 Exit strategy

Not all translocations proceed according to plan. There will be a point at which investing further resources is no longer justified, despite any prior management adjustments. The decision to discontinue is defensible if translocation design includes indicators of lack of success and the tolerable limits of their duration, or if undesired and unacceptable consequences have occurred.

An exit strategy should be an integral part of any translocation plan. Having a strategy in place allows an orderly and justifiable exit.

Guidelines
Section 5
Feasibility and design

The primary focus of translocation planning will be the desired performance of the focal species in terms of either its population performance, behaviour and / or its ecological roles after translocation. However, the design of the proposed translocation will be subject to both opportunities and constraints, and all will influence the feasibility of the proposed operation. Feasibility assessment should cover the full range of relevant biological and non-biological factors.

5.1 Biological feasibility

5.1.1 Basic biological knowledge

1. Necessary knowledge of any translocation candidate species should include its biotic and abiotic habitat needs, its inter-specific relationships and critical dependencies, and its basic biology. - Annex 5.1. Where knowledge is limited, the best available information should be used, and further subsequent information used to confirm or adjust management.

2. Information from the candidate or closely-related species can be used to construct models of alternative translocation scenarios and outcomes; even simple models can help effective decision-making - Annex 5.2.

Guidelines
Section 5
Feasibility and design

5.1.2 Habitat

Matching habitat suitability and availability to the needs of candidate species is central to feasibility and design. There are many aspects covered in greater detail in Annex 5.3. Essential points are:

1. While reintroduction into indigenous range is always preferable, previous indigenous range may no longer be suitable habitat depending on ecological dynamics during the extinction period.

2. The last place in which a species/ population was found may not be the best habitat for returning the species.

3. Suitable habitat should meet the candidate species' total biotic and abiotic needs through space and time and for all life stages. In addition, habitat suitability should include assurance that the release of organisms, and their subsequent movements, are compatible with permitted land-uses in the affected areas.

4. The ecological roles of translocated species at destination sites should be assessed thoroughly, as part of risk assessment (Guidelines **Section 6**); the risk of unintended and undesirable impacts will generally be least in population reinforcements and greatest in translocations outside indigenous range.

5.1.3 Climate requirements - Annex 5.4

1. The climate at destination site should be suitable for the foreseeable future. Bio-climate envelope models can be used to assess the likelihood of the climate changing beyond the species' limits of tolerance, and therefore for identifying suitable destination sites under future climate regimes.

5.1.4 Founders

Founder source and availability

1. Founders can be either from a captive or wild source.

2. Founders should show characteristics based on genetic provenance, and on morphology, physiology and behaviour that are assessed as appropriate through comparison with the original or any remaining wild populations.

3. The potential negative effects of removing individuals from wild or captive populations should be assessed; where captive or propagated populations are sources, the holding institutions should ensure that their collection plans, institutionally and regionally, are designed to support such removals for conservation translocations.

4. Captive or propagated individuals should be from populations with appropriate demographic, genetic, welfare and health management, and behaviour.

Guidelines
Section 5
Feasibility and design

5.1.4 Founders

Taxon substitution

In some cases the original species or sub-species may have become extinct both in the wild and in captivity; a similar, related species or sub-species can be substituted as an ecological replacement, provided the substitution is based on objective criteria such as phylogenetic closeness, similarity in appearance, ecology and behaviour to the extinct form.

Genetic considerations - Annex 5.5

1. Founder selection should aim to provide adequate genetic diversity.
2. Source populations physically closer to, or from habitats that are similar to, the destination may be more genetically suited to destination conditions.
3. If founders from widely separate populations or areas are mixed, there may be genetic incompatibilities.
4. Conservation introductions may justify more radical sourcing strategies of deliberately mixing multiple founder populations to maximise diversity among individuals and hence increase the likelihood of some translocated individuals or their offspring thriving under novel conditions.
5. Genetic considerations in founder selection will be case-specific. If a translocation starts with a wide genetic base, a sufficiently large number of individuals, and subsequent differential performance or mortality is acceptable (and will be monitored), then the genetics of founder selection are unlikely to constrain feasibility of a conservation translocation.

5.1.5 Animal welfare

1. Conservation translocations should whenever possible adhere to internationally accepted standards for welfare, but should comply with the legislation, regulations and policies in both the source and release areas.
2. Every effort should be made to reduce stress or suffering.
3. Stress in translocated animals may occur during capture, handling, transport and holding, including through confining unfamiliar individuals in close proximity, both up to and after release.
4. Stresses may be quite different for captive-born and wild-caught animals; in particular, intended “soft release” strategies may increase stress in wild-caught animals by prolonging their captivity.

Guidelines
Section 5
Feasibility and design

5.1.5 Animal welfare

5. Animals in source populations may suffer stress if the removal of individuals disrupts established social relationships.

6. An exit strategy may require removal of individuals of the translocated species, especially in the case of a conservation introduction; the acceptability of removal should be assessed before starting the translocation.

5.1.6 Disease and parasite considerations

1. The management of disease and known pathogen transfer is important, both to maximise the health of translocated organisms and to minimise the risk of introducing a new pathogen to the destination area. Further detail on these aspects is given in Annex 5.6.

2. While it is neither possible nor desirable for organisms to be "parasite and disease free", many organisms are non-pathogenic until co-infection or co-factors, or spill-over between host species create conditions that promote pathogenicity. In particular, as host immune conditions may determine an organism's pathogenicity, it is important to consider whether the translocated organisms are likely to cope with new pathogens and stresses encountered at the destination site.

3. The level of attention to disease and parasite issues around translocated organisms and their destination communities should be proportional to the potential risks and benefits identified in each translocation situation (Guidelines **Section 6**); the IUCN Guide to Wildlife Disease Risk Assessment[5] (2013, in preparation) provides a model process.

4. Quarantine before release, as a means of prevention of disease or pathogen introduction, is a basic precaution for most translocations; its use should be assessed on a case-by-case basis as it may cause unacceptable stress; conversely, stress may usefully bring out latent infections.

5. Pathogenicity may be promoted by the stress of unfamiliar or unnatural conditions of confinement, especially during the translocation process.

6. If reasonable precautions are taken and appropriate prophylaxis applied, with stress minimised in the process, there is rarely cause to consider translocation unfeasible due to disease and parasites.

5 web address to be added.

Guidelines
Section 5
Feasibility and design
5.2 Social feasibility

1. Any conservation translocation proposal should be developed within national and regional conservation infrastructure, recognizing the mandate of existing agencies, legal and policy frameworks, national biodiversity action plans or existing species recovery plans.

2. Human communities in or around a release area will have legitimate interests in any translocation. These interests will be varied, and community attitudes can be extreme and internally contradictory. Consequently, translocation planning should accommodate the socio-economic circumstances, community attitudes and values, motivations and expectations, behaviours and behavioural change, and the anticipated costs and benefits of the translocation. Understanding these is the basis for developing public relations activities to orient the public in favour of a translocation.

3. Mechanisms for communication, engagement and problem-solving between the public (especially key individuals most likely to be affected by or concerned about the translocation) and translocation managers should be established well in advance of any release.

4. No organisms should be removed or released without adequate/conditional measures that address the concerns of relevant interested parties (including local/indigenous communities); this includes any removal as part of an exit strategy.

5. If extinction in the proposed destination area occurred long ago, or if conservation introductions are being considered, local communities may have no connection to species unknown to them, and hence oppose their release. In such cases, special effort to counter such attitudes should be made well in advance of any release.

6. Successful translocations may yield economic opportunities, such as through ecotourism, but negative economic impacts may also occur; the design and implementation stages should acknowledge the potential for negative impacts on affected parties or for community opposition; where possible, sustainable economic opportunities should be established for local communities, and especially where communities/regions are challenged economically.

Guidelines
Section 5
Feasibility and design
5.2 Social feasibility

7. Some species are subject to multiple conservation translocations: in these situations, inter-project, inter-regional or international communication and collaboration are encouraged in the interests of making best use of resources and experiences for attaining translocation goals and effective conservation.

8. Organisational aspects can also be critical for translocation success: where multiple bodies, such as government agencies, non-government organisations, informal interest groups (some of which may oppose a translocation) all have statutory or legitimate interests in a translocation, it is essential that mechanisms exist for all parties to play suitable and constructive roles. This may require establishment of special teams working outside formal, bureaucratic hierarchies that can guide, oversee and respond swiftly and effectively as management issues arise.

9. The multiple parties involved in most translocations have their own mandates, priorities and agendas; unless these are aligned through effective facilitation and leadership, unproductive conflict may fatally undermine translocation implementation or success.

10. A successful translocation can contribute to a general ethical obligation to conserve species and ecosystems; but the conservation gain from the translocation should be balanced against the obligation to avoid collateral harm to other species, ecosystems or human interests; this is especially important in the case of a conservation introduction.

Guidelines
Section 5
Feasibility and design
5.3 Regulatory compliance

A conservation translocation may need to meet regulatory requirements at any or all of international, national, regional or sub-regional levels. This may in include consideration of the compatibility of permitted and non-permitted land-uses in areas either proposed for a release or where released organisms might subsequently move to.

In any country, different agencies may be responsible for proposal evaluation, importation or release licensing, or certifying compliance. A translocation programme may have requirements to report regularly to such agencies on progress and compliance.

International movement of organisms

Such movement of organisms will need to comply with international requirements. For example, the movement of individuals of any species that is on CITES Appendix I, II or III must comply with CITES requirements.

In addition, regulators will need to consider whether permits and agreements are required under the Nagoya Protocol in order to deal with benefits arising from the use of genetic resources and/or traditional knowledge.

Legislation for species being moved outside their indigenous range

Many countries have formal legislation restricting the capture and/or collection of species within their jurisdiction. Additionally, many countries have formal legislation restricting the release of alien species, and this may apply to the release of organisms in their native country but outside their indigenous range.

Permission to release organisms

Irrespective of any permission to import organisms, any conservation translocation should have been granted the appropriate government licence to release organisms.

Cross-border movements

Where organisms are either transported across jurisdictional or formally-recognised tribal boundaries before release, or are likely to move across such boundaries following release, translocation design should be compatible with the permissive and regulatory requirements of all affected jurisdictions.

Guidelines
Section 5
Feasibility and design
5.3 Regulatory compliance

National and international veterinary and phyto-sanitary requirements

Where there is any international movement of organisms, compliance with the World Organisation for Animal Health[6] standards for animal movement and those of the International Plant Protection Convention[7] may facilitate importation permits.

National requirements for plant and animal health before release should be met. The importation of wild species that are implicated as vectors of human or domestic animal disease may be subject to particular regulation and control by national authorities.

5.4 Resource availability

1. Effective translocation management will be truly multi-disciplinary, with strong emphasis on incorporating social skill sets as well as biological/technical expertise.

2. Under normal circumstances, a translocation should not proceed without assurance of funding for all essential activities over an adequate period of time; the latter should be determined by reference to the schedules laid down in Guidelines **Section 4**.

3. Funding agencies should be aware that rational changes to a translocation plan during implementation are normal, and budgets should be flexible enough to accommodate such changes.

6 http://www.oie.int/
7 https://www.ippc.int/

Guidelines
Section 6
Risk assessment

1. Any translocation bears risks that it will not achieve its objectives and/or will cause unintended damage. Consequently, the full array of possible hazards both during a translocation and after release of organisms should be assessed in advance. Annex 6.1 contains fuller detail.

2. It should be emphasised that any translocation outside indigenous range carries further risks, due to: (1) lack of certainty over ecological relationships and an inability to predict ecological outcomes, and (2) the record of species moved outside their indigenous ranges that have become invasive aliens, often with extreme adverse impacts on native biodiversity, ecological services or human economic interests.

3. Risk is the probability of a risk factor occurring, combined with the severity of its impact. Individual risks will generally increase as the following increase in scale:

    1. The duration of any extinction period,
    2. The extent of ecological change during any extinction period,
    3. The degree of critical dependence of the focal species on others,
    4. The number of species to be translocated,
    5. The genetic differences between the original form and the translocated individuals,
    6. The potential negative impacts on human interests,
    7. The probability of unacceptable ecological impacts,
    8. Whether the translocation is into or outside indigenous range.

    The total risk landscape will be determined by:

    1. The number of risk factors occurring,
    2. Uncertainty over the occurrence of each risk factor,
    3. Uncertainty over the severity of its impacts,
    4. Ignorance of other possible risks factors,
    5. The level of competence of those responsible for implementation,
    6. The cumulative effects of all occurring risks,
    7. The extent to which these risks interact.

4. The extent of risk assessment should be proportional to the level of identified risk. Where data are poor, risk assessment may only be qualitative, but it is necessary as lack of data does not indicate absence of risk. Conclusions from the risk assessment and feasibility study should determine whether a translocation should proceed or not.

Guidelines
Section 6
Risk assessment

5. Where possible, formal methods for making decisions based on best evidence should be used. As a general principle, where substantial uncertainty about the risks of a translocation outside indigenous range remain, such a translocation should not be undertaken.

6. The main categories of risk around a translocation are:

- Risk to source populations: except under rare circumstances, removing individuals for translocation should not endanger the source population - Annex 6.2.
- Ecological risk: a translocated species may have major impacts (whether desirable/undesirable, intended/ not intended) at its destination on other species, and on ecosystem functions; its own performance may not be the same as at its origin; evidence shows that risks are greater for a translocation outside a species' indigenous range, and adverse impacts may not appear for many years - Annex 6.3.
- Disease risk: as no translocated organisms can be entirely free of infection with micro-organisms or parasites, with consequent risk of their spread, disease risk assessment should start at the planning stage, with its depth in proportion to the estimated likelihood of occurrence and severity of impact of any prospective pathogen - Annex 6.4, and should be reviewed periodically through implementation.
- Associated invasion risk: separate from the risk of pathogen introduction, translocation design should be mindful of the wider biosecurity of the release area: care should be taken that potentially invasive species are not accidentally released with individuals of the focal species - Annex 6.5. This is a particular risk when translocating aquatic or island organisms.
- Gene escape: gene exchange between translocated individuals and residents is one purpose of a reinforcement; however, when historically isolated populations are mixed, or where organisms are moved outside their indigenous range, and there is a risk of hybridisation with closely-related species or sub-species, this may possibly result in lower fitness of offspring and/or loss of species integrity - Annex 6.6. This should be included in a risk assessment.

Guidelines
Section 6
Risk assessment

- Socio-economic risks: these include the risk of direct, harmful impacts on people and their livelihoods from released organisms, and more indirect, ecological impacts that negatively affect ecosystem services - Annex 6.7; translocations outside indigenous range have greater likelihood of negative socio-economic impacts and, hence, adverse public attitudes.

- Financial risks: while there should be some level of assurance of funding for the anticipated life of any translocation, there should be awareness of the possible need for funding to discontinue the translocation or to apply remedial funding to any damage caused by the translocated species - Annex 6.8.

7. It should also be noted that the risks from conservation action, or inaction, change with time. For example, if a translocation from a relatively numerous population is contemplated, the major risk is to the destination ecosystem; as the size of the source population declines, the risk to this population increases while remaining the same for the destination population.

Guidelines
Section 7
Release and implementation

1. Implementation of a conservation translocation extends beyond the release of organisms. A translocation, including one to a highly suitable area, can fail due to a poorly-designed release. Implementation should therefore take into account the aspects covered in Guidelines **Sections 4, 5, 6** and **8**, and particularly those that include legal requirements, public engagement, habitat management, sourcing and releasing organisms, interventions and post-release monitoring.
2. As released individuals become established in their destination area, emphasis will shift to population monitoring and adjustment of management based on monitoring results.

7.1 Selecting release sites and areas

A release site should:

- Meet all practical needs for effective release with least stress for the released organisms,
- Enable released organisms to exploit the surrounding release area quickly,
- Be suitable for media and public awareness needs, and any community involvement.

A release area should:

- Meet all the species' biotic and abiotic requirements,
- Be appropriate habitat for the life stage released and all life stages of the species,
- Be adequate for all seasonal habitat needs,
- Be large enough to meet the required conservation benefit,
- Have adequate connectivity to suitable habitat if that habitat is fragmented,
- Be adequately isolated from sub-optimal or non-habitat areas which might be sink areas for the population.

Guidelines
Section 7
Release and implementation
7.2 Release strategy

Many aspects of the translocated organisms' biology are relevant to the release strategy. These are explored in detail in Annex 7, but the following are central:

- The life stage and season of release should be optimised with respect to the species' natural dispersal age or season, considering whether dispersal after release is to be encouraged or discouraged,
- The age/size, sex composition and social relationships of founders may be optimised for establishment and the population growth rate stated in the objectives,
- Translocation success increases with the numbers of individuals released (which is often enhanced through multiple release events across more than one year), but this needs to be balanced against impacts on source populations,
- Releases, either simultaneously or sequentially, at multiple sites may serve to spread out the released organisms, with several potential benefits,
- Minimising stress during capture, handling, transport and pre-release management will enhance post-release performance,
- Various management interventions and support before and after release can enhance performance.

Guidelines

Section 8

Monitoring and continuing management

8.1 Monitoring

1. Translocation management is a cyclical process of implementation, monitoring, feedback and adjustment of both biological and non-biological aspects until goals are met or the translocation is deemed unsuccessful - ***Figure 2***.

2. Despite thorough translocation design and modelling, inherent uncertainty and risk will lead to both expected and unexpected situations.

3. The monitoring programme (Guidelines **Section 4.3**) is the means to measure the performance of released organisms against objectives, to assess impacts, and provide the basis for adjusting objectives or adapting management regimes or activating an exit strategy. Adequate resources for monitoring should be part of financial feasibility and commitment.

4. Pre-release baseline ecological data add great value to subsequent monitoring information - Annex 8.1.

5. Monitoring should identify new threats to the translocated population which were not part of translocation design.

6. The intensity and duration of monitoring of source and translocated populations should be appropriate to each situation.

7. In addition to refining any ongoing translocation, the conclusions from monitoring may guide other translocations.

8. Annex 8.2 covers the essential elements of post-release monitoring in greater detail:

- **Demographic performance**
  Key aspects for any translocation should include monitoring of population growth and/or spread; more intensive monitoring to estimate individual survival, reproduction and dispersal may be needed depending on circumstances.

- **Behavioural monitoring**
  Monitoring the behaviour of translocated individuals can be a valuable, early indicator of translocation progress; but its value depends on comparative data from either comparable natural populations or the same individuals before removal from their source population.

- **Ecological monitoring**
  Where a translocation is designed to create or restore an ecological function, progress towards such objectives should be assessed; any ecological impacts arising from a translocation should be assessed and determination made as to whether these are beneficial, benign or harmful, potentially enabling rational changes in management.

Guidelines
Section 8
Monitoring and continuing management
8.1 Monitoring

- **Genetic monitoring**
  Where genetic issues are identified as being critical to the success of a translocation, monitoring can be used to assess genetic diversity in establishing populations or the effects of reinforcement or other management.

- **Health and mortality monitoring**
  This assesses the extent that an establishing population is experiencing disease, or adverse welfare conditions or mortality, as a basis for identifying underlying causes.

- **Social, cultural and economic monitoring**
  Participation in monitoring may be a practical means of engaging the interest and support of local communities, and can be used to assess attitudes towards the translocation, and any benefits and costs, direct and indirect, arising.

8.2 Continuing management - Annex 8.3

1. Some translocations require management over many years; monitoring results provide the basis for either continuing or changing management regimes - ***Figure 2***. They also provide the justification for any change in translocation objectives or time schedules (Guidelines **Section 4**).

2. Learning from translocation outcomes can be improved through application of more formal adaptive management approaches, whereby alternative models are defined in advance and are tested through monitoring. This process means that the models used to decide management are based on the best possible evidence.

Guidelines
Section 9
Dissemination of information - Annex 9

Regular reporting and dissemination of information should start from the intention to translocate and throughout subsequent progress. It serves many purposes both for each conservation translocation and collectively:

1. To create awareness and support for the translocation in key affected parties.

2. To meet any statutory requirements.

3. To contribute to the body of information on, and understanding of, translocations; collaborative efforts to develop translocation science are helped when reports are published in peer-reviewed journals (as an objective indicator of high quality), and include well-documented but unsuccessful translocations or methods as well as successful ones.

4. The means of dissemination are many (for example through conventional print, radio and film media, through mechanisms such as participatory appraisal and planning, and increasingly through internet-based communications such as virtual presence meetings, and social networks). The media, formats and languages used should all be appropriate for the target audience.

Figure 1 The translocation spectrum

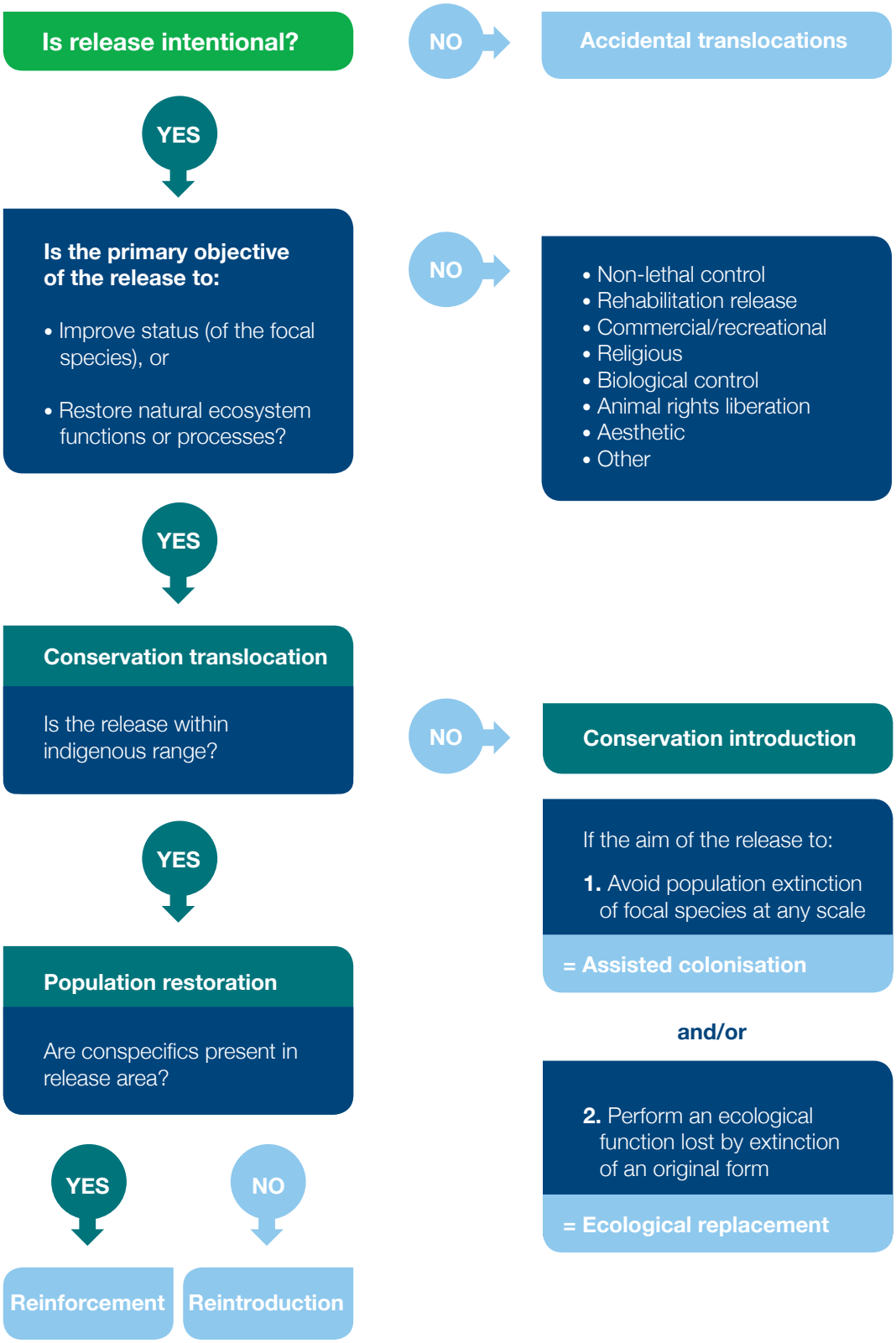
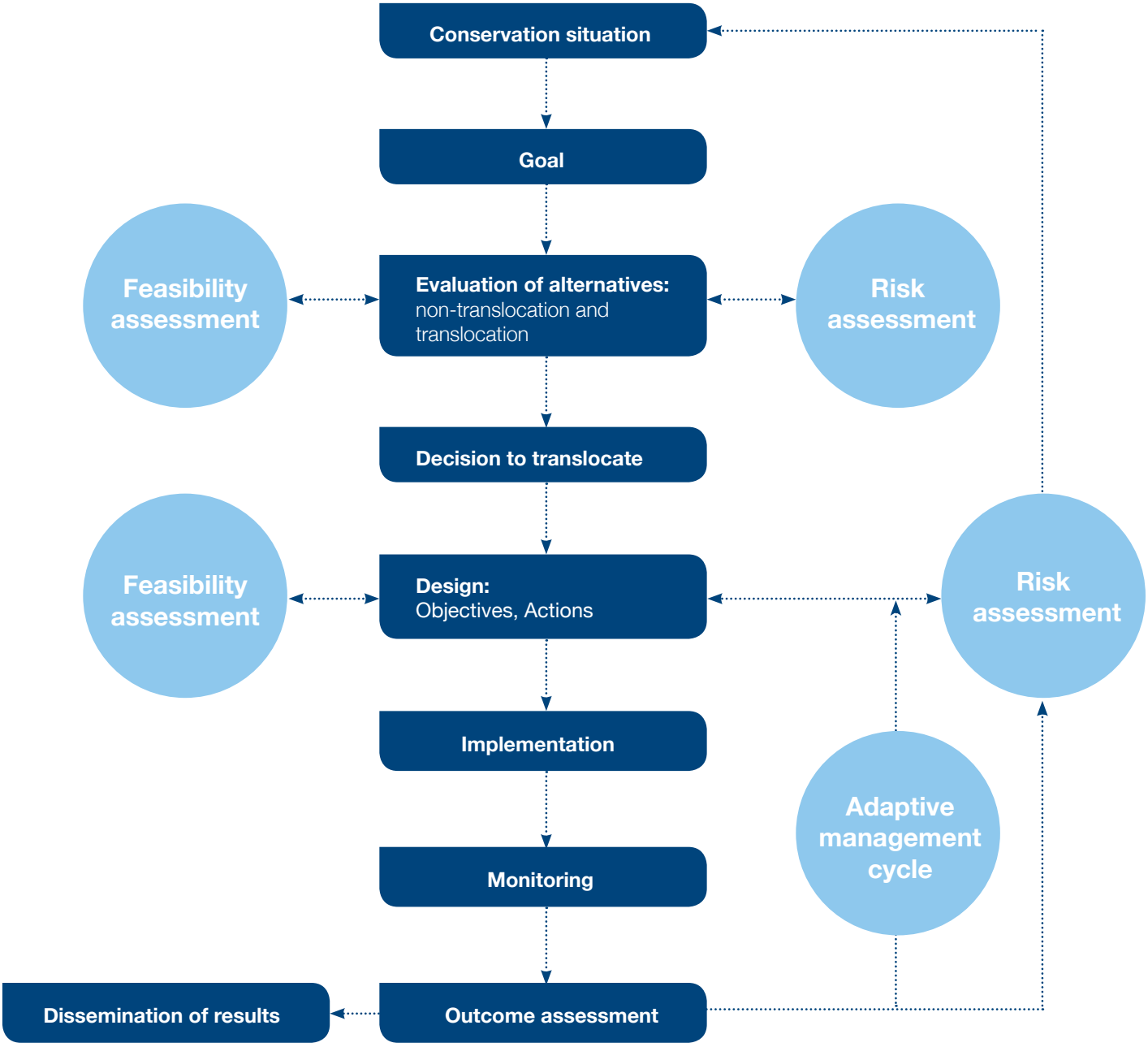


Figure 2 The conservation translocation cycle



Guidelines

For Reintroductions and Other Conservation Translocations

Annexes

Version 1.0

Contents of Annexes

Annexes to Guidelines

Annex 1
Background

Humans have moved organisms between sites for their own purposes for millennia. This has yielded benefits for human kind, but in some cases has led to disastrous impacts. IUCN stated its perspective on such moves with its 1987 Position Statement on the Translocation of Living Organisms. Subsequently, the Species Survival Commission's Reintroduction Specialist Group developed policy guidelines that were approved by IUCN's Council in 1995 and published in 1998 as the IUCN Guidelines for Reintroduction[1]. The Guidelines were short and practical in focus and have been used by other SSC Specialist Groups to derive more detailed Guidelines for their own taxa and purposes[2].

In 2010, the 1998 Guidelines were deemed to need review and revision, because:

1. The last 20 years have seen a huge increase in the numbers of rigorously designed and assessed, carefully implemented and monitored plant and animal reintroductions, with an associated increase in the understanding of the scientific principles, ethics and practical issues associated with successful reintroductions.

2. The perspective of a reintroduction as a single species being returned to its indigenous range is now restrictive: while many such examples remain, translocation is being used with many and multiple motivations and under a huge range of circumstances. Hence, reintroductions occupy a place within a spectrum of translocations that are both for conservation benefit and for other purposes, and many with aspects of each. Hence, compared to the 1998 Guidelines, the scope of this revision has been widened to include all translocations with conservation benefit (as defined in the Guidelines, **Section 1**) their primary purpose.

3. It is increasingly recognised that, while species conservation remains a priority for conserving biodiversity, reintroduction needs to be undertaken in the context of the conservation and restoration of habitats and ecosystem services.

4. The increasing rate and complexity of global change, including habitat loss, species declines, biological invasions and climate change suggest entry into an age of "ecological surprises" where management solutions based on historical precedent may not always be adequate for future biodiversity conservation needs.

5. Reintroductions or restoration efforts with the direct participation of community groups of interested people have increased.

1 http://www.iucnssc rsg.org/download/English.pdf
2 http://www.iucnssc rsg.org/policy_guidelines.html

Annexes to Guidelines

Annex 1
Background

The wider scope of the revised Guidelines reflects the fact that conservation is becoming increasingly interventionist, with biodiversity actively managed. A major factor influencing this is climate change, set against a backdrop of massive habitat destruction and fragmentation.

The palaeo-ecological record and contemporary observations show that climate change has profound influence on the distribution and abundance of species. An increasing number of species will be susceptible to extinction if they are unable to adapt to new conditions within their current ranges or are unable to shift their distributions.

If climate change (or other major threat) predictably dooms a species to extinction in its current location, one option is to move it deliberately to sites where conditions are judged to be more suitable, or are likely to become so in the future. Such sites will often be outside the species' known or inferred indigenous range. The 1998 Guidelines included "Conservation/ Benign Introductions: an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within appropriate habitat and eco-geographical area." Thus, assisted colonisation has been used successfully to counter imminent extinction threats to endangered species long before the current concern over climate change impacts. The revised Guidelines include assisted colonisation as one option within the overall spectrum of translocations ***Figure 1***.

One of the most debated aspects of translocating species outside their indigenous range, albeit with conservation intentions, is that this action could harm local biological diversity, human livelihoods, health and economy. It is therefore important to assess carefully the risks related to these translocations, making best use of advances in invasion biology. Hence, the revised Guidelines are a product of both the Reintroduction and Invasive Species Specialist Groups.

The Guidelines strive to cover situations of conservation intervention that may today seem challenging to current conservation convention; however, it is hoped the Guidelines will have a long effective lifespan. They are not an advocacy document for conservation translocations; indeed they are designed to ensure that proposals for any such activity are rigorously designed and scrutinised, whatever the taxon or scale of operation. Accordingly, the need for risk assessment and sound decision-making processes in all translocations is emphasised, but with the level of effort in proportion to the scale, risk and uncertainties around any translocation.

Annexes to Guidelines

Annex 1
Background

The scope of the Guidelines is deliberately restricted to issues around the translocation of single species or, at most, small numbers of species and their critically co-dependent species. Many of the tools and elements of other translocations are shared with conservation translocations, as delimited here. This would include, for example, the rehabilitation and release of small numbers of individuals, or the promotion of conservation benefit through ecotourism. Further, aspects of conservation translocations merge with many other disciplines in contemporary conservation, which also have their own guidelines or policies. Within IUCN, these Guidelines should be seen as complementary to, and consistent with, the following key works:

- IUCN Guidelines for the Placement of Confiscated Animals (2000)[3]
- IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (2000)[4]
- IUCN Technical Guidelines on the Management of Ex-situ populations for Conservation (2013 in preparation)[5]
- IUCN World Commission on Protected Areas (2012), Ecological Restoration for Protected Areas: Principles, guidelines and best practices[6]
- IUCN (2013, in preparation). Guide to Wildlife Disease Risk Assessment[7]
- IUCN Red List[8]
- IUCN (2000). The IUCN Policy Statement on sustainable Use of Wild Living Resources[9]

And, it should be noted that many other organisations have developed their own Guidelines for activities in the spectrum from species reintroduction to ecosystem restoration.

These Guidelines are consistent with the guiding spirit of the Convention on Biological Diversity and its Strategic Plan for Biodiversity (the Aichi Biodiversity Targets).

3 http://data.iucn.org/dbtw-wpd/edocs/2002-004.pdf **4** http://intranet.iucn.org/webfiles/doc/SSC/SSCwebsite/Policy_statements/IUCN_Guidelines_for_the_Prevention_of_Biodiversity_Loss_caused_by_Alien_Invasive_Species.pdf **5** Website to follow **6** https://cmsdata.iucn.org/custom/image-viewer/launch.cfm?img_id=26888 **7** Website to follow **8** http://www.iucn.org/about/work/programmes/species/our_work/the_iucn_red_list/ **9** http://intranet.iucn.org/webfiles/doc/SSC/SSCwebsite/Policy_statements/The_IUCN_Policy_Statement_on_Sustainable_Use_of_Wild_Living_Resources.pdf

Annexes to Guidelines

Annex 2
Definitions and classification

Conservation benefit as a primary objective

The requirement that a conservation translocation must benefit either a population or its species, or the ecosystem it occupies, is consistent with the requirement of the 1998 Guidelines, namely that the purpose of a reintroduction is the establishment of a viable population.

The present Guidelines acknowledge that conservation benefit may be broader than establishing a demographically viable population (for example, through ensuring the persistence of traits essential for survival), but that primary benefit should still be at a higher level of organisation than the individual.

Where conservation benefit is not obvious

There are several situations in which conservation benefit

- is not the primary aim, or
- may be hard to discern, or
- is commingled with other benefits, or
- is deferred to some future period, or
- cannot be confirmed until some future period.

These situations occur singly or in combination in the following:

1. Releases for rehabilitation

The present Guidelines consider the release of individuals for the sake of their welfare, or for rehabilitation from captivity, as primarily for the benefit of the released individuals; hence, such releases are outside the scope of these Guidelines.

Such releases may yield some conservation benefit, but equally they may cause harm. The risks are well-known to practitioners, and some are covered in other IUCN Guidelines[10]. It is to be hoped that the precautionary tone and treatment of risk in these Guidelines will help shape strategies for the release of rehabilitated animals, even though they are not the focus of these Guidelines.

2. Population reinforcement for recreational or commercial offtake

Comparable situations arise where populations are augmented for purposes of recreational or commercial offtake. Again, the hierarchy of motivation should be considered, and often conservation benefit at the level of the population or ecosystem will either be non-existent or be secondary to other interests. But, the risks in translocation and release in such cases may also be precisely those covered in these Guidelines.

10 For example, B.Beck et al. (2007). Best practice guidelines for the re-introduction of Great Apes. Gland, Switzerland, SSC Primate Specialist Group of the World Conservation Union; 48 pp. http://www.primate-sg.org/PDF/BP.reintro.V2.pdf

Annexes to Guidelines

Annex 2

Definitions and classification

3. Mitigation translocations

'Mitigation translocation' is increasingly common, and may concern very large numbers of individuals; it involves the removal of organisms from habitat due to be lost through anthropogenic land use change and release at an alternative site. Permission for these development operations is often conditional on an obligation to mitigate or offset the impacts of the development. This is then claimed to be met by the translocation of individuals of key species from the site to be developed for release into further 'wild' sites.

Rigorous analysis and great caution should be applied when assessing potential future conservation benefits and using them to mitigate or offset current development impacts, in view of the inherent uncertainty regarding translocation success. Further, any mitigation proposal should follow the process of design and feasibility, implementation, monitoring and adaptive management of these Guidelines.

Under the translocation spectrum of ***Figure 1***, circumstances will dictate the nature of the mitigation measure amongst these options:

1. If the translocated individuals are released into existing populations of conspecifics, then it is a reinforcement provided there is a conservation benefit for the receiving population; evidence shows that individuals released into established populations may experience very high mortality.

2. If they are released into empty habitat in indigenous range, then it is a reintroduction,

3. If released into empty habitat that could not qualify as within indigenous range, then it is a conservation introduction,

4. If released into an area that is definitively not habitat, it is an irresponsible release with no conservation benefit.

The first three options are covered under these Guidelines. The fourth option should not be allowed.

4. Removal for intensive protection

Organisms may be removed from their natural environment into conditions of intensive protection, as provided by zoological and botanic gardens and other dedicated facilities.

Annexes to Guidelines

Annex 2
Definitions and classification

Where conservation is a claimed motivation, this is usually a response either to progressive reduction in numbers with an increased risk of local or total extinction, or as emergency action in the face of sudden catastrophic threat or reduction in numbers.

Where the stated purpose is to protect and/or propagate such species until individuals can be returned to the wild, conservation benefit is clearly intended. But, entry into intensive protection is not regarded as a release, and the conditions usually experienced (such as limited space, controlled environmental conditions, breeding programmes) are beyond the scope of these Guidelines. Many relevant aspects are considered in other IUCN resources[11].

In contrast, any return of individuals from intensive protection back into natural conditions is a release and translocation; it should have conservation benefit, and will be covered by these Guidelines.

5. Least risk, least regret translocations

Much reintroduction experience has been with species that are naturally scarce or threatened, and/or are already declining, or are extinct locally or globally. The wider range of conservation translocations is less focused on rare species. Assisted colonisation is most often viewed as a solution for species facing extreme threat from climate change, irrespective of their current conservation status.

Translocations of species that are neither naturally scarce or declining, nor with high probabilities of extinction are increasing, often as partnerships between local communities and conservation professionals, in which the principle motivation is the restoration of a component of local cultural heritage.

While such small-scale, community-driven restorations should be subject to all relevant formal regulations and legislation, like any translocation, they are likely to be relatively low-risk in terms of the cost of failure or the likelihood of extreme, adverse ecological impacts. These may be characterised as 'low cost, low risk, least regret' translocations. The Guidelines are equally applicable but, as they state, many of the recommended considerations around planning, feasibility and risk should have levels of effort proportional to the scale and nature of the intended translocation.

11 IUCN Technical Guidelines on the Management of Ex-situ populations for Conservation (2013 in preparation)

Annexes to Guidelines

Annex 3

Deciding when translocation is an acceptable option

3.1 Introduction

1. Any proposed species translocation should be justified by identifying a conservation benefit and weighing any benefits against risks, while considering alternative actions that could be taken. Motivations such as experimenting solely for academic interest, releasing surplus captive stock, rehabilitation for welfare purposes, attracting funding or public profile, or moving organisms to facilitate economic development are not regarded here as conservation purposes.

2. Species or populations that have small or declining populations or ranges, and/or high probabilities of extinction, will often be prime candidates. The metrics used by the IUCN Red List status can be used to assess the potential need for conservation intervention.

3. While the ultimate aim of any conservation translocation is to secure a conservation benefit, this benefit may need long-term or permanent management support to persist. Such obligations and their cost implications should be included in any assessment of alternative conservation solutions (below).

4. Conservation priorities exist at the levels of species, biological communities and ecosystems for different purposes. Candidate species for conservation translocation might be accorded priority based on biological criteria such as their ecological role, their evolutionary distinctiveness or uniqueness, their role as flagship species, their degree of endangerment, or their potential as ecological replacements. Translocations may be promoted on grounds of cultural heritage and its restoration but this alone is not conservation benefit. The pivotal criteria for justifying any conservation translocation will be situation- and species-specific.

5. Where species are extinct, consequent changes in the ecosystem can indicate a need to restore the ecological function provided by the lost species; this would constitute justification for exploring an ecological replacement.

Annexes to Guidelines

Annex 3

Deciding when translocation is an acceptable option

3.2 Assessing extinction causes and threats

1. Any proposed conservation translocation should be justified by first considering past causes of severe population decline or extinction. There should be confidence that these past causes would not again be threats to any prospective translocated populations.

2. Threats need to be identified through all seasons and at appropriate geographic scale for the species, taking account of the species' biological attributes and life history.

3. During a species' absence, potential new threats to any restored population may have arisen.

4. All threats, direct and indirect, that might jeopardise attainment of the stated conservation benefit of the translocation should be identified and measures specified by which these threats would be mitigated or avoided.

5. The spatial extent of a threat should be considered. Threats causing local extinctions are often acute but controllable, but threats that operate over all or a large part of the species' range (such as pathogens, introduced predators or competitors, widespread land-use change, atmospheric pollutants and climate change) are more difficult to manage.

6. The severity of impact or sensitivity to a threat may vary with demography or life stage. Threat assessments need to consider the adaptive capacity of the focal species; this capacity will tend to be higher in populations with high genetic diversity, long-range dispersal and/or effective colonisation ability, short lifespans/high reproductive rates, phenotypic plasticity, and rapid evolutionary rates.

7. Threats can be biological, physical (such as extreme climate events), or social, political or economic, or a combination of these.

Annexes to Guidelines

Annex 3

Deciding when translocation is an acceptable option

8. Threats may be inferred from anecdotal observations of conditions around the time of extinction, with subsequent rigorous testing of the anecdotes.

9. It is useful to consider multiple hypotheses for causes of extinction or decline and to test these based on the available evidence; where significant uncertainty exists, an experimental approach within the translocation programme can provide guidance for implementation.

10. A trial release may answer uncertainties such as the identity of past threats, but should only be contemplated where all formal requirements have been met, where consequences will be suitably monitored and will be used to refine further release design, and any unacceptable impacts can be mitigated or reversed.

Annexes to Guidelines

Annex 3

Deciding when translocation is an acceptable option

3.3 Considering alternatives

Many conservation translocations will yield conservation benefit only at high cost and with considerable risks. Therefore, irrespective of any conservation priority assigned to the species, any proposed translocation should be justified through comparison with alternative solutions, which might include:

1. Increasing habitat availability through restoration, connectivity, corridor establishment, or habitat protection (area-based solutions),

2. Improving the viability of extant populations through management interventions such as pathogen, predator or invasive alien species control, food provision, assisted reproduction, or protective fencing (species-based solutions),

3. A variety of tools including establishment of protected areas, changes in legislation or regulations, public education, community-based conservation, financial incentives or compensation to promote the viability of the wild populations can be valuable either on their own or in combination with area- or species-based solutions (social/indirect solutions),

4. Doing nothing: inaction on behalf of a rare and declining species may carry lower risks of extinction compared to those of alternative solutions, and the focal species might adapt naturally where it is or adjust its range without human intervention (no action).

5. A conservation translocation may be used as one solution amongst these other approaches.

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Planning a translocation

1. The goals, objectives and actions should take into account the commonly observed phases of development of successfully translocated populations:

- The Establishment phase starts with the first release and ends when post-release effects are no longer operating; these effects can include the effects of the translocation process, chance events in small populations, or a delay before reproduction occurs, all of which may slow initial growth.
- The Growth phase is often characterised by high rates of increase and/or expansion of range, continuing until the population approaches carrying capacity.
- The Regulation phase starts with the reduction in survival and/ or recruitment due to increased population density.

2. The rates and duration of the Establishment and Growth phases will vary widely and be species-specific; they will influence the translocation flowchart - ***Figure 2***.

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5.1 Background biological and ecological knowledge

1. Information on the biology and ecology of wild populations (if they exist) should be collected or collated from available publications, reports, species action plans and consultations with relevant species experts including both professional and amateur naturalists.

2. Background biological knowledge should cover aspects such as: reproduction, mating systems, social structure and behaviour, physical adaptations, individual growth and development, parental care, population dynamics in indigenous range.

3. Background ecological knowledge should include biotic and abiotic habitat requirements, intraspecific variation, adaptations to local ecological conditions, seasonality and phenology, dispersal, and interspecific relationships including feeding, predation, disease, commensalism, symbioses and mutualisms.

5.2 Models, precedents for same/similar species

1. Some type of modelling should be used to predict the outcome of a translocation under various scenarios, as a valuable insight for selecting the optimal strategy.

2. It is always useful to construct a basic conceptual model (for example, verbal or diagrammatic), and then to convert this to a quantitative model if possible.

3. Modelling and planning should be informed by data from previous species management activities including translocations of the same or similar species.

4. If data are not available for the species, inferences can be made from closely related sub-species and/or ecologically similar species.

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5.3 Habitat

1. As habitats vary over space and time, species' ranges are dynamic. Environmental conditions will continue to change after species extinction. It is invalid to assume that former range will invariably provide suitable habitat.

2. It is insufficient to address only the causes of the original population decline as other threats may have emerged during any period of extinction.

3. It is essential to evaluate the current suitability of habitat in any proposed destination area.

4. Although the habitat requirements of large, generalist animal species may be easy to infer, this will not usually be the case with many taxa, for instance those with complex life cycles such as migratory species or invertebrates with larval stages.

5. A habitat assessment should include assurance of essential seasonal or episodic environmental variation.

6. The occurrence and severity of episodic or unpredictable events that are extreme and adverse for the species should be assessed.

7. The release area should be large enough to support the stated population targets. The effective habitat area will depend on the size and isolation of individual patches if the habitat is fragmented.

8. Given the prevalence of habitat fragmentation, conservation translocation designs may include increasing connectivity between habitat fragments to establish a metapopulation (a set of populations with some dispersal between them).

9. For some taxa, habitat quality and proximity to other sites may be more important determinants of habitat suitability than habitat patch size.

10. Achieving suitable habitat may require its restoration or even creation, or removal of alien or non-indigenous animals or plants that were a threat in the past to the focal species or would be a threat again for translocated individuals; any such removal should be done as humanely as possible and in a manner that causes minimum disruption to habitats or other species.

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11. While no organisms should be released without assessment of habitat quality in the destination area, the level of effort expended on assessment should be proportional to: the scale of area likely to be affected by the translocation and subsequent establishment, the degree of certainty on the expected performance of the released organisms, the level of risk of undesired and/or harmful outcomes, the ability to reverse unacceptable outcomes.

12. Assessing habitat requirements will involve surveys of extant populations of the focal species if they remain in the wild. However, current range can be an unreliable indicator of habitat requirements if remnant populations have been forced into refuges of sub-optimal habitat.

13. The possible ecological roles of the focal species in any new environment should be carefully evaluated, with the particular concern that the conservation interests of other species and habitats will not be jeopardised by the translocation **(Section 6)**.

14. Plants, fungi and invertebrates that are immobile for at least part of their life cycle, require microsite assessment potentially at the scale of centimetres; in contrast, large animal species living in extreme or unpredictable conditions will require areas that will vary unpredictably in size and location between seasons and years.

15. As even the most detailed habitat assessments may not capture the full range of environmental variation during the lifespan of individuals of the focal species, the loss through death or dispersal of translocated individuals at some sites or in particular years should be expected.

16. A candidate species may be linked with other species either through a shared ecological dependence or as providers of critical functions such as being a sole pollinator, a symbiont or host. Any destination area should be surveyed for the presence of any essential co-dependents of the focal species. It may then be necessary to translocate these essential species with the focal species; alternatively, species indigenous to the destination area may be able to assume these roles.

17. The release area and essential habitat for the translocated organisms should be secure from incompatible land-use change before the conservation goal is reached, and, ideally, in perpetuity.

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5.4 Climate requirements

1. The climate requirements of the focal species should be understood and matched to current and/or future climate at the destination site.

2. The climate requirements of any candidate species for a conservation translocation can be assessed through measurement of key climate parameters in the species' current range; this should include the extent of climate variation tolerated by the species based on its distribution; the resulting bio-climate envelope can be used in models of predicted climate change to assess how the focal species might respond to scenarios of future climate; the results can be used to identify potentially suitable destination locations. However, the utility of this approach depends on many factors such as the availability and quality of data, spatial resolution and the climate change scenarios used[12]; in addition, the bio-climate model for a species with a small, remaining range will under-estimate the breadth of potentially suitable climatic conditions.

3. A climate envelope model should be supplemented by a study of other factors that might determine habitat suitability and distribution, such as the presence of essential or co-dependent species, the effects of predators, competitors, disease etc.

4. Any determination that an area is habitat for a conservation translocation should include reassurance that its climate is predicted to remain suitable for the reintroduced species for long enough to achieve the desired conservation benefit, acknowledging the uncertainties inherent in climate projections.

12 http://www.iucnredlist.org/documents/RedListGuidelines.pdf

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5.5 Founders

Genetic considerations

1. Any source population should be able to sustain removal of individuals/ propagules, and removal should not jeopardise any critical ecological function, except in the case of an emergency or rescue removal.

2. If there is little genetic variation in source material used for translocations, there are two potential risks: the first is that reproduction between related individuals can lead to reduced vigour, reproductive output and survival (inbreeding depression); the second is a lack of adequate genetic variation to enable survival and adaptation in the face of environmental change.

3. Such genetic problems can occur due to sampling a source population with low genetic diversity (typically small/ isolated populations), biased sampling of a single source population, genetic bottlenecks in the translocation process, and unequal survival, establishment and reproductive output in the destination area.

4. If founders originate from environments markedly different to the destination area, there is a risk of failure due to their being poorly adapted to the destination area.

5. If a translocation programme involves mixing populations, there is the potential for fitness costs associated with genetic incompatibilities between different lineages (genetic outbreeding depression). Predicting the situations in which genetic incompatibilities may occur is not simple, and the fact that problems may not become apparent for 2-3 generations makes pilot testing difficult. However, recent meta-analyses[13] provide useful working principles.

6. Taking individuals from multiple populations can increase the genetic diversity and decrease the risk of inbreeding depression in the translocated population. This is appropriate if outbreeding depression and/or (for animals) behavioural differences between the populations are considered unlikely.

7. More radical strategies involve greater geographical or ecological distances between source and destination sites, and/or greater mixture of source material from multiple populations.

13 Frankham R et al. (2011). Predicting the probability of outbreeding depression. Conservation Biology: 25:465-475

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8. Multiple sourcing aims to provide a balance between using primarily local/ecologically similar source material, and introducing decreasing proportions of genotypes with increasing geographical/ecological distance from any population at the destination site. This is designed to mimic the beneficial influx of 'useful' genetic variants from occasional long distance gene flow, without swamping out locally adapted variants. This approach is recommended for fragmented habitats in which either the fragments contain inbred individuals or their populations are considered unlikely to possess adequate genetic variation to respond to environmental change.

9. Predictive sourcing aims to introduce genetic diversity that will be adapted to the predicted direction of environmental change. The challenge is to introduce material adapted to future environmental conditions, without being so maladapted to current conditions that it suffers immediate fitness consequences.

10. A combination of multiple and predictive sourcing is a logical, but largely untested strategy for translocations in fragmented systems which are likely to suffer detrimental effects of climate change; it may be especially considered for conservation introductions.

11. The relative risks and benefits associated with the choice of source population(s) will vary depending on the goals and type of translocation and source population availability A species' life history traits are also relevant as they are major determinants of the amount and spatial distribution of a species' genetic variation. As the 'mixture approaches' to translocations essentially involve providing variable source populations upon which natural selection can act, such sourcing may result in increased mortality, with possible consideration for animal welfare.

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5.6 Disease and parasite considerations

1. Surveillance of source populations can establish the potential pathogen community present; individuals can then be selected for purposes of reintroduction or translocation, based on a risk assessment.

2. All aspects of the translocation process can cause stress-induced disease: the conditions and duration of any quarantine, inappropriate disease prevention protocols, poorly designed transport containers and methods of transport, extended time in transport, and lack of adaptation prior to transport can contribute to the occurrence of disease and mortality during the translocation process.

3. The possibility of infection through interaction with human, domestic animal or inanimate elements during the translocation process is always present and in practice unpredictable; effective biosecurity is, therefore, a requirement throughout.

4. Tools for management after release, such as feeding stations that concentrate or mix released and wild conspecifics, may promote the exchange of pathogens.

5. Pathogen risk assessment of translocated plants should include the possibility of infection through interaction with wild and domestic plants, disease vectors or inanimate components during the translocation process.

6. If an extinct host had parasites that also became extinct, then it is desirable from a restoration perspective to re-establish those parasites with the translocated host; but, this should be subject to especially rigorous assessment of the risks to the same or other species in the destination area; an apparently benign mutual relationship between host and parasite at source may change adversely for the host in the destination environment.

7. Translocations within geographical/administrative areas sharing diseases may not need extensive disease screening, but attention to managing infection threat should increase with the distance between source and destination sites.

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Risk assessment

6.1 Assessing the risk landscape

1. Any translocation may fail to deliver desired results or have unintended consequences. The probability of achieving desired results is favoured by early identification of the risk factors that might be encountered across all aspects of the translocation. Risk is assessed as the likelihood of any risk factor occurring, combined with the severity of its impact. The range of possible risks comprises the 'risk landscape'.

2. A risk assessment should carefully consider all information on the species' biology, history of invasiveness in other geographical contexts (including closely-related species in the same genus), known pathogens or parasites, probability of potential impacts - including economic impacts, and available options for reversing those impacts. The risk assessment should take into account all sources of uncertainty and apply them at an appropriate spatial scale. In the case of translocations outside indigenous range, the risk assessment should include predictions of range expansion over various time periods.

3. A risk analysis should include assessment of the availability of necessary resources to cope with problems that emerge during the translocation, and the subsequent likelihood of meeting all regulatory requirements.

4. The uncertainty in risk assessment should be carefully considered, especially for translocations outside of indigenous ranges.

5. It should be stressed that current risk assessment protocols focus at the single species level, and require in-depth information on a species' ecology. Thus, these protocols are not fully applicable to assemblages of species, or to taxonomic groups for which information is limited.

Translocations with transboundary risk

1. Common duty and international law aim to prevent, reduce and control environmental harm to neighbouring countries, and to promote cooperation to manage transboundary environmental risks. States should carefully consider risks to neighbouring territories.

Decision making

1. The decision to proceed or not with a translocation requires weighing the potential risks against the expected benefits. This means assessing the probabilities that different outcomes may occur (either quantitatively or qualitatively), and placing values on those outcomes.

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2. For example, if a proposed conservation introduction is deemed to have a high probability of success and have a low probability of undesirable impact on the destination ecosystem, it might still be the wrong option if the current functioning of that ecosystem is highly valued. If impact on the ecosystem cannot be predicted confidently, risks cannot be assessed adequately, and translocation should not be the preferred option in these circumstances.

3. The use of structured decision-making frameworks is recommended, so the logic, value judgements and knowledge gaps behind such decisions are clear to everyone involved.

Managing undesirable outcomes

1. Risk analysis should include an evaluation of options to reduce the risk of undesirable outcomes. The most obvious option is to remove the translocated population. However, this may be possible only at very early stages after establishment when undesirable effects may not yet be evident.

6.2 Risks to the source population

1. Where a translocation involves removal of individuals or propagules from existing wild populations, any potential negative impacts on the source population should be assessed.

2. If removal of individuals or propagules from a source population causes a reduction in its viability in the short-term, the translocation objectives should include balancing this with the expected gain in viability of the destination population, so that the species has a greater overall viability than without the translocation, within a stated time period.

3. Translocations can affect not only the source populations of the focal species but may also have negative effects on associated/dependent species in the communities from which those individuals are removed.

4. It may be beneficial to use non-viable populations as sources of stock.

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Risk assessment

6.3 The ecological consequences of translocation

1. The ecological consequences of a translocation include those affecting both the translocated species and other species or ecological processes in the destination community.

2. The biological traits of a species in a source area may indicate its expected performance in a destination area; but species' responses may be different under the ecological conditions of the destination area due, for example, to a change of predators or parasites or a different level of competition, or to interactions with other species already present.

3. Translocated organisms will engage in any or many of the following ecological processes, irrespective of whether they are deemed desirable or undesirable, intended or unintended:

At the level of species/populations or ecosystem structure, these may include:

inter-specific competition and predation, hybridisation (intra- and inter-specific), disease transmission (pathogenic or vector/reservoir), parasitism, bio-fouling, grazing/ herbivory/ browsing, rooting/ digging, trampling, interaction with invasive species, and introduction of pathogens to the same species, other species, or humans.

At the level of ecosystem functioning, these may include modifications to:

hydrology, nutrient regimes, food webs, natural benthic communities, complete replacement/loss of habitat, physical disturbance, fire regime, successional patterns and soil attributes including erosion, accretion and structure.

4. The risks of undesirable effects increase greatly when a species is translocated outside its known range.

5. The complex and interacting negative effects of introduced species on biodiversity, human health, cultural values and ecosystem services may only become evident decades after introduction.

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Risk assessment

6.4 Disease risk

1. As it is not possible, despite all appropriate precautions, to ensure that translocated individuals of any species are completely free of all disease/pathogen risk, risk assessment should therefore focus on known pathogens in the translocation stock that are likely to have undesirable impacts on other organisms at the destination. Generalist pathogens with no known history at the destination are a particularly high risk.

6.5 Association invasion risk

Where inadequate biosecurity protocols have resulted in further species being introduced with the translocated organisms, there is a risk of the former becoming invasive in the release area. If this happens, the benefits of the translocation may be insignificant compared to the damage done by the invasive species.

6.6 Gene escape

Intraspecific hybridisation

1. Where translocations involve reinforcement, or reintroductions close to existing populations, there is a risk of genetic swamping of the resident population(s) by the translocated individuals. This can potentially cause a reduction in vigour or reproductive success in a small, stable, resident population if a large proportion of the subsequent reproductive output is derived from the less well-adapted translocated stock.

Interspecific hybridisation

1. Translocation of a population into the close vicinity of a closely related species may result in inter-specific hybridisation which would not have occurred naturally. This is particularly likely in cases where a conservation introduction moves a species out of its extant range and overcomes natural geographical barriers to hybridisation with related species. In these situations, hybridisation can potentially threaten the genetic integrity/distinctiveness of the resident species, and in extreme cases extinction-by-hybridisation is possible.

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Risk assessment

6.7 Socio-economic risks

1. The risk assessment should cover the potential direct and indirect negative impacts on human interests:

- Direct effects on people and livelihoods such as potential or perceived dangers from released plants, animals and fungi, and the adverse public relations arising from any incidents,
- Indirect ecological effects that could threaten food supplies or ecosystem services such as clean water, erosion control, pollination, or nutrient cycling.

2. Any risk that the public in a source area might not accept the responsible removal of individuals as a necessary part of conservation benefit for the focal species should be addressed.

6.8 Financial risks

1. Where a translocated species causes significant, unacceptable consequences, such as its increase to damaging, pest status, the likely outcomes are:

- remedial costs may be very high,
- remedial costs cannot be met from project funds,
- funding for future conservation translocations is less likely.

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Annex 7

Release and implementation

Many essential aspects of founder selection are covered under 'Biological feasibility – Founders' (Guidelines **Section 5.1** and Annex 5.5). This section covers the specific and proximate factors that will shape founder demographics for maximum chance of successful release and establishment, and the variety of possible supportive management actions.

1. The most appropriate life stage for translocation should be identified.

2. The optimum number of individuals to translocate will vary from species to species and with the objectives of each translocation. The optimum number will be a trade-off between impact on the source population and reducing the risk of the founder population failing to establish because of random effects on a small population, and lack of genetic diversity.

3. Mortality in the translocated population may mean that the number of effective founders is considerably less than the number translocated.

4. While successful establishment of translocated populations often depends on the release of individuals in natural sex ratios and age classes (and social groupings in animals), it may be enhanced by deliberate bias in founder selection, for example either by increasing the proportion of individuals of breeding age or by favouring the proportion of juveniles; any such strategy will be specific to the species and circumstances.

5. Plant founder selection will be influenced by the age class most amenable to successful transplanting; plants have scope for releasing individuals as seeds, which have advantages and disadvantages: they can be easy to transport and can be obtained in large numbers. The use of seeds can facilitate experimental approaches to translocation by testing different management options. However, as seeds may have mortality rates of >90%, a mixture of seeds, juvenile and adult plants is often an optimal release strategy.

6. Population models can assist in determining the optimal strategy in terms of trade-offs between source and founding populations, and in the optimal selection of numbers and composition of founders. After initial release, information from ongoing monitoring can define the optimum number and size of further releases through adaptive management - Annex 8.2.

7. Where individuals are sourced from small and declining populations, their number, age and sex composition may be determined only by what is available.

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Release and implementation

8. The life history, ecology and behaviour of the focal species, together with any seasonality in essential resource availability, should guide scheduling of releases; species may have periods of development during which they are more predisposed to disperse, establish home ranges, have higher mortality, or breed.

9. Releasing individuals over several years may help to overcome inter-annual variation in climate and the occurrence of natural disturbances that occur infrequently but with severe results.

10. Releases at multiple sites will increase the chance of selecting favourable habitat, avoiding localised disturbance events, and may encourage development of local sub-populations.

11. Repeat releases at one site may allow newly released animals to learn survival skills from those released earlier, but the social or territorial behaviour of some species may discourage such repeat releases.

12. Low survival in released organisms can be due to a wide range of health, behavioural, or other ecological factors; diverse management options can contribute to higher post-release success.

13. Released animals should exhibit behaviours essential for survival and reproduction, and for compatibility with any conspecifics in the release area; it may sometimes be desirable to move groups of animals with their social relationships intact.

14. Animals can be behaviourally conditioned before release to avoid predators, or to develop predatory skills that may have been lost either over short periods or successive generations in captivity; this may be particularly valuable for socially complex species; where possible, practitioners should design experiments to determine the efficacy of conditioning techniques and/or to determine correlates between pre-release behaviour and post-release survival.

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Release and implementation

15. Pre-release treatment or medication can help to protect animals and plants from pathogens encountered after release.

16. Animals may be held for some period at the release site to allow them to accustom to local conditions or enhance social group cohesion; such procedures are most likely to be useful with captive-bred animals, but should never be assumed to be useful without evidence.

17. Rapid dispersal of animals from release sites is common, and may be linked to stress before or during the release process; such movements are also often associated with immediate post-release mortality and occasionally low reproductive rates; in contrast, a period of confinement at the release site can discourage translocated animals from returning to their source area.

18. Horticultural management can prepare plants for local conditions through modifying conditions such as irrigation, light levels and available nutrients.

19. During or following release, the provision of artificial caging, shelters or residences, or supplementary food and water can increase survival of plants and animals, but may also promote disease transmission through artificially concentrating individuals.

20. For some species such as invertebrates, amphibians or reptiles, 'head-starting' avoids the heavy mortality of young age classes in the wild; wild hatchlings are reared in protective enclosures before release at less susceptible size/age.

21. In various species, 'fostering' integrates captive-bred or orphaned eggs/wild young with offspring that are already being raised by wild-born parents; this may allow the translocated young to be fed by wild conspecifics and to learn behaviours and traditions that may be critical for survival.

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Annex 8

Outcome assessment and continuing management

8.1 Survey / monitoring before release

It is desirable to collect baseline information on any area before releases into it. Without it, it is difficult to ascribe observed changes after release to the impacts of the released organisms.

The resources for pre-release survey are likely to be less than for post-release monitoring; hence, pre-release effort should focus on the species and ecological functions most likely to be affected by the translocation.

While the emphases of pre- and post-release monitoring may differ slightly, their methods and resulting data should allow direct comparison.

8.2 Monitoring after release

While post-release monitoring is an essential part of a responsible conservation translocation, the intensity and duration of monitoring should be proportional to the scale of the translocation (in terms, for example, of the numbers of organisms released, their ecological roles, the size of area affected) and the levels of uncertainty and of risk around the translocation results.

Demographic monitoring

1. Translocation objectives are often stated in terms of desired population sizes or probabilities of extinction within defined time frames (Guidelines **Section 4**). Assessing whether populations are likely to meet these objectives requires demographic models of populations, so the information from monitoring should be designed to allow choice between alternative models and model parameters. Monitoring can just involve estimating (or indexing) abundance, but predictions will be much more precise if data are collected on vital rates, such as survival, reproduction and dispersal.

2. Methods of estimating abundance include sample plots, with methods to account for incomplete detectability; indices of relative abundance or presence/absence surveys may be adequate, but only if objectives focus solely on the growth or spread of populations.

3. Estimating survival rates involves monitoring a sample of marked (or otherwise identifiable) individuals; incomplete detectability should be accounted for to avoid biased survival estimates, and it may also be important to avoid confounding death and dispersal; where it is difficult to mark or directly observe individuals, photo identification using natural markings, or genetic monitoring, (see below) may be appropriate.

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Outcome assessment and continuing management

4. Estimating reproductive success involves quantifying numbers of offspring or propagules produced, along with establishment rates of offspring in the translocated population; this requires field surveys to identify reproductive individuals, their breeding locations, and the fate of their offspring, especially their survival to reproductive age; alternatively, it may be adequate to estimate recruitment, for example through the number of new individuals entering the population per individual currently present.

5. Monitoring detail will be determined by the species' longevity and specific attributes such as age of first reproduction.

6. Monitoring should cover the entire area occupied by the translocated population.

Behavioural monitoring

Behaviours which can yield insights into the adjustment of translocated animals to the destination area include activity and movement patterns, foraging behaviour and diet selection, social organisation, breeding season and success.

Ecological monitoring

1. Ecological monitoring should be undertaken to record the ecological changes associated with the translocation, and to contribute towards the general knowledge basis for translocation feasibility and design. It is most unlikely that any translocated organism can attain its intended demographic targets without evident ecological impacts.

2. Ecological monitoring is also necessary to link changes in habitat, for whatever reason, to the translocated population's demography.

3. Unexpected consequences of a translocation should be detected and monitored to see whether their longer-term impacts will be neutral, negative or positive.

4. The appearance of unintended and undesirable adverse impacts following translocation may prompt radical changes of management or even reversal of the translocation - Annex 8.3.

5. Where a translocation purpose is to restore an ecological function, monitoring should include a focus on detecting and measuring the return of this function.

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Annex 8

Outcome assessment and continuing management

Genetic monitoring

1. Genetic markers can establish the proportion of genetic diversity that is captured from the source populations and whether this diversity is maintained in the transition to the established population at the release site(s). Tissues taken and stored in the early stages of a translocation programme can be a cost-effective resource for future evaluation of genetic change.

2. In well-resourced projects, genetic monitoring may also be used to make demographic inferences, such as insights into the number of adults contributing to subsequent generations, the extent to which translocated individuals in reinforcement are contributing genes to the resident population, and for gaining general insights into behavioural ecology or population size.

Health and mortality monitoring

1. Monitoring can assess whether there are unacceptably high levels of disease/adverse welfare/mortality which will impact on the success of the translocated population, or which may present a threat to any neighbouring populations; however, if recapture is needed for this purpose, it may only exacerbate underlying problems.

2. Identifying the causes of death accurately and precisely can be critical in assessing translocation progress and indicating the challenges facing the establishing population.

Socio-economic and financial monitoring

1. The socio-economic and financial impacts of any translocation should be monitored, especially in a conservation introduction.

2. Where such impacts are undesirable and unacceptable, monitoring results can prompt changes in management or an exit strategy- Annex 8.3.

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Outcome assessment and continuing management

8.3 Continuing management

1. Monitoring information enables managers to assess whether objectives are being met according to schedule. This information can then be used both to adjust any ongoing management of the current population and, more generally, to contribute to the design of other translocations.

2. Adjustments may involve increasing or decreasing the intensity of management or changing the type of management. For example, if a translocated population failed to grow despite ongoing management, it might make sense to increase the intensity of that management. Alternatively, it might be better to try a different management option or even discontinue management and relocate the remaining individuals elsewhere. If monitoring indicated the translocated population was having undesirable impacts, this could potentially lead to a decision to control or remove the population or conduct other management actions to lessen these impacts. The decision process should be transparent, and reflect current understanding of the population's dynamics and impacts, the values placed on different outcomes by all people involved, and the cost of management options.

3. Although decisions need to be made, it is essential to acknowledge the uncertainty in population predictions. There are two sources of uncertainty in these predictions. First, populations are subject to random variation due to chance fates for individuals (demographic stochasticity) or to environmental fluctuations (environmental stochasticity). Second, understanding of populations is always limited, and decisions should be supported by inclusion of the assumptions behind them and the extent of uncertainty in biological knowledge of them.

4. A key benefit of monitoring is that it allows practitioners to progressively improve understanding and therefore develop more accurate models for further predictions and objective setting. This is especially useful when original objectives cannot be met due to factors beyond management control. This process of learning from management results is called "adaptive management". However, adaptive management does not mean merely adjusting management following monitoring; it means having clear models in place in advance that are then evaluated against monitoring results. It is sometimes appropriate to manipulate management actions deliberately to gain knowledge, a process known as "active adaptive management". For example, if a translocated population is growing at the target rate under a management regime, it may make sense to temporarily discontinue the regime to ensure it is necessary.

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Annex 9

Dissemination of information

1. Dissemination aims to ensure that maximum information around a conservation translocation is available in timely and suitable fashion to target audiences. Hence, communication should start at the planning stage, followed by reporting on progress at key stages of the project, and with this information disseminated to all parties involved.

2. Effective communication of information through the course of a conservation translocation serves the following purposes:

- It prevents conflict with interested parties in both source and destination areas, and generates trust that any translocation is undertaken with integrity and without hidden motives (the corollary is that retrospective management of negative interactions can be costly and damaging to the translocation),

- It allows the evaluation of success whilst a translocation is in progress, and should provide a lasting record of methods, monitoring and results that contribute to retrospective evaluation and comparison with other translocation attempts,

- Dissemination of results is often part of statutory or contractual requirements,

- It contributes to assessments of species' status by providing data on survival and range,

- It provides a lasting record of the origins of any population of the translocated species.

3. Mechanisms for communication should be relevant to the intended audience, but should include several of the following platforms; use of these may be combined with consultative processes:

- Internet resources, social media, presentations at venues around the release area,

- Publication mechanisms of statutory bodies which should be publicly accessible unless good cause is given for maintaining confidentiality.

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- Publication mechanisms of non-governmental organisations where these are made publicly available.
- Databases of translocations kept by statutory bodies or non-governmental organisations.
- Meta-analyses of conservation translocation success across major taxa.
- Publication in peer-reviewed media confers an assurance of quality, and permanent, formal citation; this allows publications to be sourced and become a resource for any subsequent evidence-based, systematic reviews.

4. Information should be disseminated in languages and formats best suited to serve essential and interested parties and organisations.

Figure 1 The translocation spectrum

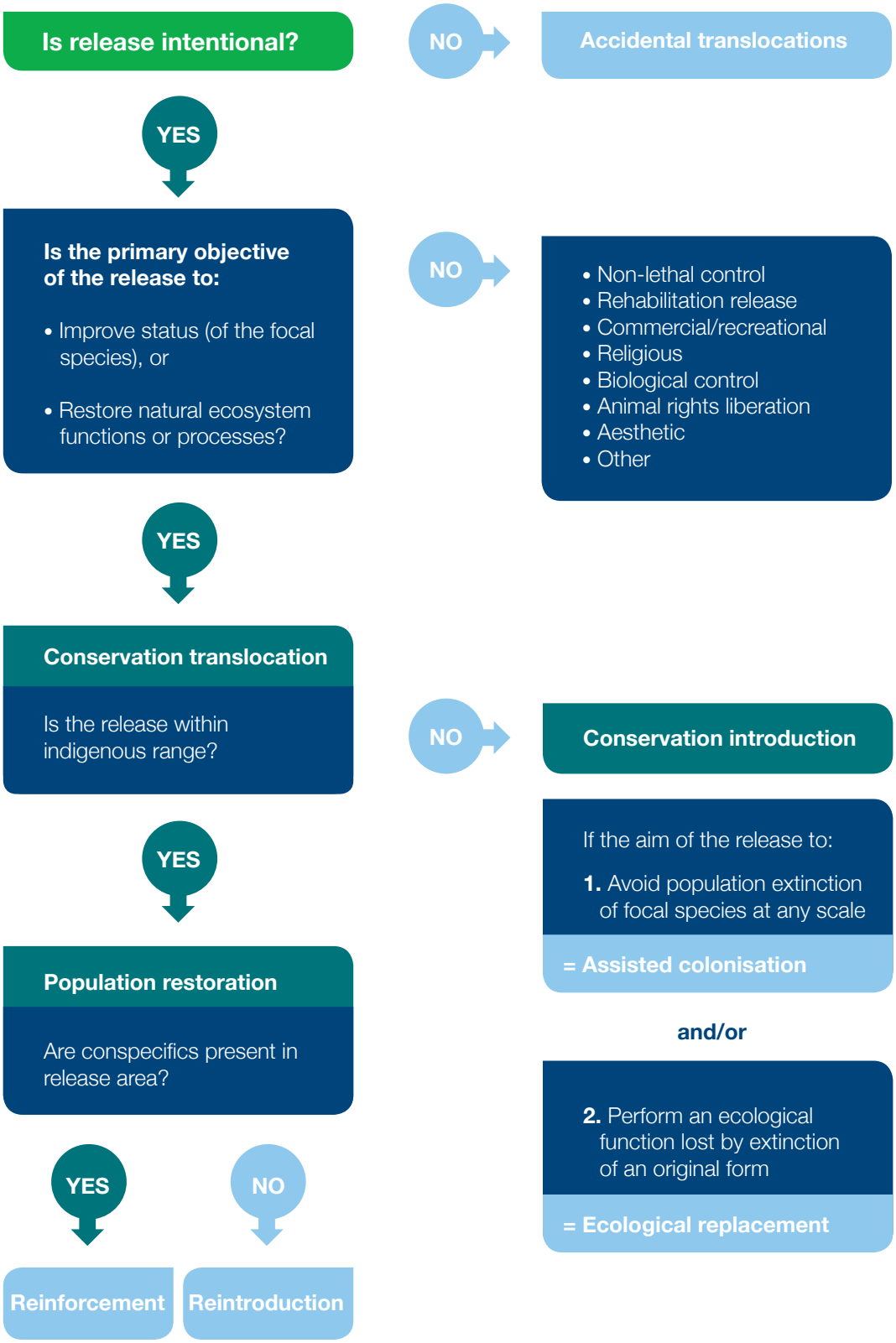
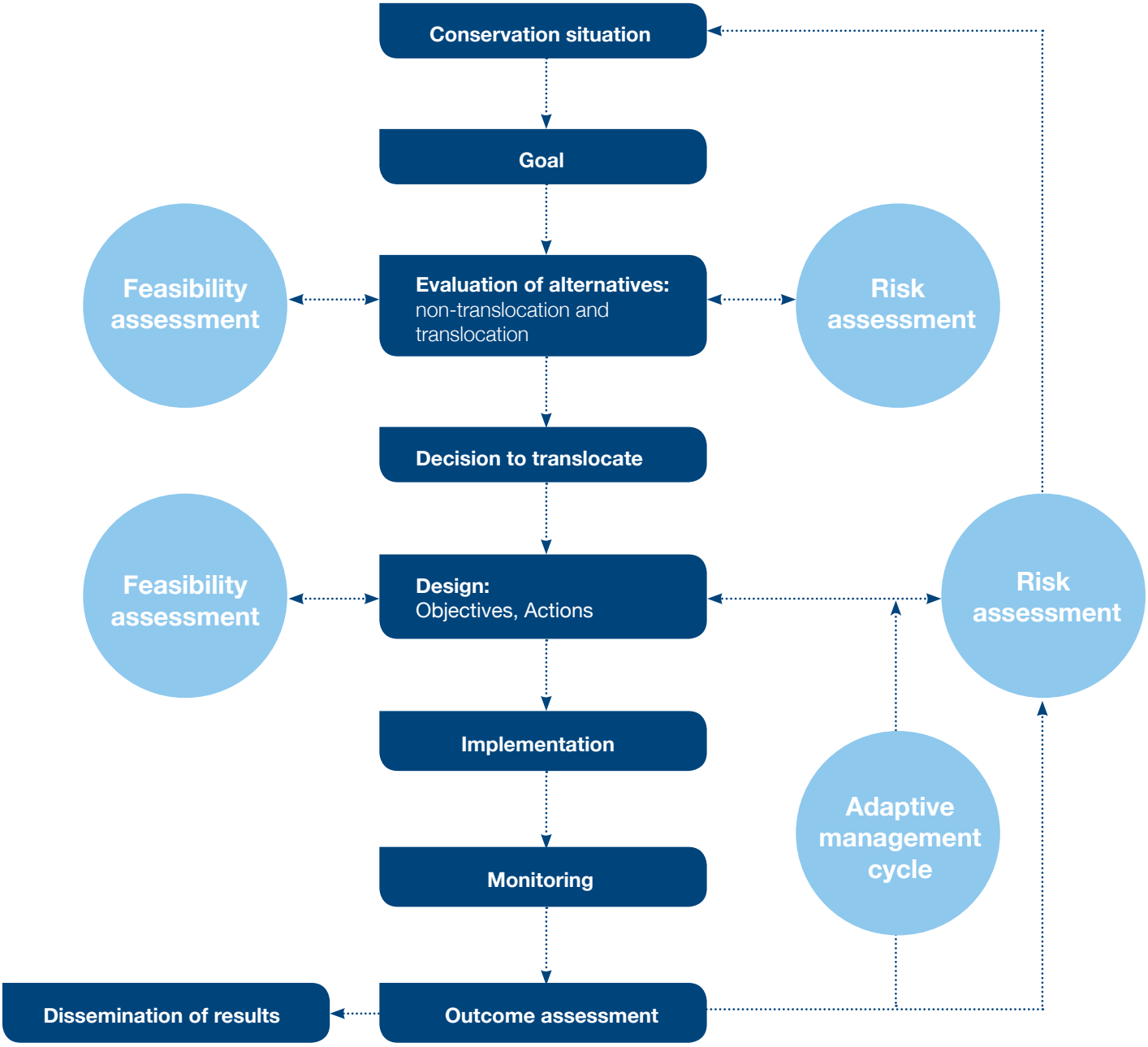


Figure 2 The conservation translocation cycle



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2014 CBSG Annual Meeting
New Delhi, India

The Asian Species Action Partnership: Involving zoos and aquaria in averting the extinction of Southeast Asia's Critically Endangered non-marine vertebrate species

Convenors: Madhu Rao and Bill Robichaud

AIM

Vertebrates in South-east Asia are among the most critically endangered in the world. The *Asian Species Action Partnership*, an IUCN SSC initiative, is a consortium of institutions committed to saving the (ASEAN + E. Timor) region's threatened vertebrates on the brink of extinction. The aim of the working group is to identify concrete actions for the engagement of zoos and aquaria in the conservation of these species.

BACKGROUND

Across the globe, vertebrate extinction risks are highest in South-east Asia. This region also has among the world's fastest recent habitat-loss rates within a context of rapid economic growth. An explosion in the trade demand, and thus harvest rates for wild species for luxury food, medicines, tonics, horns and other trophy parts has resulted in the near-extinction of globally significant biodiversity with implications for ecosystem services and dependent human communities in this rapidly developing part of the world.

The protected area systems are neither effectively managed nor sufficient to protect biodiversity and are under serious threat due to large-scale deforestation. Consequently, many South-east Asian species will become extinct in the near future if current trends continue.

Acknowledging the need for urgent action, 14 institutions have joined forces in a call to emergency action to address the crisis. By mobilizing support where it is urgently needed, drawing on the synergistic strengths of the participating institutions, there is need to implement urgent actions that include a combination of *in situ* and *ex situ* measures to prevent the extinction of Critically Endangered[1] vertebrate species in South east Asia.

PROCESS

The proposed structure is as follows:

Part I. 10-minute presentations

- EAZA support for ASAP species: building on an effective working model (Speaker, tbc=to be confirmed)
- Developing effective strategies using science-based tools for averting species extinctions: a role for CBSG (Carolyn Lees, CBSG) (confirmed)
- The status of Sumatran Rhino conservation. (Susie Ellis, IRF) (tbc)
- Saving the Saola through *in situ*, *ex situ* collaboration (Bill Robichaud, Saola Working Group) (confirmed)
- The Javan Songbird crisis in Indonesia: a critical role for zoos (tbc)

[1] Critically Endangered (CR) as per the IUCN Red List

Part II. Discussions (by taxon/topic sub-group) on potential needs and collaborations between ASAP and the zoo/aquarium community
Broadly, the topics could be the following:

- Priority IUCN SSC- Specialist Group needs for progress on ASAP species
- ASAP species in collections: which ASAP species are currently in zoos and aquaria?
- ASAP-species/taxon-specific collaborations with zoos and aquaria
- Which ASAP species are suited for zoo/aquaria campaigns? (identifying attributes)
- Conservation genetics needs for ASAP species

Part III. Consensus: Key actions and zoo/aquarium linkages for ASAP species moving forward

OUTCOMES

- A list of potential collaborations (at varying scales) for ASAP species with the zoo and aquarium community
- A list of concrete actions (also at varying scales) moving forward, linked to responsible agency/individuals and timeline.

PREPARATION

- Basic knowledge of the ASAP initiative and the list of ASAP species (see briefing material)
- Knowledge of IUCN CR species in their institution's collections
- Knowledge of IUCN CR species in the current regional / global management plans, e.g. RCPs, GSMPs etc.

ASAP Species List (Compiled from the IUCN Red List as on 31 December, 2012)

Amphibians

Latin Names (Common Names)

Duttaphrynus sumatranus
Leptobrachella palmata
Leptophryne cruentata (Bleeding Toad)
Pelophryne linanitensis
Pelophryne murudensis
Philautus jacobsoni
Platymantis insulatus

Birds

Aceros waldeni (Rufous-headed Hornbill)
Anthracoceros montani (Sulu Hornbill)
Ardea insignis (White-bellied Heron)
Aythya baeri (Baer's Pochard)
Cacatua haematuropygia (Philippine Cockatoo)
Cacatua sulphurea (Yellow-crested Cockatoo)
Carpococcyx viridis (Sumatran Ground Cuckoo)
Centropus steerii (Black-hooded Coucal)
Charmosyna toxopei (Blue-fronted Lorikeet)
Cissa thalassina (Javan Green Magpie)
Colluricincla sanghirensis (Sangihe Shrike-thrush)
Columba argentina (Silvery Wood Pigeon)
Corvus unicolor (Banggai Crow)
Cyornis ruckii (Rueck's Blue Flycatcher)
Dicaeum quadricolor (Cebu Flowerpecker)
Eurochelidon sirintarae (White-eyed River Martin)
Eurynorhynchus pygmeus (Spoon-billed Sandpiper)
Eutrichomyias rowleyi (Cerulean Paradise-flycatcher)
Fregata andrewsi (Christmas Island Frigatebird)
Gallicolumba keayi (Negros Bleeding-heart)
Gallicolumba menagei (Sulu Bleeding-heart)
Gallicolumba platenae (Mindoro Bleeding-heart)
Gyps bengalensis (White-rumped Vulture)
Gyps tenuirostris (Slender-billed Vulture)
Houbaropsis bengalensis (Bengal Florican)
Leucopsar rothschildi (Bali Starling)
Lophura edwardsi (Edwards's Pheasant)
Monarcha boanensis (Black-chinned Monarch)
Nisaetus floris (Flores Hawk Eagle)

Oriolus isabellae (Isabela Oriole)
Otus siaoensis (Siau Scops Owl)
Pithecophaga jefferyi (Philippine Eagle)
Prioniturus verticalis (Blue-winged Racquet-tail)
Pseudibis davisoni (White-shouldered Ibis)
Ptilinopus arcanus (Negros Fruit Dove)
Rhodonessa caryophyllacea (Pink-headed Duck)
Sarcogyps calvus (Red-headed Vulture)

Sterna bernsteini (Chinese Crested Tern)
Sturnus melanopterus (Black-winged Starling)
Thaumatibis gigantea (Giant Ibis)
Vanellus macropterus (Javan Lapwing)
Zosterops nehrkorni (Sangihe White-eye)

Fish

Aaptosyax grypus (Mekong Giant Salmon Carp)
Adrianichthys kruyti (Duck-billed Buntingi)
Anoxypristis cuspidata (Knifetooth Sawfish)
Balantiocheilos ambusticauda (Siamese Bala-shark)
Betta miniopinna
Betta persephone
Betta simplex (Krabi Mouth-brooding Betta)
Betta spilotogena
Catlocarpio siamensis (Giant Carp)
Cephalakompsus pachycheilus
Ceratoglanis pachynema
Chilatherina sentaniensis (Sentani Rainbowfish)
Datnioides pulcher (Siamese Tiger Perch)
Encheloclarias curtisoma
Encheloclarias kelioides
Epalzeorhynchos bicolor (Redtail Sharkminnow)
Glyphis siamensis (Irrawaddy River Shark)
Hampala lopezi
Mandibularca resinus (Bagangan)
Nemacheilus troglocataractus
Oreoglanis lepturus
Ospatulus truncatus (Bitungu)
Pandaka pygmaea (Dwarf Pygmy Goby)
Pangasianodon gigas (Mekong Giant Catfish)
Pangasius sanitwongsei (Dog-eating Catfish)
Pristis microdon (Largetooth Sawfish)
Pristis zijsron (Narrowsnout Sawfish)
Puntius amarus (Pait)

Puntius baoulan (Baolan)
Puntius clemensi (Bagangan)
Puntius compressiformis
Puntius disa (Disa)
Puntius flavifuscus (Katapa-tapa)
Puntius herrei
Puntius katalo (Katolo)
Puntius lanaoensis (Kandar)
Puntius manalak (Manalak)
Puntius tras (Tras)
Scaphognathops theunensis
Schistura leukensis
Schistura nasifilis
Schistura spiloptera
Schistura tenura

Sewellia albisuera
Sewellia breviventralis (Butterfly Loach)
Spratellicypris palata (Palata)
Trigonostigma somphongsi (Somphongs's Rasbora)
Weberogobius amadi (Poso Bungu)
Xenopoecilus poptae (Popta's Buntingi)

Mammals

Ailurops melanotis (Talaud Bear Cuscus)
Axis kuhlii (Bawean Deer)
Bos sauveli (Kouprey)
Bubalus mindorensis (Tamaraw)
Bunomys coelestis (Lampobatang Bunomys)
Crateromys australis (Dinagat Crateromys)
Dendrolagus mayri (Wondiwoi Tree Kangaroo)
Dicerorhinus sumatrensis (Sumatran Rhinoceros)
Dobsonia chapmani (Philippine Bare-backed Fruit Bat)
Macaca nigra (Celebes Crested Macaque)
Macaca pagensis (Pagai Island Macaque)
Melomys fraterculus (Manusela Melomys)
Nomascus concolor (Black Crested Gibbon)
Nomascus leucogenys (Northern White-cheeked Gibbon)
Nomascus nasutus (Cao-vit Crested Gibbon)
Pongo abelii (Sumatran Orangutan)
Presbytis chrysomelas (Sarawak Surili)
Pseudoryx nghetinhensis (Saola)
Pteropus aruensis (Aru Flying-fox)
Pygathrix cinerea (Grey-shanked Douc)

Rhinoceros sondaicus (Javan Rhinoceros)
Rhinopithecus avunculus (Tonkin Snub-nosed Monkey)
Rhinopithecus strykeri (Myanmar Snub-nosed Monkey)
Simias concolor (Pig-tailed Langur)
Spilocuscus rufoniger (Black-spotted Cuscus)
Spilocuscus wilsoni (Blue-eyed Spotted Cuscus)
Sus cebifrons (Visayan Warty Pig)
Tarsius tumpara (Siau Island Tarsier)
Trachypithecus delacouri (Delacour's Langur)
Trachypithecus poliocephalus (White-headed Langur)
Uromys boeadii (Biak Giant Rat)
Uromys emmae (Emma's Giant Rat)
Zaglossus attenboroughi (Sir David's Long-beaked Echidna)
Zaglossus bartoni (Eastern Long-beaked Echidna)
Zaglossus bruijnii (Western Long-beaked Echidna)

Reptiles

Crocodylus mindorensis (Philippines Crocodile)
Crocodylus siamensis (Siamese Crocodile)
Gavialis gangeticus (Gharial)
Brachymeles cebuensis (Cebu Small Worm Skink)

Calamaria ingeri
Calamaria prakkei (Prakke's Reed Snake)
Gongylosoma mukutense (Pulau Tioman Ground Snake)
Lycodon chrysoprateros (Ross's Wolf Snake)
Oligodon booliati (Boo-Liat's Kukri Snake)
Batagur baska (Four-toed Terrapin)
Batagur borneoensis (Three-striped Batagur)
Chelodina mccordi (Roti Island Snake-necked Turtle)
Chitra chitra (Southeast Asian Narrow-headed Softshell Turtle)
Cuora galbinifrons (Indochinese Box Turtle)
Cuora trifasciata (Chinese Three-striped Box Turtle)
Geochelone platynota (Burmese Starred Tortoise)
Heosemys depressa (Arakan Forest Turtle)
Leucocephalon yuwonoi (Sulawesi Forest Turtle)
Mauremys annamensis (Annam Leaf Turtle)
Rafetus swinhoei (Yangtze Giant Softshell Turtle)
Siebenrockiella leytensis (Philippine Pond Turtle)

The Way Forward for Collaborative Conservation Breeding Programmes in India

Working Group Briefing Material

2014 CBSG Annual Meeting
New Delhi, India

The Way Forward for Collaborative Conservation Breeding Programmes in India

Convenor: PC Tyagi

Introduction

The Central Zoo Authority was created in the year 1992 through a statutory amendment of the Wildlife (Protection) (Amendment 1991) Act, 1972 to oversee the functioning of the zoos in the country and to enforce minimum standards and norms for upkeep and health care of animals in Indian zoos.

The National Zoo Policy, 1998 and the National Wildlife Action Plan (2002-2016) advocates that zoos' role is to complement and strengthen the national effort in conservation of the rich biodiversity of the country, particularly the wild fauna, and that zoos should initiate *ex situ* breeding of endangered species of wild fauna and their rehabilitation in the wild as per the IUCN guidelines for re-introduction.

The Central Zoo Authority, in consonance with the policy mandate, formed a group of experts to prepare a strategy for conservation breeding of endangered species in Indian Zoos. The group identified 35 mammals, birds, and reptiles for their probable captive breeding in identified zoos. The Chief Wildlife Warden of the states who were selected as coordinators for the endangered species found in their region were unable to achieve adequate progress due to several impediments. The main drawback was lack of appropriate founders, the setting up of off-exhibit enclosure for the species, and availability of technical manpower dedicated for the programme.

The Central Zoo Authority again constituted an expert group on conservation breeding and after several deliberations, a concept paper was prepared in July 2007. The expert group approved a list of 26 endangered species prioritized based on scientific criteria for initiating the conservation breeding programme. A further two workshops were conducted in 2013 with active collaboration between Captive Breeding & Zoo Management Cell of Wildlife Institute of India, Dehradun and Laboratory for Conservation of Endangered Species, Hyderabad under the guidance and support of Central Zoo Authority. These workshops were held to formulate a conservation breeding and species recovery plan for the endangered species based on the existing information and knowledge about the ecology, biology and behavioral characteristics of the species. The draft plan needs further review and improvement for implementation.

At the CBSG Annual Meeting, a working group discussion is being organized to address strategies, issues and the way forward for collaborative conservation breeding programmes in India.

AIM

1. To validate the prioritized list of endangered species for the conservation breeding programme
2. To indentify the constraints in the conservation breeding programme initiated with the support of the Central Zoo Authority.
3. To address emerging issues pertaining to the following:

A. Acquisition of appropriate founders for the Conservation Breeding programme of endangered species and to assess the number of founders required.

B. Housing requirement in the off-exhibit conservation breeding centre for the species.

C. Technical support required for the implementation of the programme.

D. Linking *ex situ* management of endangered species with *in situ* conservation programmes.

E. Veterinary & health care of conservation breeding programme.

F. Genetic & Demographic management of species for the conservation breeding programmes.

G. Use of biotechnology for conservation breeding.

H. Protocol for re-introduction of captive bred population in the wild.

BACKGROUND

The list of books and research papers available will be compiled as Reference material. This will include the following:

1) ENVIS report on various endangered species compiled by Wildlife Institute of India, Dehradun

2) Final Report on the Research Project 'Housing & Enclosure Enrichment of select species in Indian Zoos", prepared by WII, Dehradun

3) Studbook data on endangered species compiled by WII, Dehradun

4) International Studbook of species

5) Conservation Breeding & Species Recovery draft plans.

PROCESS

Resource persons will make 2-3 short presentations to introduce the topic and initial discussion issues will be identified for further discussion in the forum. A list of critical issues has been already identified in the purpose and objectives given above, however based on collective wisdom of the group, issues would be prioritized for discussion.

OUTCOME

After deliberation on each issue, recommendations will be suggested by the group on which a presentation will be made and a brief note will be prepared for taking the conservation breeding programme forward.

Rolling Out the Climate Reality Community Conservation Package

Working Group Briefing Materials

2014 CBSG Annual Meeting
New Delhi, India

Rolling out the Climate Reality Community Conservation Package

Convenor: Madelon Willemsen

BACKGROUND

There have been a number of strong internal campaigns related to climate change in zoos and aquaria. As a collective, we have an opportunity to talk to a large number of visitors to raise awareness and inspire action on this important world issue.

Continuing on the momentum of Zoos & Aquariums for 350, global marketing communications group WPP and GPY&R Sydney are working with Madelon Willemsen to deliver an innovative and impactful climate change campaign. This campaign will enable zoos and aquaria to lead a collective and consistent global call to action on climate change. The new global climate change campaign will be applicable to all zoos and aquariums and inspire the global visitors in taking action to ultimately reduce the effect of man-made climate change on animal species. It will go hand in hand with the already existing great campaigns such as Pull the Plug, from the EAZA Pole to Pole campaign. The marketing strategies, creative work, and assets are designed to empower zoo and aquarium visitors in learning about the impact of climate change on animals and what action they can take.

The creative team is well known for the pro-bono work on global campaigns for climate change. GPY&R Sydney and a number of other WPP agencies are currently working with Al Gore and his team from the Climate Reality Project and the UN Secretary-General Ban Ki-moon, to put pressure on world leaders, through their citizens, to make meaningful commitments on carbon emission reduction.
http://climaterealityproject.org/initiative/why-why-not

WPP has also done pro-bono work for Al Ain Zoo for the World Water Day -
http://www.wpp.com/sustainabilityreports/2012/case-studies.html

During our presentation we will present the creative work and its application on the ground and in media for use by all WAZA members, CBSG representatives and other organizations signed up to Z&A for 350.

AIM

The aim of the working group is to receive participants' valuable feedback on the campaign, its assets and roll out strategy. We are also interested to receive feedback on the funding campaign to create and roll out the physical assets for use.

PROCESS

With the presentation that was introduced earlier in the day in mind we will:

1. Present a brief recap on the presentation and a presentation on the assets
2. Answer general questions about the campaign
3. Do a Gap analysis: your opinion and feedback on gaps in the creative work and assets.
4. Discuss the roll out and marketing strategies: discussion of barriers and opportunities
5. Present a funding proposal for feedback and ideas on funding opportunities to roll out this campaign across the global zoos and aquaria.

OUTCOMES
Participants' input and feedback will be incorporated into the campaign before being launched at the WAZA conference a couple of days later. The discussion outcomes will be key to ensure the campaign can be rolled out across the global zoos and will help firm up the proposal for an acceptable funding strategy.

Follow the creative team whilst developing this campaign in the months before the New Delhi meeting: http://www.cbsg.org/blog/blog-category/climate-reality-community-conservation.

CBSG/Conservation Genetics Specialist Group Collaboration Working Group Briefing Materials

2014 CBSG Annual Meeting
New Delhi, India

CBSG/Conservation Genetics Specialist Group Collaboration Working Group

The Conservation Genetics SG will act as a genetics focal point within the SSC, providing advice on policy and management not only to SGs lacking expertise but also to geneticists working within larger SGs who may need access to policy information and advice on the latest techniques and analytical approaches available and their applicability to the group they are studying. This new SG is Co-chaired by Michael Bruford of Cardiff University, UK and Gernot Segelbacher of University Freiburg, Germany.

Because we anticipate that several CBSG members will also become members of CGSG (Bob Lacy has been invited to join the group's Senior Advisory board) , the groups will provide assistance to each other and collaborate on joint initiatives, it will be valuable for the CBSG community to provide input at this early stage of development of this Specialist Group. This working group is an opportunity to discuss what this input might consist of and to consider areas of potential synergy between the two Specialist Groups. It will be held if there is sufficient interest among Annual Meeting participants.

Proposal to Establish an IUCN SSC Conservation Genetics Specialist Group

1) What are the key conservation issues facing the taxon or group?

Genetic diversity (GD) has been defined as one of the three main elements of biodiversity (within the CBD and more generally). It contributes to the maintenance of species and habitat diversity, to fundamental ecosystem processes and is also recognized as an essential component of ecosystem resilience by providing capacity for species to adapt in changing and challenging environments. Numerous case studies now illustrate the potential applications of genetic data and tools and the importance of incorporating GD in conservation policy and practice. This recognition has recently led the Convention on Biological Diversity to explicitly include genetic diversity within the Aichi 2020 Targets (Target 13) stating that genetic erosion should be minimized and that genetic diversity should be safeguarded. Although some countries, paying reference to the 2010 targets, are interpreting this Target as applying to domesticated species and their wild relatives only, this Target does now explicitly include other socio-economically important species and those of cultural value.

Interpretation of the Target varies widely between the countries that have already published their 2020 strategies, which may illustrate a general confusion at the policy level on the precise meaning of the text. For example, socio-economically important species could be those that are directly exploited (e.g. fisheries) but could also include those species that provide key ecosystem services on which human populations depend (e.g. soil microorganisms that contribute to decomposition and bioturbation, and hence soil fertility). Additionally, many endangered species, especially flagship species, are culturally valuable, often appearing as emblems and may also be socio-economically valuable due to their importance in ecotourism. Finally, the concept of genetic erosion can be interpreted in a number of ways – in plant genetics it is mainly interpreted as loss of genetic diversity (in which case this clause is almost restated by the clause 'safeguarding' genetic diversity), but in animals it is just as often associated with the negative effects of hybridisation and introgression between common and rare species. These issues need clarification and guidance (see below).

National and international agencies and NGOs (especially in forestry, fishery and agriculture) are increasingly acknowledging the importance of genetic diversity and are attempting to conserve it by implementing monitoring programs in wild populations to provide early warning signals of population decline and genetic erosion. However, several studies have shown that genetic aspects of biological conservation do not figure prominently in the priorities of practitioners, possibly due to a lack of policy drivers in the past. At the same time there has been a lack of access to genetic expertise for conservationists (e.g .Hoban et al 2013).

What is now clear is that genetic tools offer a range of solutions to pressing management questions. For example, to investigate the effects of fragmentation at large spatial scales that are relevant for conservation planning (i.e. at the landscape level), molecular methods currently provide the most effective tools that can be used for many animal and most plant species and genetic data can now be used to quantify the effectiveness of mitigation measures in connectivity management.

There are a plethora of other questions relevant to practitioners, where genetic information can directly impact on conservation management. These include, but are not confined to, the following ten examples:

1. Identifying species and understanding their evolutionary distinctiveness (phylodiversity);
2. Monitoring biodiversity by 'meta-genomic' analysis of environmental samples (eDNA);
3. Helping to identify units for conservation (those that are evolutionarily distinct [ESUs] and/or demographically distinct [MUs]);
4. Assessing the genomic impact of intentional genetic manipulation on natural populations, both on genetic diversity as a whole and on specific genes linked to phenotypes under manipulation;
5. Maintaining genetic diversity and adaptive potential in small and fragmented populations, both *in situ* and *ex situ*, including minimising inbreeding and genetic drift;
6. Assisting managed translocations within and among populations by selecting individuals with appropriate genotypes (e.g. unrelated but within the same natural gene-pool);
7. Detecting and helping to manage introgression and hybridization in threatened populations;
8. Assessing the effects of habitat connectivity measures by monitoring the diffusion of genotypes over time and measuring their reproductive success;
9. Monitoring the spread of cryptic or elusive invasive species;
10. Establishing or validating pedigrees in the absence of records.

Genetic tools may thus help us to assess the success of conservation actions in many cases more explicitly. This information is currently often very much asked for by funding bodies or governmental institutions.

Bridging the gap between decision-makers, conservation practitioners and research scientist is one of the goals of the recent EU-funded initiative ConGRESS (www.congressgenetics.eu) and the US Fish and Wildlife Service's Conservation Genetics Community of Practice (http://www.fws.gov/ConservationGeneticsCOP/), which provide resources and guidance to facilitate the planning of genetic studies in endangered species management. One of the key aims of the above programs is to assist managers in deciding when or whether genetic approaches are likely to be necessary or beneficial for conservation decision-making. It has often been observed that genetics projects have been undertaken without asking this crucial question. The Sample Planning Tool module on the ConGRESS website is explicitly designed to assist in this process.

One immediate issue that has arisen concerns ongoing intentional genetic manipulations of wild species for commercial gain, an activity that in Southern Africa, for example, is rapidly negating species and population boundaries in wild ungulates that have been established for thousands of generations and which in some instances involve protected species. Such activities currently lack a policy and legislation position (for example IUCN guidelines) yet unless regulated; these modifications could go unchecked and could even spread. Another live issue involving the use of genetic methodology is in de-extinction, which may become technically realistic in certain manifestations in the near future and where some form of investigation and guidance would be beneficial given its controversial nature. However, a recent de-extinction taskforce has been established by IUCN and it is not within the remit of this proposed specialist group.

Building on recent initiatives and bearing Aichi Target 13 in mind, we propose the establishment of a Conservation Genetics Specialist Group within the IUCN SSC with the main initial focus as follows:

1. Providing guidelines for implementing Target 13, including:
    a. Definition of which kinds of wild species should be included;
    b. How 'genetic erosion' should be defined and measured
2. Providing guidance on intentional genetic manipulation of wild species.
3. Examining the technical feasibility and potential consequences of de-extinction biology in conservation
4. Providing expert knowledge and assistance to other specialist groups (especially those lacking genetic expertise among their members) using, for example, online resources.
5. Providing a focal point for the conservation genetics community, which are in some regions scattered institutionally and taxonomically and working in isolation.

2) Why is this taxonomic level and / or geographic scope considered to be the most appropriate level at which to address these conservation issues? n/a

3) Is there a clear gap for the group to fill, and a value-added benefit that the formation of the group would deliver, rather than duplicate efforts of existing Specialist Groups or IUCN partner institutions?

While a number of the larger Specialist Groups have geneticists on their list of members, the distribution and engagement of this expertise is patchy and for certain groups that focus on less well-understood taxa, it may be lacking entirely. An obvious exception to this observation is within CBSG where the VORTEX population viability modelling software has been designed to model genetic diversity and is even capable of utilising molecular marker allele frequencies. However, this is not done routinely (Bruford et al 2010; Hoban et al 2012), and one potential collaborative role for the Conservation Genetics Specialist Group would be to assist CBSG in making this practice more widespread, and in helping to interpret the results where it is applied.

Primarily, we see the Conservation Genetics SG acting as a genetics focal point within the SSC, providing advice on policy and management not only to SGs lacking expertise but also to geneticists working within larger SGs who may need access to policy information and advice on the latest techniques and analytical approaches available and their applicability to the group they are studying. While it might be assumed that SG geneticists will already be familiar with this information, genetic methods and data analysis are currently developing at a very rapid pace and many of these new approaches are generic enough to be relevant to all SGs. In support of this, we have found that since it was established, many stakeholders using the ConGRESS web portal (primarily aimed at policy makers and managers) are in fact practising geneticists. It would be our intention to invest time and effort into making the ConGRESS portal available and relevant to the SG community as one of the first activities of the genetics SG.

One of the issues by which the CGSG could help other SGs most actively, is by linking them to scientists who could most ably help them with specific research and management questions. Here, the network of scientists within the CGSG would be very useful in helping to identify the presence or absence of appropriate researchers working in the same region or taxonomic group where work is required. In the absence of appropriate individuals, the CGSG could act as a conduit for making research or management projects visible to the genetics community and if necessary helping to facilitate interaction between parties. Geneticists have a mutually intelligible language that is sadly not always understood by others. We would either use the portal forum for this purpose or, more likely, an email list in the first instance.

Interaction with other Specialist Groups and Sub-Committees

Reintroduction SG (guiding on suitable conservation units, *contacts established)*
Conservation Breeding SG (assisting in genetic aspects of breeding programs, PVA modelling using genetic data, *contacts established*)
Climate Change SG (estimating the adaptive potential of species, *contacts to be established*)
Invasive Species SG (genetic aspects of pest control, *contacts to be established*)
Species Conservation Planning SC (assisting in finalising species specific Strategic Conservation Plans, *to be established*)
SSC Specialist Group (species specific recommendations, *established cooperation e.g. with Galliformes Specialist Group*)

For drafting the de-extinction guidelines a close collaboration between the Reintroduction SG, the Invasive Species SG and the Conservation Genetics SG will be established

4) What are the key activities / outputs that the group would undertake / deliver to better understand and address these issues, and how will these activities / outputs contribute to the SSC Strategic Plan?

Mission / Goals (until 2016)

- The proposed Genetics SG will make the importance and relevance of genetic diversity for all taxa more visible within IUCN and worldwide.
- The proposed Genetics SG will provide guidelines for the implementation of Aichi Target 13.
- The proposed Genetics SG will establish a platform for advice and connection to other IUCN groups.
- The proposed Genetics SG will expand and enhance the existing network of geneticists who are now (or will in the future) assisting the IUCN via specialist groups or in other projects and activities and who are willing to facilitate the interaction between taxon and other SGs and genetics advice and practitioners.
- The proposed Genetics SG will continue to develop online information sources, such as the ConGRESS web portal (www.congressgenetics.eu) to enhance their global relevance for the SSC.

Working plan

We envisage a two-step process:

1. We will form a core group of members for the first year, who will work together in identifying the needs of other specialist groups and who will connect with larger IUCN groups including, for example, the Reintroduction and Conservation Breeding specialist groups or the Species Conservation Planning Sub-Committee. Some of these members will be already active geneticists working within the SSC within other SGs. We will first carry out an audit (by SG targeted questionnaire) to identify all these individuals and will then use this database to form our core group and subsequent expanded group. In this way we will ensure global, taxonomic and subdisciplinary (eg population genetics, phylogenetics, eDNA) balance within the SG. We anticipate an especially close relationship, including membership overlap, with the other thematic SGs, and especially CBSG – of which Bruford has been an active member in the past, participating in a number of PVA workshops in a modelling capacity.

2. We will develop existing work on genetic diversity indicators for monitoring genetic diversity for use within the 2020 targets and IPBES context and, in this way, expand the network. We will also develop a roadmap for increasing the implementation of genetic tools (genetics or genomics).

3. We will seek funding and expertise to develop the ConGRESS web portal to make it a) more relevant for the SG community (using SG taxon tags) and b) to expand it to include other regional databases – this is already in process for Africa, where ConGRESS ran a workshop at the end of 2013.

Publication of IUCN Conservation Genetics Guidelines is planned for 2016 within the context of the Aichi Targets. Species-specific recommendations will be implemented in Strategic Conservation Plans.

Link to IUCN SSC strategic plan

The proposed Conservation Genetics Specialist group will provide knowledge relevant to the following SSC / SP Targets (examples):

1) Assessment of Red List Species (e.g. through metagenomics)
2) Measuring Conservation Success (e.g. through estimating connectivity, traceability)
3) Identifying evolutionary distinct biodiversity (conservation units)
4) Advising reintroduction Projects
5) Organising a symposium on the World Species Congress

5) Is there a unique/core group of relevant experts willing to dedicate energy and time towards furthering a conservation agenda around a particular taxon or group of species?

Yes – in addition to the both proposed Chairs we have already working collaboration in place through the CONGRESS network (www.congressgenetics.eu).

The following persons are planned to be part of a Senior Advisory board of the Conservation Genetics Specialist Group.

Craig Moritz, Ollie Ryder, Ya-ping Zhang, Bob Lacy

Participating members see separate list

6) Is clear leadership available?

Proposed Chairs:

Michael Bruford (Cardiff University, UK)
Gernot Segelbacher (University Freiburg, Germany)

7) Is there an institutional source for support and co-ordination?

Yes, both Cardiff University and University of Freiburg support the activities of the two proposed chairs.

References

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2. Hoban SM, Bertorelle G, Gaggiotti OE (2012) Computer simulations: tools for population and evolutionary genetics. *Nat. Rev. Genet*. 13: 110-122.
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CBSG Annual Meeting
2014
New Delhi, India

Section 4
2013 Working Group Updates

2013 Working Group Updates

Horizon Scanning (Markus Gusset, Convenor)

At the 2013 CBSG Annual Meeting, we conducted the first horizon scan for zoos and aquariums. Our aim was to identify the 10 most important emerging issues with potential to impact upon threatened species conservation by 2020 from the perspective of zoos and aquariums worldwide. As a result of this joint exercise, we collaboratively produced an article that has been accepted for publication:

Gusset, M., Fa, J. E., Sutherland, W. J. & the Horizon Scanners for Zoos and Aquariums (2014) A horizon scan for species conservation by zoos and aquariums. *Zoo Biology* 33: in press.

The following is the abstract of this article:

We conducted the first horizon scan for zoos and aquariums to identify the 10 most important emerging issues for species conservation. This involved input from more than 100 experts from both the wider conservation community and the world zoo and aquarium community. Some of the issues are globally important: diseases, zoonoses, and biosecurity issues; new (communication) technologies; global water shortage and food insecurity; developing economies and markets for wildlife consumption; changes in wildlife population dynamics; and political instability and conflicts. Other issues are more specific to zoos and aquariums: need for extractive reserves; space shortage in zoos and aquariums; need for metapopulation management; and demand for caring of more species in zoos and aquariums. We also identified some broad approaches to these issues. Addressing the emerging issues identified in our horizon scan will further increase the contribution of the world zoo and aquarium community to global biodiversity conservation.

This article will be actively and widely disseminated, which will afford zoos and aquariums the opportunity to prepare in time for forthcoming potential threats and opportunities in species conservation.

CBSG North America follow-up to 2013 working group (Anne Baker, Convenor)

During the CBSG North America working group at the 2013 CBSG Annual Meeting we explored three questions:

- *Why have conservation planning efforts at your organization been successful?*
- *What factors have caused projects to be less successful?*
- *What assistance could CBSG North America provide that would assist your institution in conservation planning?*

Based on the responses to these questions we have been developing a conservation planning framework that can be used in a facilitated process to help in the development of institutional conservation plans. The framework is designed to be used as part of a strategic conservation planning process involving participants selected by the institution. A series of questions guide the planning

process and helps an institution identify specific conservation goals and objectives. The framework is still being developed and modified as it is used in actual conservation planning workshops.

Data Management Application of the One Plan Approach (Karin Schwartz, Convenor)

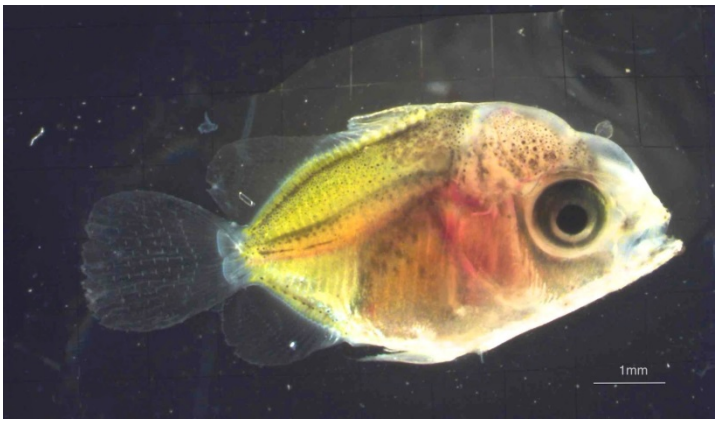
This working group began the process to develop scientific-based recommendations for establishing a global database system that will provide a direct link between information collected on animals under human care and on the wild population in order to enhance *in situ* conservation of these species. The working group identified data needed to manage and assess programs as well as data management tools currently in use by both *in situ* and *ex situ* partners. I am in communication with the Reintroduction Specialist Group (RSG), WAZA (Markus Gusset) and ISIS (Nate Flesness) in incorporating these results into a dissertation on integrating *in situ* and *ex situ* data management processes via ISIS Zoological Information Management System. Data models for species recovery programs were developed and data needs for both *in situ* and *ex situ* components were aligned with the functionality of ZIMS. The next steps will be to develop a Task Force to formulate integrated data management guidelines and work with ISIS, RSG, WAZA and NGOs to implement the use of ZIMS with Medical for integrated data management processes for species conservation programs.

Rising Tide Conservation – Progress Report 2013/2014 (Brad Andrews, Convenor)

Rising Tide Conservation is a loose affiliation of Hobbyists, display aquaria, ornamental fish wholesalers, retailers, and aquaculture researchers. The goal of the program is to provide alternatives for reef collecting by advancing commercial aquaculture of marine ornamental species. Below are some of the folks and their accomplishments in 2013 and 2014. There is still more to come – watch us grow!

The University of Florida's (UF) Tropical Aquaculture Laboratory (TAL) in Ruskin, Florida is home base for the Rising Tide Science team. Craig Watson and Eric Cassiano head up the program there. The broodstock maintained in Ruskin include Bartletts' anthias, schooling bannerfish, pennant coralfish, yellow tangs, Pacific blue tangs, milletseed butterflyfish, emperor angelfish, and semicircle angelfish. Pacific blue tangs spawn viable eggs nightly and larval trials are conducted on a consistent basis. The longest lived blue tang larva was 17 days and valuable information on the species has been attained since testing began. Getting the Bartlett's to spawn took two years. When they are unhappy with the sex ratios of small groups- this species readily converts from females to males. In late 2013, a few small groups stabilized and spawning ensued. The longest lived Bartletts' anthias larva was 40 days, yellow tang larva was 18 days, milletseed larva was 44 days, and schooling bannerfish larva was 46 days.

Jon Degidio is wrapping up his masters working with milletseed butterflyfish. He was able consistently to rear larvae to day 44 over five grow out trials. This means he got them through the first big hurdle – they were eaters! They did not metamorphose but it is estimated that they should complete this stage around 55dph. Jon made some major species advances and we expect him to earn his master's degree at the end of this year.



Day 35 Milletseed butterflyfish larvae – not yet metamorphosed

Dr. Matt DiMaggio joined the team at the TAL in June. Dr. DiMaggio brings expertise on fish reproduction. We expect great things from him. Dr. Jason Broach came on board in August 2014. Dr. Broach will be focusing on live feeds including *Colurella sp.* and *Oithona sp.*. Ms. Samantha Groene is the part of the team that does what needs to be done. She spends her days feeding fish, cleaning tanks, and counting eggs.

Dissemination of information is a top priority for Rising Tide Conservation. The TAL team maintains and contributes to the Rising Tide blog (http://risingtideconservation.blogspot.com/) which allows information to be instantly available to everyone covering all subjects. They've written two technical manuals available on the UF EDIS webpage on the commercial production of French grunts and porkfish. They have a peer-reviewed journal article recently published in Aquaculture International and another which has been accepted and is awaiting publication in the Journal of the World Aquaculture Society. They've given numerous presentations at Aquaculture America (scientific conference) as well as the Regional Aquatics Workshop (RAW), Marine Aquarium Conference of North America (MACNA), and Marine Breeding Initiative workshop (MBI) which are hobby and public aquarium conferences.

Dr. Cortney Ohs at the Indian River Research and Education Center in Vero Beach joined the program in 2014. Mature golden trevallies were induced to spawn and in mid-April when ambient water temperatures were 26°C. Hatching occurred within 18 hours of spawning and larval development was rapid; larvae had fully functioning mouthparts within two days post hatch (dph). They fed enriched rotifers at 10-15 rotifers/mL and copepod nauplii (Parvocalanus sp.) at 2/mL until 10 dph, and on 11 dph we fed Artemia nauplli at a density of 4.0 individuals/mL. The fish were weaned onto a dry diet around 15 dph, and after 30 dph fish were feeding solely on the dry diet and had metamorphosed. The typical black bar pattern and gold coloration could be seen by 20 dph. They obtained over 3,200 juveniles which are now on display at SeaWorld Orlando. Subsequent trials are ongoing to attempt to increase the rates of metamorphosis.

Day 45 Golden trevally

Ms. Karen Britian is raising fishes in Hawaii at the laboratory of Dr. Clyde Tamaru. In the winter of 2013, Karen worked with Eagle Scout Reed Morgan who led his scout troop in the construction of a new algal culture area. They are now able to more efficiently grow a variety of algal species to be used as food for our copepod cultures, which are in turn used to feed our larval fishes. November of 2013 saw the start of our first successful larval rearing trial of the Purple Masked Angelfish (*Paracentropyge venusta*) resulting in juvenile fish. This was the fifth rearing trial for this species and wild collected plankton was the food source. We are currently on our eighth larval trial with P. venusta and are seeing promising results using only cultured foods. This trial is at day 40 with approximately 20% survival from the date of hatch.

115 day old purple masked butterflyfish showing juvenile coloration

Mr. Chad Callan of the Oceanic Institute (OI) and Hawaii Pacific University (HPU) is focused on rearing yellow tangs in Hawaii. On Jan 1, 2014 they stocked a 1000L tank with about 40,000 yellow tang eggs. In this rearing attempt we experimented with very high water turn-over rates, and very clean (ultra UV dose) water. They were excited to see 1000's of fish survive past the first 2-3 weeks and ended up with more than 600 at day 35. They then moved the fish to smaller tanks and have been investigating potential settlement cues, like photoperiod and substrate. A small number of larvae crossed day 50 and appeared very close to settlement. One larvae, "Lucky" made it all the way to day 83

– still no metamorphosis. Investigations on cues for metamorphosis continue. A master's degree student, Emma Forbes will continue these investigations.

Day 60 yellow tang larvae

One last accomplishment of note happened in 2013, but it didn't involve the research scientists. The commitment of various stakeholders in this project has far reaching effects. In 2013, commercial aquaculture of Banggai Cardinal fish was established to the degree that the entire US demand for this fish can be met with fish from an aquaculture source. These fish are now available through a wholesaler that supports the program. We recommend that aquaria and consumers purchase these fish to support the efforts of this commercial facility.