OPERATIONAL GUIDELINES FOR WILD ANIMAL REHABILITATION

Fauna Conservation Department
Wild Animal Rescue Centre
Hong Kong SAR

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Contributors

This revision of the WARC Operational Guidelines like the previous editions represents the collective knowledge and experience of past and present staff of the Fauna Conservation Department. Ideas and their implementation have developed from experience and trial and error as some species that arrive at the rescue centre have little documented material related to their captive care and requirements. The content of the guidelines has been updated with the addition of new Chapters and photographs to assist rescue centre staff when dealing with specific animal groups and species. Many rescue centre facilities like those at KFBG have developed from a basic beginning and we hope that the contents of the latest edition will provide a practical resource for other centres in development. In addition, the guidelines share many ideas and skills necessary to care for the wide range of fauna that might be encountered through wildlife rescue operations in Southeast Asia.

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Fig. 1. A rescued Black Kite (*Milvus migrans*) is released by Mr. Andrew McAulay (KFBG Chairman), following its successful rehabilitation

About Kadoorie Farm and Botanic Garden

Kadoorie Farm and Botanic Garden (KFBG) is situated in the rural New Territories, on the northern slopes of Tai Mo Shan, Hong Kong's highest mountain (957 metres). Two steep ridges, to the East and the West, enclose its deep-set valley. Within KFBG are streams, woodlands, orchards and vegetable gardens, walking trails, live animal exhibits, floral exhibits, sustainable agriculture demonstration plots, art exhibits, a wild animal rescue centre, a native tree nursery, and other conservation and education facilities.

Fig. 2. KFBG Butterfly Garden

In the post-war years, Hong Kong was flooded with destitute refugees. Many had traditional knowledge of crop production and livestock farming but no stock, others had land but no experience. They required support to rebuild their lives. In 1951, in response to these pressing human needs, Lawrence and Horace Kadoorie established the Kadoorie Agricultural Aid Association (KAAA), which became a key partner of the Hong Kong Government in devising and implementing a plan to help Hong Kong feed itself. The Kadoorie brothers, part of a well-established business family, saw wealth as a sacred trust to benefit mankind. With such aid, thousands of people received agricultural training; thousands of pigs, chickens and ducks were bred and given to farmers or sold to them on credit; thousands received micro-loans; and numerous wells, irrigation channels, roads, footpaths, bridges, pigsties and farm houses were built. The farm site at Pak Ngau Shek was established in 1956 as a base for livestock breeding and distribution, agricultural research, farmer training, public education and recreation. The barren slopes were terraced and planted with orchards and vegetable gardens. The development of the botanic garden began in 1963 and the plant conservation programme from 1972.

On 20th January 1995, the Legislative Council of Hong Kong passed an Ordinance (KFBG Chapter 1156) incorporating KFBG as a non-profit corporation designated as a conservation

and education centre with a new mission. It is a unique public-private partnership, for while the KFBG Corporation is a public organisation, it is privately funded by the Kadoorie Foundation (with operating costs of over HKD 100 million per year); these funds are supplemented by Government subventions, small donations from the public and occasional project-related Government contracts that enable us to extend our work.

Since 1995, KFBG has been conducting a wide range of nature education, nature conservation and sustainable living programmes both on-site and throughout Hong Kong and South China.

In a time of severe global crisis – including the inter-related issues of widespread disconnection from nature, each other and self; the ever-increasing exploitation of, and unwise over-reliance on the world's dwindling resources to support unsustainable lifestyles; climate change; shrinking of natural habitats and species loss – KFBG, as an organisation, raises awareness, undertakes rigorous science-based species conservation and ecosystem restoration, and offers new ways of thinking and living to respond to the world's problems. Hence, our work brings hope and improvement by focusing on nature conservation, sustainable living and holistic education that re-connects people with nature. By working together with the public, Governments, academia, NGOs and businesses, we can protect our common future.

KFBG's mission statement is "To harmonise our relationship with the environment"

To learn more about KFBG, please visit our website www.kfbg.org.

Fig. 3. Rescued Small-toothed Ferret badger (*Melogale moschata)*

KFBG Animal Rescue ‘Code of Ethics’

This is an important starting point for all rescue centres and will help management and staff remember why the centre exists. The code also helps to guide all future decision making by the centre managers.

i. The rescue team should be responsible and try to achieve high standards of animal care.
ii. The rescue team must abide by local, regional and international laws concerning wildlife, wildlife rehabilitation and associated activities.
iii. The rescue team should always follow current health and safety practices.
iv. The rescue team should acknowledge limitations and seek the assistance of a

Fig. 4. Kadoorie Brothers Memorial Pavilion

veterinarian or other trained professional when appropriate.
v. The animal care should be placed above personal gain.
vi. Releasable animals should be maintained in a wild condition and released as soon as appropriate.
vii. The rescue team should encourage community support and involvement through volunteer training and public education.
viii. The common goal should be to promote a responsible concern for living beings and welfare of the environment.

ix. Non-releasable animals which have no role in conservation, education or captive breeding should be considered for humane dispatch.

Fig. 5. Rescued Mindanao Water Monitor (*Varanus cumingi*) (Tan Kit Sun/KFBG)

WILDLIFE RESCUE PROCESS SUMMARY

Chronological Order for Wildlife Rescue and Rehabilitation

The steps below can be considered a generic checklist for animal rehabilitation and will help with regular reviews aimed at maintaining and advancing the standards observed by the rescue work. The list does not specify who carries out the individual actions as its purpose is to provide a record of the standard steps that are followed from animal admission to release or placement. This does not supersede the WARC Acceptance protocol or any other detailed procedures that are presently followed in the centre.

1) Admission of the Animal

a) Make sure the animal history is provided by the person presenting the animal
b) Record all information on standard forms for later retrieval
c) Provide relevant copies of handover details to the presenter
d) For infant/baby animals, determine if the animal is in need of rehabilitative care or could be placed back in its nest/den; if the latter, arrange return of the animal(s) accordingly

2) Stabilization of the Animal

a) Evaluate the animal quickly when transferring to a holding pen/cage/etc.
b) Examine for critical conditions and administer emergency care as needed

c) Provide warmth (unless hyperthermic)
d) Provide quiet rest space
e) Prepare materials needed for health check/examination
f) If possible before handling the animal for the full exam, observe quietly for posture and behaviour

3) Initial Examination
a) Animal identification (species, age, sex if sexually dimorphic)
b) Weight
c) Temperature (as able)
d) Visual exam
e) Palpate limbs
f) Examine orifices
g) Assess nutritional status and condition

4) Initial Treatment
a) Provide fluids
b) Clean and treat any wounds
c) Stabilize fractures
d) Administer medications (antibiotics, analgesics, etc.)
e) Provide appropriate, palatable nutrition for the species
f) Conduct or schedule any appropriate diagnostics (radiographs, bloodwork, faecal examination, etc.) and any additional treatments (surgeries, follow-up bandage changes, etc.)

5) Intensive Rehabilitation
a) Monitor weight
b) Provide ongoing, appropriate fluids and nutrition
c) Treat medical problems as needed
d) Provide comfortable, appropriate housing and habitat, minimize interaction with human activity

6) Intermediate Rehabilitation
a) Monitor weight
b) Provide ongoing, appropriate nutrition
c) Treat medical problems as needed (should be minimal)
d) Provide comfortable, appropriate housing and habitat with mental stimulation, minimize interaction with human activity
e) Provide manual physical therapy as needed
f) Monitor behaviour

7) Pre-Release Conditioning (for some young animals and those in captivity for extended periods)
a) Provide larger, outdoor housing

b) Monitor weight and general condition
c) Provide ongoing, appropriate nutrition, introducing a more natural diet
d) Treat any primary or secondary medical problems as needed (should be minimal)
e) Exercise daily, as appropriate for that species

8) Release Evaluation

Exceptions for some of the following items may occur when natural circumstances cannot be replicated in captivity.

a) Ability to self-feed (if live prey may require ethical consideration and authorization)
b) Normal mobility and function, reasonable level of physical fitness and stamina necessary for foraging, breeding, migration, or territory defence behaviour if predicted
c) No evidence of disease
d) Normal weight for that species/sex/season
e) Normal blood values (where appropriate/feasible and known)
f) Suitable release sites available
g) Normal behaviour (the animal exhibits reasonable responses to human activity, exhibits normal socialization with both same and other species)

9) Release

a) Provide proper/safe transportation
b) Choose appropriate season/time of year (migration, breeding season, etc.)
c) Choose appropriate time of day
d) Provide food if appropriate
e) If monitoring is required, tag or band the animal before release
f) Monitor post-release activity and behaviour, if possible

Fig. 6. Volunteers releasing four Black Kites (*Milvus migrans*) after completion of their rehabilitation at the Wild Animal Rescue Centre

10) Placement

a) Repatriation to the wild of confiscated wildlife should always be the aim. However, this may not be possible if the exact provenance of the animal is not known.
b) It is important early in the process to decide if release is an option for the healthy animal. If the animal is not native and repatriation to the wild is not possible, re-homing or placement would be undertaken at this point
c) Determine the options and communicate with the IUCN Specialist Groups and known experts if necessary
d) Once an appropriate option has been found inform the Agriculture, Fisheries and Conservation Department (AFCD) and obtain approval to go ahead with a proposal to transfer the animals to the identified centre

Fig. 7. Releasing repatriated Pig-nosed Turtles (*Carettochelys insculpta*) seized in the Hong Kong SAR, in West Papua, Indonesia

CHAPTER ONE

INTRODUCTION TO GENERAL RESCUE CENTRE PRINCIPLES

Introduction

The KFBG Wild Animal Rescue Centre (WARC) was established in 1994 due to an identified need in Hong Kong for rescue and rehabilitation of injured native wild animals and to support the HKSAR Government's efforts in combatting the illegal wildlife trade.

The Operational Guidelines have been produced by staff at KFBG to represent a standard for the care of animals that enter the wild animal rescue centre rehabilitation programme. Many of the procedures are common practice for most well-established rescue centres, some are modified procedures which are better suited to the environment in which we operate. KFBG employs professional staff who have many years of collective veterinary and husbandry experience in dealing with diverse faunal groups. The Guidelines have become a formidable document of over 200 pages, definitely not a quick read. We suggest that the document is used like a manual, each chapter providing useful workflow information that might be able to guide the reader. Previous guidelines were translated into Chinese and Vietnamese. We will continue to strive toward progressive procedures and maintain high standards of operation and endeavour to share experiences with other established and new rescue centres in the region.

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Fig. 8. Veterinary Hospital and enclosures of the Wild Animal Rescue Centre (WARC)

Legal Considerations for Rescued and Confiscated Animals in Hong Kong

Running a wild animal rescue centre in Hong Kong SAR requires that all areas of operation are carried out legally following the local laws and that all permits and agreements of authorisation are valid.

To operate the WARC at KFBG the centre requires several permits issued by the Director of AFCD and requiring annual renewal.

Associated with these permits will be a reporting system which allows the authorities to audit the operations and keep records of relevant changes to operations. This also requires that good record keeping is undertaken. Species360 (ZIMS) is a zoological record keeping system which KFBG subscribes to; it helps to keep all animal records which can then be produced to support monthly and annual reporting internally and externally.

Permits are also required specifically for the veterinary hospital facilities to dispose of sharp instruments such as scalpel blades and needles (Environmental Protection Department) and to operate X-ray equipment (Radiation Ordinance Cap 303). The Vet Hospital also requires a Gun Licence from the HK Police Force to possess a dart gun.

Two key permits authorising the KFBG Wild Animal Rescue Centre (WARC) to operate are those that cover the handling and possession of native and exotic animals and endangered species. These permits fulfil the requirements under the two ordinances described below.

1. Wild Animal Protection Ordinance (Cap 170) and
2. the Endangered Species Protection Ordinance (Cap 586).

Both are issued and renewed annually by the Director of AFCD and are required to carry out all aspects of the rescue work at KFBG. The permits also include holding rescued or confiscated animals for education as well as retaining specimens and carcasses for scientific purposes or education. Under the terms of the permits, we are required to notify AFCD before carrying out certain actions such as the euthanasia of any species under an Endangered Species Protection (ESP) enforcement case.

When Does an Animal Need Intervention?

In our experience it is a common misconception by the general public to assume that an animal encountered in slightly unusual circumstances is in need of assistance. A rescue centre should understand the situation and be prepared and ready to advise the public as to when animals are candidates for human assistance and when nature should be allowed to take its course.

Trapped Animals

A healthy but trapped animal may only need to be given a safe and accessible route back to nature and often may not need to endure the stress of capture and transport to a rescue centre.

Baby/Infant Animals

Parental instincts to protect and care for offspring are very strong. Baby animals encountered in the wild or in a human landscape should not immediately be assumed to be abandoned. It is normal for fledgling birds to leave the nest as they learn to fend for themselves and for a short period, they may appear helpless or abandoned, but in most cases the parents are nearby and will watch and care for their offspring. It is also common for some baby mammals such as deer to be concealed in vegetation or other cover without a parent visible nearby. This strategy reduces the chance of the parent drawing predators to the site. The parent will return at safe intervals to check on, care for and feed the young animal. Young animals should not be assumed abandoned and immediately removed unless there is clear and present danger. Where young animals are encountered, they may simply need to be given time to return to a safe site away from human activity or may benefit from being relocated nearby to a safe natural environment; removal and transfer to a rescue centre may not be required or in the best interest of the animal involved. When a young deer is encountered, it is not immediately removed but left in situ until staff are sure that the fawn has been orphaned.

Fig. 9. Rescue and hand raising of abandoned Northern Red Muntjac (*Muntiacus vaginalis*)

Window Strikes and Chilled Animals

Birds in urban environments may accidentally fly into reflective glass and become temporarily disoriented. Small mammals, particularly bats, in very cold weather may become chilled and appear weak. In both cases often they need only be provided with warmth in a safe resting environment (ventilated cardboard box lined with soft towel or tissue) to fully recover and thus can be released without a trip to a rescue centre.

General Procedures for Animal Deliveries

24 Hour Animal Drop Off Facilities

Three facilities are presently available to receive animals out of hours from the public, the SPCA and the authorities:

1. 24 Hour Drop Off Room – primarily snakes, birds and small mammals
2. Vet Hospital X-ray Room – large mammals
3. Snake Handling Room – some large mammals (depending on transport cage) and caged large pythons

An Intensive Care Unit (ICU) is available inside the 24 Hour Drop Off Room, the Vet Hospital and Ward 1 for nestling birds and any other small, young, sick, or weak animals.

The 24 Hour Drop Off Room temperature is maintained at between 25-26 Celsius. The transport crate containing the animal should be covered with towels both to shelter against the air-conditioning breeze and as a visual barrier. The decision to use the ICU should be made by the delivering SPCA inspector or on advice from the Fauna officer on duty (carrying the duty phone). The Veterinary Hospital facility is a little more flexible than the other two locations; if there is an exceptional case and the security guards are not sure where the box/cage should be delivered, it should be placed in the Vet Hospital X-ray room. Advice in unusual cases if required can be obtained from the Fauna duty officer.

Fig. 10. 24-hour animal drop off facilities

24 Hour Animal Drop Off Procedures

1. With the arrival of a new animal case the security team should escort the delivering party (AFCD, Police, SPCA or member of the public) to the appropriate drop off facility keeping the animal in the same cage/ box in which it has been transported to KFBG. The animal and its original container should be locked in the allocated location. If the animal is not securely and safely contained it may be turned away to return within normal working hours. The Police will collect an empty snake box after the delivery of each occupied snake box. The Police paperwork MUST be taped on to the snake box on arrival.
2. Security staff should not involve themselves in any animal handling. The delivering party will be responsible for each arriving case. The security guard should assist by accompanying the animal to the correct location and completing all necessary paperwork before the delivering party departs.
3. The rescue centre team, security guards and SPCA inspectors have formed a WhatsApp group so that KFBG can be notified of incoming deliveries in advance and details about each case can be easily shared and discussed. Any questions about individual cases can be answered via WhatsApp, preferably before the animal arrives.
4. The SPCA inspector will be required to complete an animal acceptance form provided by the security guard, and the security guard will complete an SPCA handover form for the inspector. The security guard should provide his/her name on the SPCA form. The name and signature of both the animal recipient and the person delivering the animal MUST be completed on the WARC acceptance form.
5. If there is a copy of the SPCA handover form this can be left with the security team and passed to the Fauna team (FAU) the next morning; otherwise, the SPCA will fax a copy to FAU the next morning.
6. If in any doubt about either the condition or the safety of storage of an animal being delivered seek advice from the Fauna duty officer by calling the duty mobile.
   If no response can be obtained from the Fauna duty mobile and the security team feel the animal is not securely boxed, the animal may be turned away. In urgent situations where the duty officer cannot be reached, the security team can also contact the Veterinarian or the Department Head for assistance.
7. Cases that could present a safety risk and cannot be placed in the 24 Hour Drop Off facility would require a WhatsApp message and a call to the Fauna duty mobile, these include:
   Medium/large wild boar (Hospital)
   Adult macaques (Hospital)
   Large red muntjacs (Hospital)
   Large pythons (>4m) (Snake Handling Room) – too large to fit in the standard snake box
8. As far as possible, when animals arrive in a cage the cage must be screened by towels/sacking to reduce stress and small transport cages should be filled with shredded or crumpled newspaper. Delivering staff can be asked to do this. No animal

should be left on a bare surface and without visual barriers. Substrates can include folded paper, a towel or other soft grip surface.

9. FAU should be notified as soon as possible within working hours of any deliveries made that the duty officer has not already been informed about and that a WhatsApp message was not received for (i.e. AFCD and Police cases). The duty mobile could be used to provide this information.
10. When possible, rescue centre staff will attend KFBG out of hours if a case requires urgent assistance, otherwise first arriving staff the following morning will check and handle overnight cases. Cases where animals are clearly suffering and require immediate attention may be directed to SPCA duty vets if they cannot receive swift veterinary attention at KFBG.

Animal Admission Procedures

1. At the time of admission, 2 forms are needed (see Appendices 10 and 11)
2. The acceptance form has to be signed by the person/institution (member of public/ SPCA/AFCD) who surrenders the animal and by the KFBG staff member receiving the animal.
3. A visual check of the animal is performed immediately upon arrival.
   If the animal is not STABLE:
   - AVIAN > signs of avian influenza? Call the vet.
   - Medical/surgical emergencies > Call the vet.
   - Stress, panting, panic… > rest for 30 minutes > recheck. Call the vet if animal appears to be struggling to breathe or if panting does not subside.
4. When the animal is stable, the full admission check (following all steps on the admission form; see Appendices 12-14) should be performed and fluids administered as described in Chapter Eight.
5. The animal can then be relocated to a temporary holding box/cage.
6. A medical, husbandry and feeding plan should then be formulated.
7. The case should be added to the relevant whiteboard.
8. A ZIMS record should be opened and any other relevant paperwork updated.

Identification of New Arrivals

If an incoming animal cannot be identified it is almost impossible to begin to assess the animal's condition and to formulate a plan of treatment or husbandry for that animal, so the first step is to be sure the type of animal is known. For some species or individuals (e.g. Pangolins) captive husbandry can be so difficult that the best course of action could be to seek an immediate release if injuries are minor and the animal fits all other release criteria, in particular, if it is of recent wild origin, and native. In most cases, however, the animal will need to stay at the rescue centre for a period of time. A good library is required for accurate identification of different animal species. The wealth of information on the internet can both aid identification and provide husbandry tips for difficult species.

Fig. 11. Rescued Wrinkle-lipped Free-tailed Bat (*Chaerephon plicata*) possibly a vagrant migratory species in Hong Kong

Assessment of Condition

Once the animal is identified, ideally it should be inspected by a qualified veterinarian. The animal's size, weight and body condition should be recorded to compare with normal parameters for the species in the wild. At this point, the veterinarian along with the rehabilitator should assess whether the animal is a viable candidate for rehabilitation. Animals which are very ill or with severe trauma may not be sensible choices for rehabilitation. In most cases, rehabilitating an animal which will probably never regain full fitness should be avoided, as it is unlikely ever to be releasable and so is condemned to spend life in captivity. However, for some cases this may be acceptable, for instance for

very rare or endangered species which may be candidates for conservation breeding programmes locally or worldwide.

If eventual release or placement cannot be envisaged for an incoming animal, then it should probably not be rehabilitated, and immediate euthanasia should be considered. Rescue centres that attempt to save everything will compromise animal welfare, run short of resources and not fulfil their basic objectives.

Fig. 12. Brown Wood Owl *(Strix leptogrammica*) undergoing a physical examination in the Veterinary Hospital

General Quarantine Principles

The KFBG WARC will endeavour to ensure that animals in quarantine and their waste will remain separated from all non-quarantine cases. Where possible, quarantine animals will be housed in a dedicated facility. Due to the nature of a rescue centre and the flow of animals through it, it is recognised that total isolation may not always be possible. In such cases, husbandry and management practices will be modified to ensure that barrier techniques are in place.

Initial Housing

From the moment an animal is received, it should be maintained in subdued conditions with as little disturbance as possible. Lighting should be kept low (but complete darkness avoided) and sound and movement should be kept to a minimum. A temperature regime appropriate to the animal's physiological tolerances should be maintained.

For most small-sized mammals and birds, boxes made of strong plywood with escape-proof ventilation holes and vertically sliding doors are suitable. The box should be large enough for the contained animal to stand up, lie down, turn around and perch, but not large enough to allow rapid movement or flight. This will help to keep an injured animal calm and reduce stress whilst allowing easy access. A box of this type should be used for only 1-2 days maximum (typically less than 24 hours at KFBG) pending initial examination and the preparation of longer-term housing. If the initial examination finds medical issues or the animal is young, it may be housed in a hospital cage or intensive care unit for a time. If the initial examination finds the animal healthy, it may go directly to more long-term and spacious housing.

Feeding

At KFBG, wild animal rescue and rehabilitation cases are fed a natural or naturalistic diet as far as possible. This is for two reasons: (1) many wild animals will not accept commercially prepared zoo-type diets (e.g. pellets), and (2) it is important to maintain natural feeding behaviours and instincts as far as possible whilst in captivity.

Depending on species, food may include meat, fish, invertebrates, plants, fruit, vegetables and/or beans. Care should be taken to source these foods from a clean, safe source (e.g. reputable suppliers or grown/bred on site), to ensure they are free from pesticides and pathogens. Common food items should always be kept in stock. For animals which require meat, it is recommended to have a supply of frozen whole prey items (mice, rats, day-old chicks) which can be thoroughly defrosted in the refrigerator before feeding. The freezing process can help kill some of the potentially harmful pathogens in freshly killed prey items.

For animals which are particularly fastidious - requiring specific plant or prey species - it may be necessary to go out and gather these food items from the wild. In these cases, less quality control is possible, but try to select items that look clean and healthy.

Despite our best efforts, it is impossible for a captive diet to perfectly replicate the wild diet in terms of ingredients and diversity. For many species, detailed dietary composition is simply not known. We therefore supplement many of our diets with commercially available zoo-type diets or supplements, particularly for animals that need to stay in captivity for longer.

General Cleaning Protocol

Hygiene is crucial when rehabilitating animals. Wild animals in a captive situation are under a great deal of stress and this can significantly suppress their natural immunity. As such, they are prone to infection and disease at a higher rate than in the wild.

Cleaning and Disinfection

Cleaning is the removal of dirt and debris from a surface while disinfection kills off most of the micro-organisms on the surface. Both cleaning and disinfection need to be undertaken in the rescue centre in order to prevent potential disease outbreaks.

Virusolve®+ [didecyldimethyl ammonium chloride, bis(3-aminopropyl) dodecylamie] is used as the general disinfectant for the vet hospital and critical areas. It comes in liquid form and requires dilution before use. 0.5% (1:200) is for intermediate level disinfection (e.g. bedding, containers and cages) while 5% (1:20) is for high level disinfection (e.g. facilities and enclosures in contact with cases of infectious disease). Diluted Virusolve®+ solution can be stored for 14 days.

A general guideline for using diluted Virusolve®+ solution is to spray or soak the object or surface, leave it for a minimum of 2 minutes' contact time and then wipe or rinse it off. Feeding and drinking utensils that are soaked should be rinsed under running water in order to remove any residue.

Bleach is used as a general disinfectant for footbaths, soiled bedding and other enclosure areas. It comes as 6-8% dilution and needs to be further diluted to 0.05% (1:119/1:159) before use. Since bleach will be deactivated by organic materials, for example excreta and soil, staff need to clean surfaces first before they disinfect them. According to WHO disinfection guidelines, a contact time of $\geqslant$ 10 minutes is recommended if disinfection is by wiping of nonporous surfaces while 30 minutes is recommended if disinfection is by immersion of items. Concentrated bleach should be diluted and used within 24 hours.

Hibiscrub® (chlorhexidine scrub) is an antiseptic detergent solution and it is used as a disinfectant for hands before and after handling animals. It comes as a 4% soapy solution and does not need to be diluted before use.

Water Dishes

Water dishes and trays should be cleaned with diluted Virusolve®+ daily, and water should be refreshed whenever fouled or dirty. Water dishes need to be of a design or weight that can be easily accessed but not overturned.

Multiple Water Sources

It is a good idea with some animals, particularly mammals, to provide multiple water sources; some species routinely defecate in water thus depriving themselves of a clean source if only one is provided.

Food Preparation

Feeding areas, preparation utensils and food bowls should be disinfected after every use to prevent the build-up of pathogens.

New Animals

New animals should never be placed in an enclosure before the area has been thoroughly disinfected, as the previous occupants may have been carrying harmful bacteria, viruses or parasites.

Release

The IUCN (International Union for the Conservation of Nature and Natural Resources) provides thorough and clear guidelines relating to the release of rehabilitated animals into

the wild. Only **native** species of known local genetic origin in good health should be considered for release. Release can be a stressful experience, as the animal must attempt to establish a territory within an existing population and find enough food in an unfamiliar area. Release location is a vital consideration. Where possible, current data showing wild population numbers should be checked to make sure that an animal is not being released into an area that has already reached its carrying capacity, or an area that should not contain the species in question. Some animals will only be able to disperse from the release site fairly slowly, so the area must be able to sustain the animal and provide sufficient cover. Repeated releases in the same area should be avoided, especially with territorial species and those which disperse slowly. A release site may rapidly reach carrying capacity for such species.

Some individuals will be unable to adjust immediately to wild release (especially longer-term captives or more 'intelligent' species that have quickly tamed in captivity) and a system to 'hack' (acclimatise) the animals to the wild should be adopted. This would normally involve housing the animal at the release site for around 7-14 days then allowing the animal access out of its enclosure (without forcing the animal out). Over the following days, the animal should explore the surrounding area returning to feed at the housing site if it wishes. Feeding should be gradually reduced and eventually stopped over a period of days or weeks to encourage the animal to become independent. During the 'hacking' period, human presence at the site should be kept to an absolute minimum. This is however a very

Fig. 13. A Northern Red Muntjac (*Muntiacus vaginalis*) is released back to the wild following successful rehabilitation

demanding process, the success of which cannot be guaranteed. Before proceeding down this path the conservation value of the animal should be given careful consideration.

Where possible, released animals should be monitored and if they appear to be in any difficulty, they should be re-captured and rehabilitated, and a new release strategy formulated.

Releasing back to the wild may not be a suitable choice for some rescued animals. If the animal is exotic (non-native) and endangered, it should be relocated to a permanent captive home, preferably a recognised captive conservation breeding programme in or close to its country of origin. Ultimately if a conservation option is not available efforts should be undertaken to see if there is an educational outcome for the animal.

Fig, 14. Non releasable Collared Scops Owl (*Otus lettia)* in an educational exhibit

Record Keeping

It is essential throughout the process of rehabilitation, from the moment of arrival to the last monitoring record or sighting, to keep organised, detailed records. These records should include everything from point of origin data, medical problems, and food initially offered, to details of successes and failures in husbandry conditions and enrichment efforts. Only by compiling these data in a usable format can the standard of care given to animals in rehabilitation be critically appraised and improved. Accurate records accrued over time can help in deciding which diet to use or avoid, what release methods to use or avoid and even which cases to attempt or avoid rehabilitating. The importance of full clear records cannot be understated.

Records can be maintained either in paper format or via a computerised system. While a paper record system is cheap and has a short learning curve, it takes up space and is tedious when it comes to analysing data. A computerised system on the other hand saves space and automates and simplifies report generation and data analysis. We therefore encourage use of a computerised system.

Fig. 15. Global map of Species360 Members. There is currently no equivalent shared database to that maintained by Species360 to keep track of captive wildlife

Record Keeping Software - Zoological Information Management System (ZIMS)

There are very few comprehensive, computerised zoological record-keeping systems that include a veterinary module. One such system is the Zoological Information Management System, usually referred to by its acronym 'ZIMS'. ZIMS is licensed only via a renewable annual membership of its provider, the non-profit organisation Species360 (formerly the International Species Information System, or ISIS). KFBG joined Species360 in 2004 and has since then maintained a database for all animals entering the rescue programme.

ZIMS is used by more than 1100 zoos, aquaria and wildlife institutions in 96 countries. It enables data sharing as well as data collection, and thus is effectively the global database for the zoological community. It contains records on more than 10 million animals of over 22,000 species, including hundreds of millions of husbandry and medical records.

Species360 members use the basic biological information (age, sex, parentage, place of birth, circumstance of death, etc.) collected in ZIMS to manage genetic and demographic programmes for their animal collections as well as to generate useful statistics.

Species360 records are accepted and preferred by international regulatory bodies like CITES (Convention on International Trade in Endangered Species). Several Regional Associations seek Species360 membership for their members: Europe: EAZA requires Species360 membership; Australasia: 100% of ARAZPA institutions with exotic animals are Species360 members; USA: 98% of AZA institutions are Species360 members. Species360 works in partnership with these regional Zoo Associations around the world.

See Appendices 27-29 for samples of ZIMS reports.

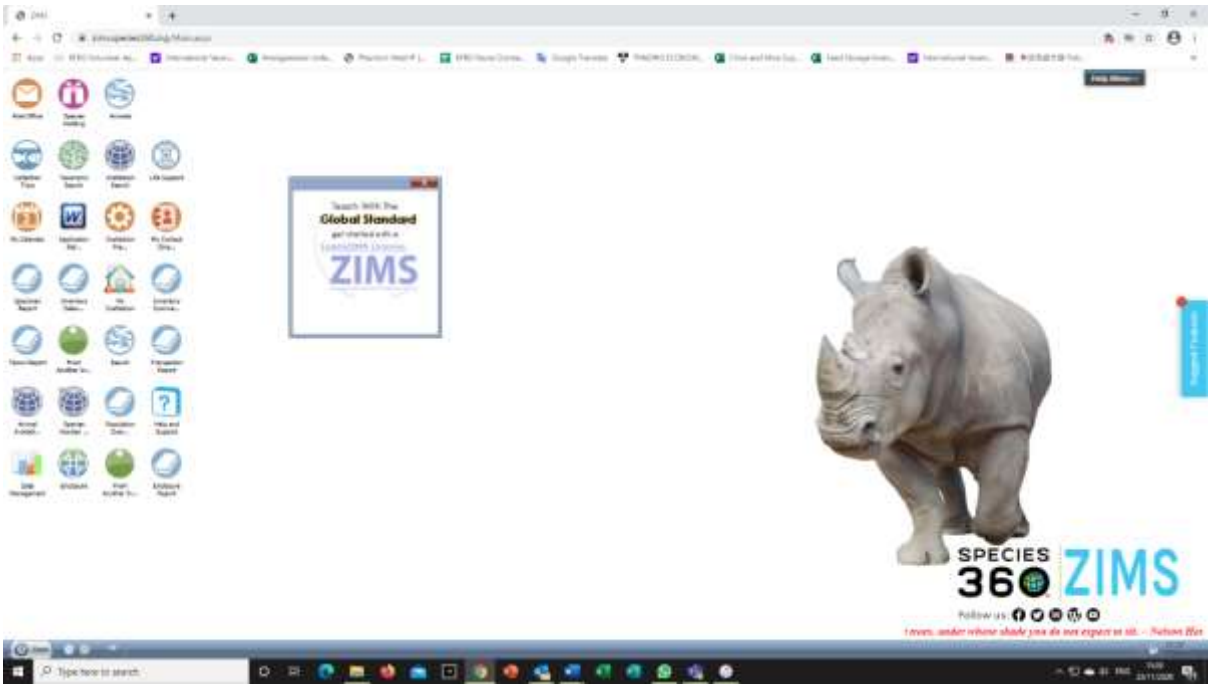


Fig. 16. ZIMS main introduction page

CHAPTER TWO

HEALTH AND SAFETY

General Health and Safety Statement

It is the policy of the Kadoorie Farm and Botanic Garden Corporation (KFBG) to protect its employees, volunteers, visitors, and contractors from recognized hazards by:

a. Complying fully with applicable health and safety laws and regulations.
b. Providing appropriate training, equipment and support necessary for safe working practices.
c. Actively identifying, assessing, and controlling risks involved in all operations and activities.
d. Requiring staff, volunteers, and contractors to comply with a high standard of occupational health and safety.
e. Continuously seeking to improve health and safety standards and minimize accidents towards the goal of zero accidents.

Zoonoses of Concern at WARC

A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Animals thus play an essential role in maintaining zoonotic infections in nature. Zoonoses may be bacterial, viral, or parasitic, or may involve unconventional agents.

The following zoonoses have been identified as being of actual or potential concern at the rescue centre: mycobacteria, *Salmonella*, *Campylobacter*, avian influenza, botulism, *Escherichia coli*, leptospirosis, rabies, herpes B, *Streptococcus suis*, tickborne diseases, mycoplasmosis, psittacosis, aspergillosis, balantidiasis, cestodiasis, nematodiasis, hepatitis B, Newcastle disease. More recently the COVID-19 virus has caused major disruption across the globe. Thought to have originated in bats, at time of writing it is unknown whether it spread to humans directly or via an intermediate host. Given that many emerging infectious diseases originate in wildlife, it is important for rescue centres to be aware of regional disease outbreaks and take additional precautions as necessary.

Vaccinations

Vaccination protocols are in place for birds and mammals.

Mammals are vaccinated during quarantine according to species requirements if they are to become part of the collection. Examples of vaccines that may be given include rabies, tetanus, FVRCP and DHPPiL, depending on the species. For different species protocols, one can refer to the American Zoo Association (AZA) guidelines.

Part of the permanent bird collection is vaccinated against avian influenza (AI). Since the vaccine changes very often the protocol is adapted accordingly, but as a rule of thumb birds are vaccinated once in September each year. Blood for AI antibody titres is taken before the first vaccination and 16 weeks after the vaccination. If the vaccine has changed and

depending on titre results, birds may also receive a booster vaccine 4 weeks after the first vaccine.

Avian Influenza (AI) Protocol When on High Alert

KFBG AI Serious Response Level (RED ALERT)

- The KFBG Serious response level (RED) will be raised replacing the Alert response level (Yellow) if a wild bird or resident bird on the KFBG premises is diagnosed HPAI positive or if a bird with HPAI is discovered within a **3 km radius** of KFBG**.**
- At the raising of the Government serious response level and following a recommendation from AFCD to close off public access to bird enclosures, KFBG will automatically go to Red Alert if this is not already the case.
- All bird enclosures will be closed off to the public for a period of **3 weeks** using ribbon or plastic chain with appropriate advisory notices posted bilingually. The public will still be able to see the birds in many cases but will not be able to come into contact with the enclosures.
- The AFCD Senior Vet will be immediately notified.
- The KFBG Veterinarian or the HOD in his/her absence is responsible for ensuring compliance with this protocol.
- Dead birds found on the premises will be handled according to AFCD instructions.

Disinfection

a) **Public and private service areas / walkways / handrails / signs** in and around enclosures should be disinfected **daily** each morning.
b) **Bird enclosures and furnishings** used with birds such as Astroturf / perches / food dishes will be disinfected **daily** in line with wet cleaning practices, wherever possible.
c) **Disinfectant foot and vehicle wheel baths/disinfectant spray stations** - Additional foot baths will be considered if required.
d) **The General Administration Department (GAD) will screen all vehicles** entering KFBG and provide disinfectant wheel spray to all vehicles that have recently visited farms, markets, or other areas likely to have brought the vehicle in contact with bird contaminants. Wheel baths or spray stations can also be considered depending on the intensity of traffic. A spray station should be set up outside the Operations Office and Kadoorie Centre gate (if vehicles enter from outside). Wheel baths should be considered at the Chicken Area and WARC Access road. These will be managed as per standard foot bath practices.

Normal Operations will be re-established after a period of 3 weeks when no further cases of HPAI have been reported since the most recent case.

Animal Euthanasia

When an animal is considered suffering and terminal, euthanasia must be carried out following humane and ethical considerations according to the KFBG "Euthanasia and Animal Dispatch Policy"

Under normal circumstances the Fauna Conservation Department Veterinarians are the only staff that will make decisions on when and how an animal is to be euthanised. A competent person can also be authorised by the vets to carry out the procedure (the department head (DH) must be aware of all staff that are considered 'competent' and can be authorised to carry out the procedure, and the up-to-date Competent Staff List is maintained by the senior vet).

Only the vet nurse and permitted FAU staff at assistant conservation officer (ACO) level and above (listed on the Competent Staff List) can be authorised by the senior vet and DH to carry out euthanasia.

The standard steps to be undertaken when euthanising an animal are outlined below:

1. The vets when present at work will take charge of all euthanasia procedures
2. If the vets are not on-site but still **in the country**, the following steps are taken-
    a. The vets will be notified by call/text by a competent staff member for pre-approval.
    b. If the vets are not reachable, and the volume of the lethal drug to be used is below 5 ml (correspondent to an animal weighing less than 5 kg), the competent person examining the animal may proceed to euthanise the animal on welfare grounds. The vets have given blanket authorisation through the Competent Staff List and the staff member is not required to get prior permission from another vet before administering 5 ml of drug (Dorminal; pentobarbital sodium 200mg/ml). The vet should be informed at the first opportunity. If in doubt the case may be delayed until the following working day or until the vets have been reached.
3. If the vets are not on-site and are **out of the country**
    a. The person receiving/examining the animal should contact one of the cover vets by phone if a case requires consideration for euthanasia and the volume to be used is below 5 ml (corresponding to an animal weighing less than 5kg). The vets will authorise the competent staff to undertake the procedure if it is agreed following the sharing of case details that the condition of the animal requires this action.
4. In all cases where the volume to be injected is above 5 ml (corresponding to an animal weighing more than 5 kg) the staff examining the animal is required to contact a qualified vet (the KFBG vets or the cover vet). **Only a qualified vet can carry out euthanasia in these cases.**

In all cases, the details of the animal euthanised and the volume of Dorminal used must be logged.

Fig. 17. Veterinarian drawing blood from a rescued Burmese Python (*Python bivitattus*) via the tail vein. This can also be the injection site for euthanasia or anaesthetic drugs

Disposal of Animal Carcasses

This procedure clarifies actions that should be taken when dealing with animal carcasses (either whole bodies or parts). In most cases the carcasses will be returned to AFCD or some other responsible HKSAR Government authority. Some carcasses in whole or part may be retained for education purposes following approval from the relevant Government department/s and in exceptional cases some carcasses may be retained for hillside burial (e.g. old exhibit specimens) at the direction of the Department Head and after approval is obtained from AFCD. Some cases may also be placed in the Carcass Burial Pit adjacent to the rescue centre. Protected species will require approval from AFCD.

The carcass disposal flowchart is in Appendix 26.

Freezer Storage of Carcasses

Carcasses should normally **only** be stored in the following places (prior to disposal via AFCD or handover for specimen room use).

1. The vet hospital refrigerator pending necropsy
2. The vertical carcass freezers in the Post-mortem Room
3. The chest freezer in the Big Storeroom

Records

- The carcass bags should be clearly labelled with the following: Date, in the format dd/mm/yyyy, K number (K#), other ID (police number, AFCD case, carapace number, notch number), taxonomic name, common name, whether the animal was euthanised or found dead, the handler's initials, and collection site for carcasses that have originated outside the WARC and captive collection. Moreover, a clear number of carcasses should be written on the bag.
- The Carcass Log File in the Vet Hospital must be filled in with the date, taxonomic name and common name, K#, other ID, number of specimens, if it was euthanised (Euth) or found dead (FD), the amount of Dorminal used and the initials of the staff performing the job. A **second staff member** should countersign the carcass bag and logbook, to confirm the carcass count and identity before deposition in the freezer.
- It is the responsibility of the Veterinary Nurse (VN) or delegated person, to check that the Carcass Log File is filled correctly, clearly and completely.
- Data from the paper Log File must be entered into the Excel File that can be found under SOP/Veterinary/Carcass. Data entry into the Excel File is the responsibility of the Veterinarians and it should be done at least weekly or bi-weekly. Some carcasses are immediately sent to the AFCD laboratory (Tai Lung Veterinary Laboratory) following or prior to post-mortem; in this case, the disposition should be updated only in ZIMS.
- ZIMS should be updated as follows:
  a) The disposition of the animal/s - this requires a carcass note and a death note.
  b) The designated freezer name and location, to clarify where the carcass/carcasses is/are stored.
  c) If no ZIMS record is available, one should be created and the carcass dispositioned accordingly.
  d) When carcasses are surrendered to the Government, or buried, the official handover list (excel file stored in the appropriate dated folder) will be updated with the disposition date.

Disposal of Carcasses

As of March 2014, AFCD has agreed to collect all carcasses of wildlife and exotic animals that have died at KFBG. No carcasses should be buried on-site at KFBG other than for special exceptions agreed by the Department Head.

The collection will be carried out according to AFCD availability following the below procedure.

Under certain circumstances and with the knowledge of the Department Head and prior approval from AFCD, carcasses of protected animals may be disposed of in the Carcass Burial Pit at the end of the rescue centre.

Prior to Collection:
The VN/Vet will send the list of animals in the freezer ready for disposal to the specimen curator, all Officers, and the Department Head. The list should be reviewed, and decisions made as to whether there is any specimen to be retained.

The person interested in retaining any carcass (whole or in part) will be responsible for seeking the appropriate Government approval. The updated list will be sent back to the Vet team.

The Vet team will then send it to the AFCD Department responsible for the countercheck. Once the file is sent back to the Vet team, the carcasses destined for AFCD will be chosen, counted, checked and bagged. The bag/s should carry a visible and clear label ("for AFCD" and collection date "dd/mm/yy").

The specimens to be retained at KFBG should be chosen, packed, and placed in a bag clearly labelled. It is the vet nurse/veterinarian's responsibility to contact the Project Officer and have them removed from the freezer. The carcasses to be disposed of at KFBG (exceptional cases) should be checked, counted, bagged, and labelled and the disposal organised either by the Vet team or the person in charge of the burial.

On Collection Day:
The government official will come to KFBG. Two copies of the AFCD memo will be signed on-site by the VN/Veterinarian who hands over the carcasses:

- one copy to be retained at KFBG, scanned, and placed in the server and properly filed in the appropriate folder at the Vet office
- one copy to leave with AFCD

The bagged carcasses (labelled "for AFCD") will then be loaded on to the van.

Post AFCD Collection:
The Vet team is responsible for updating the computer logbook. This file should clearly contain the day of the handover and the location of each carcass. Moreover, the file should contain the possible plan for the carcasses to be retained.

THE PROCESS FOR THE DISPOSAL OF CARCASSES MUST FOLLOW THE CARCASS DISPOSAL FLOWCHART (Appendix 26).

NOTE: If a bird carcass is discovered on the hillside, and it is suspected NOT to be an impact trauma, the collecting staff should wear protective gloves when retrieving it. The bird should be placed in a sealed bag and given directly to the Veterinarian or placed in the red

bucket outside the veterinary hospital. AFCD should be immediately called (1823) to collect the dead body.

If there are clear signs that the bird died due to impact trauma (i.e. found under a window) the carcass is recorded in the logbook and it follows the general disposition procedure. The carcass log and the bag must carry a clear indication why the bird does not have a ZIMS record (e.g. 'found dead on hillside').

Ultimately the Senior Veterinarian is responsible for the overall management of carcasses and the department administration will assist with logistical support.

Fig. 18. Carcasses are placed in labelled paper bags. They are then stored in the freezer at -20°C pending collection by the authorities

Inclement weather and typhoon protocol

Introduction

Preparation work should be done by all team members when bad weather conditions such as typhoons and black rainstorm signals are expected and staff attendance to work may be affected.

Inclement Weather Basic Enclosure, Animal Care and Facility Related Actions

1. Make sure ANIMALS ARE LOCKED UP in a safe place (indoors) wherever possible or practical for the species involved.
2. Ensure all windows are closed and secured.
3. Ensure all doors and double doors are securely closed unless they must remain open for animal access.
4. Check all drainage channels, pipes and sumps are free from debris, leaves and rubbish.
5. Where possible lift out sump filter guards – particularly from the main WARC drains.
6. Close and secure all plastic weather guards on at the WARC Small Mammal Left (SML) and WARC Small Mammal Right (SMR) enclosures.
7. Roll IN all roof-top rain covers and secure if strong winds expected. Tie securely if only rain is expected.
8. Empty flight test net and collapse completely, secure loose net with heavy smooth articles to prevent movement in wind.
9. Open pool drain valve at the WARC Tortoise Garden Enclosure (WTTGDN)
10. Open pool drains on ANY outdoor unoccupied pond facilities including any that have had the animal locked indoors as storm preparation.
11. Remove loose objects and tools to a safe location.
12. Main Gate Pond 3 Inner enclosure (WXMGPD3i) - Ensure pool drain indoors is closed or pool is full, otherwise backwash and flood may occur.
13. Carry out minimum daily care and prepare AND LABEL next day's feed in WARC fridge/kitchen for 'essential' animals. Reptiles are generally not seen as essential as they can more easily tolerate missed feeds.
14. For raptors prepare only small items that can be offered whole (mice/chicks) and don't require further preparation. If bad weather is expected, a starve day may be imposed to cut down workload but only for long term resident Raptors. Rehab case birds must be fed. See Inclement Weather Feeding Guidelines for Raptors below, and general avian feeding guidelines in Appendix 17-18.
15. Offer additional diet to animals that are expected to need access to feed before the next staff attendance and servicing.
16. Co-ordinate team to make a final walk through ensuring **all** actions have been taken and no items missed.
17. Discuss existing cases and decide if any cases would benefit from OFFSITE care for the duration of an approaching storm (e.g. baby birds requiring hourly feeds). Arrange accordingly. Arrange accordingly.
18. DON'T FORGET TO INCLUDE EMPTY ENCLOSURES AND SHARED AREAS IN PRE-STORM CHECKS.

Post Storm Follow Up in Order of Priority

1. Visual check of condition of all facilities starting with occupied animal facilities first, head count only where practical or if facility damage indicates possible animal escape.
2. TROUBLE SHOOT as needed but ensure ALL facilities get rapid attention – allocate others to check if you are delayed while trouble shooting. Do not delay the full check to solve minor problems that will not result in further losses to facilities or animals – come back to these later.
3. Check for flooding and power failure - do not handle either until you are sure it is safe to do so.
4. Resolve power and flood issues and secure or remove debris to make it safe to work.
5. Report the ALL CLEAR to ADMIN and/or GAD once all facilities are considered checked and SAFE.
6. Return to address normal animal care/husbandry processes ensuring FULL head counts are made and utilising pre-prepared diets etc. Consider weather conditions now and in the near future before release of stock outdoors.
7. Reset all timers, thermostats, and electrics etc.

Interim Measures in the Event of Staff Attendance during Storm Conditions

1. Visual check for damage
2. Quick animal check
3. Power Check (lighting, UV, infrared light, heater, fridge, freezer)
4. Offer clean water or spray water as needed
5. Alarm system check
6. Pool and drain check (flooding, drains blocked by debris)
7. Offer essential care to hospitalised animals and baby animals only
8. NO general feeding except for special cases such as hospitalised or baby animals

WARC Inclement Weather Feeding Guideline for Raptors

General Raptor Minimum Feeding Guide using defrosted mice/chicks (selected raptor species). On average an adult mouse weighs between 25 - 30g, therefore in the absence of mice, the equivalent weight of lean meat can be fed.

Raptor Size	**Amount per bird**
Large Raptors e.g. Serpent Eagle, Eagle Owl, Brown Fish Owl	4 mice
Large Medium Raptors e.g. Black Kite, Common Buzzard, Peregrine Falcon	3 mice
Small Medium Raptors e.g. Crested Goshawk, Grass Owl, Barn Owl, Tawny Owl	2 mice
Small Raptors e.g. Besra, Collared Scops Owl, Asian Barred Owlet	1 mouse

Table 1. Raptor feeding guide

Live Education Displays Pre-Inclement Weather Checklist and Action

Position P (Parrot Sanctuary)

CTPS 1-6, CTSBA	Check that all aviary branching is safely secured
All Facilities	Prepare and label the following day's feed (wet and dry food)

Table 2.

Position WF (Wildlife Walkthrough)

CTRepGdn (Reptile Garden)	Check that all animals have been locked indoors
	Drain outdoor pool, keep valve open
CTWW (Wildlife Walkthrough)	Turn off valve that supplies water to the ponds
	Check that pond overflow points are clear of debris
	Check that all birds are locked inside the overnight cage
	Lock alligator and caiman in their huts if possible
CTWP (Wildlife Pond)	Turn off valve that supplies water to the pond
	Check that pond overflow points are clear of debris
CTMkH (Monkey Haven)	Check that all furniture in the dens are safely secured
	Check that all macaques are locked in the dens
	Drain outdoor pool, keep valve open
	Check that plastic curtain has been put down (if available) and secured in place
CTMkH, CTWWLw (Wildlife Walkthrough Lower Pond)	Prepare and label the following day's feed (wet and dry food)

Table 3.

Position MR (Mammals & Reptiles)

CTCat (Leopard Cat enclosure)	Drain outdoor pool, keep valve open
	Check that all furniture is safely secured
	Check that all drainage points are clear of debris
CTNoct (Civet enclosure)	Check that furniture are safely secured
CTPJ (Piers Jacobs Wildlife Sanctuary)	Check that drain gutters have been cleared of debris
WxMgPd1 (Main Gate Pond 1)	Check that monitor lizards have been locked in the hut
	Drain outdoor pond
	Check that pond overflow points are clear of debris
WxMgPd2 (Main Gate Pond 2)	Check that monitor lizard has been locked in the hut
	Drain outdoor pond
	Check that pond overflow points are clear of debris
WxSunGdn (Sun Garden)	Check that the drain behind Sun Garden is clear of debris
CTCat, CTNoct, CTPJ	Prepare and label the following day's feed (wet & dry food)

Table 4.

Position RS (Raptors)

CTRpN and CTRpS (Raptor Sanctuary North and	Drain all outdoor pools, keep valve open
	Check that all branches are safely secured
	Check that all drainage points are clear of debris
	Check that the drain behind Raptor South is clear of debris
CTEgAv (Raptor Roost)	Drain all outdoor pools, keep valve open
	Check that all branches are safely secured
	Check that all drainage points are clear of debris

Table 5.

Live Education Displays Bad Weather Check List and Feeding Notes

Position P (Parrot Sanctuary)

Check for Flooding	
Check for Obvious Display Damage	
Feed & Water CTPS1, 2, 4, 5, 6	Parrot Pellets only
Feed & Water CTPS3	Parrot - Pellets
	Small Bird - Chopped fruit and pellets Barking Deer - herbivore pellets and hay
Feed & Water CTSBA – Birds and Bats	Bats - Fruit
	Small birds - Fruit and pellets

Table 6.

Position WF (Wildlife Walkthrough)

Check for Flooding	
Check for Obvious Display Damage	
Feed CTWWLw	Flamingo - Pellets
	Egret - Fish
Check CTWWMd (Caiman)	
Check CTRepGdn	
Check Wildlife Pond for "washed out" fish	
Feed & Water CTMkH (Macaques)	Fruit and Vegetables

Table 7.

Position MR (Mammals & Reptiles)

Check for Flooding	
Check for Obvious Display Damage	
Feed CTPJ1 - 3	Barking Deer - Herbivore pellets and hay
	Bats - Fruit
Feed CTPJ4	Cut fruit/ vegetables and Zoo A
Feed CTCat (Mammal Displays)	Meat
CTNoct	Cut fruit and meat
Check Streamlife House	
Check Amphibian and Reptile House *Chubb alarm	
Check WxMgPd1	
Check WxMgPd2	
Check Sun Garden	

Table 8.

Position RS (Raptors)

Check for Flooding	
Check for Obvious Display Damage	

Table 9.

Position P (Parrot Sanctuary)

Check for Flooding	
Check for Obvious Display Damage	
Head Count Animals	

Table 10.

Position WF (Wildlife Walkthrough)

Check for Flooding	
Check for Obvious Display Damage	
Head Count Animals	

Table 11.

Position MR (Mammals & Reptiles)

Check for Flooding	
Check for Obvious Display Damage	
Head Count Animals	

Table 12.

Position RS (Raptors)

Check for Flooding	
Check for Obvious Display Damage	
Head Count Animals	

Table 13.

Fig. 19. Damage to facilities and tree debris, following a typhoon

Mule Section Bad Weather Check List and Preparation

Pre-Bad Weather Checklist and Preparation

1. Check that all drains are clear
2. Check that all equipment and items are stored away or secured against being blown away by strong winds
3. Check that the shutters are secured during lock up
4. Prepare food for Storm First Responder team to feed the mule

Post-Bad Weather Check List and Actions

1. Check that the mule is safe and healthy. Report if otherwise.
2. Check electrical switch board has not tripped and reset if necessary
3. Check for damage to the facilities and report if damage found
4. Check that equipment have not blown away and take action as necessary
5. Check for any fallen trees and dangerous trees and report as necessary

Emergency Mule Feeding

1. One 7kg bale of hay for the mule

Fig. 20. Duffi the mare mule in the sand exercise yard

Safety Guidelines for Working at Height

Introduction

People falling from heights can suffer very serious and even fatal injuries. All staff must make every effort to prevent this type of accident from happening. This policy sets forth the safety precautions required to safeguard people from falling from height.

Definition

Working at height includes working on unprotected roof tops, terrace edges, water channels, temporary working platforms, long ladders, scaffoldings, tree branches, etc. A place is considered 'at height' if a person is likely to be seriously injured falling from it. A fall of around 2 m or more can be used as a guide though the responsible person should judge on a case by case basis.

Relevant Legal Requirements

Construction Site Safety Regulations

Section 38 (B)(1) of these Regulations requires that "*the contractor responsible for any construction site shall take adequate steps to prevent any person on the site from falling from a height of 2 metres or more."* These regulations only apply to construction sites and even when there is construction work within the boundary of KFBG, the legal burden is on the **contractor** to take steps to provide suitable safety measures in relation to the construction work. However, the fall distance of 2 metres mentioned in the Regulations can be used as a reference for determining whether some locations should be considered "at height". That is to say, in general, a fall of approximately 2 metres or more should be regarded as likely to cause serious injuries and therefore must be considered "at height" in accordance with our definition above. Since the "2 metres" criterion is only a reference, one must not interpret it in a legalistic manner and regard, for example, 1.9 metres as perfectly safe.

Occupational Safety and Health Ordinance and Regulations

The Occupational Safety and Health Ordinance and Regulations are of direct relevance to us. The KFBG, as an employer, is bound by these Regulations. Section 6 of the Occupational Safety and Health Regulations requires that:

*"If a platform, pit or opening located within a workplace could be a danger to the safety of persons, the **person responsible for the workplace** must ensure that the platform, pit or opening-*

(a) is securely fenced to a height of 900 mm (measured from the upper surface of the platform, or of the edge of the pit or opening); or
(b) where it is not so fenced, is sufficiently well protected to the satisfaction of the Commissioner.

Principle and Implementation

General situation

Much of KFBG is situated on a steep hillside and there are many structures including terraces, retaining walls, dams, access steps, paths, roof-edges, fragile roofs, etc that were designed and constructed over the years when safety standards were not as stringent as those of the present-day.

Basic Approach

It is not possible to spell out a specific and comprehensive "present-day standard" that will address all the details in all the myriad of situations we encounter in the farm. Moreover, a fixed "standard" may not allow for the continuous improvement that is required in our Health and Safety Policy. Therefore, a combination of **risk assessment** and **continuous improvement** form the backbone of our basic strategy for implementing this Policy. The "prescriptive", "legalistic" and "minimum-standard" approach long used by regulatory agencies should be abandoned. Our approach aims to (1) afford frontline supervisors and officers more flexibility and a sense of ownership of the work they oversee, (2) allow of Departments Heads better control through oversight, and (3) allow a specialist consultant to assess and monitor the more dangerous or more complicated works when necessary.

Implementation

To facilitate the orderly implementation of this policy, "working at height" will be regulated as a "Permit-Requiring" work. Before any work that is conducted "at height" by KFBG employees or volunteers, a formal Risk Assessment must be completed by the Responsible Officer, assisted by a competent person if appropriate, and endorsed by the Head of Department. If the Responsible Officer or the Head of Department Head are not comfortable with the issuance of the permit, the work must NOT be allowed to proceed and a Hazard Report detailing the situation should be forwarded to the Executive Director.

Hierarchy of Controls

There are different ways to control the risk of falling from height; some are better and more reliable than others, and some should only be used when there are no better alternatives. In selecting these control measures, one must follow the sequence, so the more preferred options are given priority. The best way to control this risk is to do our best to avoid working at height if possible, so this must be considered first. It may mean being creative and thinking laterally to change the situation; for example, we could use tools that enable us to work while still on the ground; we could consider changing the programme, with management permission, to eliminate the need to do the task. When it is not possible to avoid such work, the second step is to consider using work equipment and other measures to prevent falls from happening. Only when it is infeasible or impractical to eliminate such risks, should one proceed to select an appropriate type of equipment and other measures to minimize the distance and consequences of the fall should one occur.

Good Management Practice

Success in achieving our policy goals also relies heavily on good management practices such as proper training and supervision, maintenance of equipment, periodic review of procedures, planning for emergencies and rescues, collecting feedback from the frontline, etc.

	Examples	Preference
Tier 1	Trim only the grass and shrubs where you can reach with a short ladder.	Most preferred, always consider these options first.
Avoiding work at height	Use long reaching tools instead of ladders.	
	Contract out the work to more qualified service providers	
Tier 2	Work restraining lanyard attached to safety line or fixed anchorage	
Preventing falls	Powered access equipment	
	Temporary or permanent guardrails	
Tier 3	Fall arresting harness and safety lines	Least preferred, use only when other methods are not feasible.
Minimizing distance and consequence	Safety nets, air bags	

Table 14. Hierarchy of Safety Controls

Blanket Permit and Routine Work

For routine work of similar nature and relatively low risks, a blanket permit can be issued by the Executive Director on the recommendation of the relevant Head of Department. For example, using a 2.5m step-ladder to change light bulbs in different buildings could be considered working at height, an overall assessment can be conducted and a blanket permit can be issued to a list of qualified workers for an extended period, specifying general safety rules rather than conducting detailed assessment for each instance.

Another example is routine work in agricultural terraces; a detailed Risk Assessment can outline safety measures to be followed, then a blanket permit can be issued for an extended period and at the end of that period a review should be conducted.

Operating Safety Procedures

For highly specialised operations such as tree maintenance, a written Operating Safety Procedure approved by the Department Head can be implemented in place of the Permit-to-work and Risk Assessment procedure described in this Chapter.

Fig. 21. Roof walks and railings allow safe access to facilities for cleaning and maintenance work

CHAPTER THREE

GUIDELINES FOR TERRESTRIAL MAMMALS

Introduction

The evolution of terrestrial mammals has produced a vast array of different mammal body forms, sizes, behaviours and morphology adapting them to an equally broad array of natural histories and ecological niches. This variety presents a challenge when defining a set of general rehabilitation guidelines for mammals: there is no “one size fits all” solution. With species in Hong Kong ranging from the smallest Lesser Bamboo Bat weighing 3 g to the largest Wild Boar weighing 200 kg and habitats and lifestyles ranging from arboreal to burrowing, no single set of rehabilitation criteria can function objectively in all situations.

The key to getting on the right track for successful mammal rehabilitation is a thorough understanding of the natural history of the species in question. To get this information rehabilitators should have access to a good natural history library and should take advantage of the expertise held onsite and in zoological gardens or similar establishments across the world. Animal caregivers are often very willing to assist others with their care problems as they are all working towards a common goal. The internet can provide a huge depth of relevant information to an animal keeper, but information should be screened for reliability and quality before use.

Armed with an understanding of how an animal lives and feeds and thrives in the wild, a rehabilitator can normally begin to tailor care and husbandry towards providing suitable conditions for the species in question.

Initial Housing

Clearly housing for a bat will vary considerably from that of a leopard cat, thus definitive mammal housing guidelines are inappropriate but certain common features should be consistent.

All newly received mammals will benefit from the provision of a quiet, darkened environment with a minimum of disturbance. Avoidance of temperature stresses by providing a range that is within the animals’ normal environmental experience is essential.

It is advisable during the initial observation and settling in period to maintain the animal in an enclosure large enough to allow it unrestricted movement but small enough to restrict or prevent high speed movements such as flight, running, leaps etc. This allows for ease of capture and handling that is likely to be required during the first few days and will help to reduce aggravation of any injuries not yet detected. Caging offering restricted movement would be approximately the same size or slightly larger than that which would be recommended for transport of the same species.

In the longer term, housing units of this size may be useful as “hide” boxes, however consideration of the types of activities carried out in an animal den or nest hole would guide the dimensions of the hide accordingly.

In a confined space, waste accumulation will be rapid so the accommodation should contain a substrate that allows easy cleaning yet provides a comfortable surface upon which to rest, offering texture, warmth, and grip for the occupant. Depending upon the species, items such as wood shavings, newspaper (whole or shredded), vet bedding, towels, artificial grass, straw, woodchip, and hessian sacking have all been used successfully.

In restricted housing and with newly admitted animals, provision of climbing perches and furnishings may be unnecessary as falls or weakness may cause further injury to the animal. However, if the individual appears fit enough to utilize it and normally requires a specific substrate or perch type to be able to assume a normal resting posture, this should be provided (taking care to ensure the risk of complications is kept to a minimum).

Examples include a single vertical post for Lorises to which they cling firmly whilst sleeping at ground level, and a textured wall or ceiling lining for bats even in short term accommodation, to allow them to suspend themselves in a normal resting position.

Confinement to these small quarters should last only until a veterinary inspection confirms that the animal is able to traverse a larger, less restrictive environment without risk to itself,

Fig. 22. A loris will feel more secure provided with a single gripping post in this otherwise barren holding box

Fig. 23. Addition of toweling to the wall of the same box design allows this fruit bat to rest comfortably and naturally

or until such time that emergency treatment is complete, and the above condition can be fulfilled.

This “settling and inspection” period should in general be no more than the first few days provided the animal has no major veterinary concerns.

Water Provision

In all forms of mammal housing, water should be provided in a place which is accessible to the animal and cannot or is unlikely to be overturned or inadvertently drained. At some early stages of rehabilitation, water supply may need to be restricted in volume and presentation so that it is only adequate for consumption, not submersion or bathing. Water may be excluded only upon veterinary advice or if there is a significant risk of drowning; water bodies large enough to allow submersion (for water loving species) should only be provided after veterinary consultation.

Fig. 24. Heavy water dish and built-in feeding and bathing pools

Long Term Housing

Dimensions and Composition

In an ideal situation accommodation should increase in size and complexity as the rehabilitation process progresses, perhaps in a three-step process (too many housing changes will be stressful). Each stage should work towards a situation that will force the animal to replicate skills required in the wild. By doing this the animal can develop fitness and behaviours which are compatible with survival in the wild, and it also gives the caregiver the opportunity to assess the animal's suitability for release.

Facilities provided immediately after the initial settling in period should generally aim to be at least as long and wide as 5 - 6 times the animal's maximum length (head to tail tip) and 5-6 times the animal's height, however this is a rough guide only. For any longer-term recovery or captivity periods, if the animal is capable of safely utilising a larger, more complex environment then that should be provided. Many species may require fairly expensive enclosures (as compared to their size) depending upon their natural behaviour. Wild behaviour and habitat choice will also dictate an enclosure's physical composition.

Animals which spend 90% of their time submerged in water in the wild, should be provided with an enclosure that reflects this by providing a higher proportion of water (of the correct depth) than land.

Highly arboreal species should be provided with enclosures that provide exactly that - high roofs with ample climbing branches and perches. Ground space with little height will not suit an arboreal species, neither would little water depth suit an aquatic species. The proportions of each feature are dictated by the wild behaviour of the animal.

Fig. 25. A log pile provides good temporary habitat for some ground mammals, while a mix of travelling branches is good for climbing species

Regarding height however, it is worth remembering that an animal that can climb out of the handler's reach is difficult to capture, therefore for animals requiring regular treatment or

handling, the height of the enclosure needs careful consideration. Only once an animal is stable and off routine treatment of any kind is it wise to allow access to an enclosure in which the ceiling height is outside arm's reach.

Furnishing

The enclosure should be furnished in such a manner as to enable the animal to behave much as it would in the wild. The best enclosures are divided into two areas so that during cleaning the animal can be secured in one area whilst the other area is cleaned. A large lockable hide box or den will be suitable for some species, but larger species may need a separate room or enclosure. Many mammals and their keepers will be under less stress or danger in a zero-contact situation in which opening and closing of all doors or dens can be done from outside the enclosure providing safe access to clean the empty section.

Fig. 26. Box opened before staff member leaves the enclosure

Fig. 27. Deep leaf litter corner provided for enrichment

Fig. 28. High branching for an arboreal primate - space below to allow swifter movements

Fig. 29. Suspended mobile branching of different diameters

All mammals should be provided with some form of retreat from human view. This is often in the form of a hide box or den area, which should be appropriately sized as per the description given in the “initial housing” section. It may not require as frequent cleaning as many species will choose not to defecate or urinate in a den once it is adopted. It is important to provide sufficient hide spaces in suitable locations in which the occupants can feel safe. Some species are happy to share an enclosure but not a den so adequate provision

Fig. 30. Hollow wood / bamboo can be used as hide and sleeping areas for arboreal species

Fig. 31. Hanging hide design which can be dismantled and cleaned

and choice for all the animals should be made. Some species will require box-like hides at ground level whilst others will prefer high platforms; again, the animal’s wild behaviour must be considered.

When furnishing an enclosure there must be a balance between suitability for the animal and ease of cleaning and disinfection. The three-dimensional nature of an animal enclosure should not be overlooked: the full volume should be utilised with the provision of perches,

Fig. 32. Animals can be secured in a hide box during cleaning, this protects the animal and staff working in the enclosure

shelves, hides and swings where appropriate. An empty 5 m x 5 m x 5 m smooth walled cage provides only 25m² of floor space for the animal to utilise, whereas adding different levels and branches can provide much more usable space and keep the animal more enriched.

Often mammals will require zero contact rehabilitation and husbandry in which, as mentioned above, all doors and den entrances can be opened or closed from outside the enclosure, providing a safe work environment for the staff. A double door system is advised for all animal holding facilities to provide protection from accidental release, but also on occasion to provide a safe retreat for staff attempting capture or enclosure management whilst an animal is in residence.

Fig. 33. Sliding door safety design controlled outside the cage

Fig. 34. Double door safety airlock

Enrichment

This is a vast and varied subject, the details of which are well beyond the scope of this document, however knowledge of the basic concepts is essential for successful housing of any species of mammal, whether discussing long-term captivity or a rehabilitation process. Animal enrichment encompasses any activity, item, or stimulus, which, without significant levels of stress, can be provided to introduce interest and activity in an animal's daily existence. Enrichment can be in the simplest of forms, for example visual cues, scents, textures and tastes, or involve more complex toys and tools designed to keep animals busy.

During the rehabilitation period, it is probably advisable to stick to the more natural forms of enrichment available in order to prevent desensitising, which could lead to too much acceptance of man-made objects. Examples include providing a mixture of fresh substrates and items taken from the natural wild habitat, such as leaf piles, soil, sand, branches,

flowers etc. As an animal travels around its action-packed environment, it will encounter multiple different sensory inputs normally encountered in the wild, helping to keep it mentally prepared for wild experiences upon release and minimising the number of alien and unnatural scents.

Other enrichment items can include, but are not limited to, naturally moving perches for climbing species, simulated flowing water, access to natural weather conditions, and live insect prey items or scattered small food items to stimulate hunting and foraging behaviours. Chapter Nine describes in more detail enrichment methods and ideas.

Substrates

If the aim of the rehabilitation is to return an animal to the wild, providing loose or unsealed substrates can pose a difficulty. An unsettled unclean surface can harbour parasites, bacteria and viruses, and enable infection and self-reinfection. However, if an animal is to be returned to the wild it must be able to behave in a natural manner and demonstrate wild abilities. This may often mean the ability to dig for food, dust bathe, burrow, etc. A careful balance should be found in which adequate access to natural substrates and substances is available, but in a manner in which faecal contamination and soiling can be controlled.

For some species, providing just patches of soft substrate or containers that can be removed and replaced may be adequate. Most mammal enclosures however will require a hard, sealed floor such as concrete, which allows easy cleaning and disinfection.

Fig. 35. A soil filled digging box

Fig. 36. Combination of concrete and wood chip

Temperament of the Mammal

When dealing with nervous individuals care should be taken to screen enclosures from view. Small viewing holes can be used, with care, to check on the animal without disturbing it. Actions should be slow, deliberate and quiet around these animals. Disturbance should be

kept to a minimum. This can make the difference between a wild animal feeding or not feeding. In some cases, nervous species may need a fast-track release schedule in order to prevent cage related injuries.

Mammal Restraint, Handling and Transport

As a rule, physical restraint and handling should be kept to a minimum to reduce injury risk and stress for both handlers and animals. Often with patience and planning an animal can be encouraged to enter a closable sleeping or transport box without the need for physical capture, however physical capture will become necessary on occasion. Because of the diverse nature of mammals, definitive guidelines are hard to provide. Methods suitable for mammal restraint range from direct manual restraint with suitable gloves, to chemical immobilisation by a veterinarian for large aggressive species. All mammal restraint should be carried out considering handler safety first and foremost and optimal animal comfort second.

Fig. 37. Some examples of suitable animal restraint equipment

Fig. 38. An assortment of crates and temporary holding boxes is indispensable when animals need to be moved from one area to another safely

A rough guide to suitable restraint methods for a variety of size classes of primarily Asian mammals is given below but as always knowledge of the species and thus the threat it presents is essential:

Small Mammals

0-3 kg e.g. Squirrels, Bats, Rats, Mustelids, the smallest Old and New World primates (Lorises, Marmosets)

Soft nets, leather gloves (varying length and thickness), cloth bags (strong pillowcases), plastic or wooden holding boxes. A secure neck grip with gloved hands is often enough to safely handle this size group.

Medium Mammals

3-15 kg e.g. Small Felids and Viverrids (Leopard Cats, Civets and similar), and medium sized primates.

Strong and deep nets, deep enough to roll closed and secure the animal, thick gloves, tough hessian or canvas sacking, wooden/metal transport boxes, snare poles, cat tongs, crush cages. Neck grip used in some species in conjunction with other methods. However, primates in this class will need a special two-handed shoulder grip to be safe. May require veterinary assistance and chemical immobilisation.

Fig. 39. Nocturnal Small Indian Civet (*Viverricula indica*) after arrival at the rescue centre is provided a quiet dark enclosure to settle in before full health check is undertaken

Large Mammals
15-100 kg e.g. Wild Boar, Barking Deer, large Primates, medium Felids and Ursids.

Secure wooden or metal boxes and crush cages combined with animal runs to guide the animal inside, followed by sedation. No human contact during restraint is advised; seek veterinary assistance for chemical immobilisation. Seek expert advice.

Mega Mammals
120 kg upward – e.g. Large Felids, Large Bears, Large Ungulates, Elephants etc. Seek expert advice.

Fig. 40. Rescue of mega mammals e.g. Asian Elephants (*Elephas maximus*) requires trained personnel and specialised equipment. Photo by Tan Kit Sun

Hand-Rearing Orphaned Mammals

Introduction

Hand-rearing orphaned mammals requires a lot of time commitment and careful rehabilitation work to provide a chance of future wild release. This can be very challenging. In many cases it is not clear if the infant animals were abandoned by the parents or if they were "rescued" unnecessarily. If the infant can be returned to its parents safely, this would allow it to have the greatest chance of survival. However, if this is not possible, the infant will need hand-rearing until capable of self-feeding. The time commitment, patience, and resources involved as well as the chance for successful wild release (or long-term positive outcome) should be considered at the beginning of the rehabilitation process to prevent unnecessary suffering and compromised welfare (for example, if animals are released but unable to adapt to the wild conditions).

This section aims to provide a general guideline for hand-rearing orphaned native animals in Hong Kong with the intention of wild release. It is prepared with reference to previous experiences regarding the hand-rearing of orphaned animals and the skills and practices recommended. There is however no single right way to hand-rear infant animals and adjustments may be required based on the individual's condition and needs.

Initial Care and Stabilisation

There are 5 major requirements to consider in relation to orphaned infant animal care:

1. Body temperature – keeping animals warm
2. Rehydration – making sure they have appropriate fluid levels
3. Feeding – providing animals with adequate and correct diet
4. Excretion and hygiene - keeping animals clean and dealing with urine and faeces
5. Prevention of habituation – not allowing the infant to get used to the carer and lose its wariness of humans

Fig. 41. Asian Leopard Cat (*Prionailurus bengalensis*) kitten under rehabilitation

Body Temperature

Infant mammals are very susceptible to hypothermia. The normal body temperature for most neonatal mammals is 100-103°F (37.8-39.4°C). The quickest way to warm up the cold baby is to use a hot water bottle, heating pad or “hot hands” (warm water in a latex glove). The recommended ambient temperature of the enclosure depends on the age of the infant animal; recommended temperatures are listed in the table below (“Reference ambient temperature for infant animals”; Watt, 1987), followed by a photographic reference guide for age determination. The enclosure should have a temperature gradient with a cool spot and a warm spot to allow the animal to move around as desired to maintain its own thermal comfort. Adjustments should be made depending on the condition of the animal and the species.

Fig. 42. Warm up infant with the use of (a) warm latex glove, (b) a hot water bottle or (c) a heating pad

Care must be taken to **make sure not to overheat the animal**. Be aware that warming devices can cause thermal burns; they should be wrapped in e.g. a towel before use, and carers should check with their own hands that prolonged contact is not uncomfortable. Also be aware that warming the animal may aggravate dehydration; address dehydration concurrently (see Table 15 below).

Reference Ambient Temperature for Infant Animals (Watt, 1987)	
Physical characteristics	**Ambient temperature of enclosure (°C)**
Hairless neonate	32- 35
Haired neonate but eyes closed	32
Haired baby with eyes open	30
Weaning	25

Table 15. Enclosure temperature references

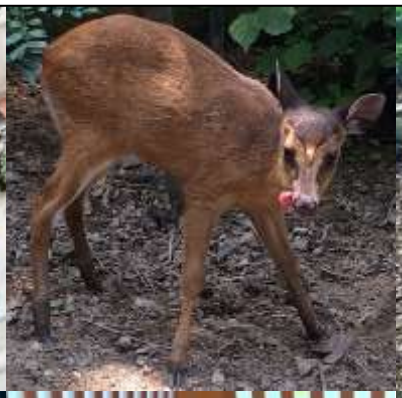
Newly Born	Un-weaned	Weaned
Artiodactyls		
		
		
Rodents		
		

Table 16.

Newly Born	Un-weaned	Weaned
Carnivores		

Table 17.

Rehydration

Dehydration is common in newly rescued infant mammals. This condition can be confirmed by the skin tenting test: pinch the dorsal skin into a 'tent' and then release it; if the skin is slow to lose its 'tent' shape, the animal is likely to be dehydrated. Subcutaneous fluids such as Lactated Ringer's Solution (LRS) are the preferred and most efficient method of rehydration. Usually, about 6.5% bodyweight in subcutaneous fluids (LRS or similar) should be warmed and administered. For more details regarding the rehydration plan, see the Fluid Therapy section of Chapter Eight. Different species may have different fluid requirements; some species (e.g. bats) become dehydrated quickly and may need more frequent fluid replenishment.

Feeding

As a general rule of thumb, three major areas should be paid special attention before feeding the infant. The animal must be (i) warmed and (ii) well hydrated before feeding, as hypothermia and dehydration weaken the animal and hinder digestion. Finally, (iii) check the state of the abdomen to see if the animal has defecated normally before feeding.

Milk Replacers

Three major milk replacers have been used for infant rearing by the WARC team and are listed in the table below. Feeding recommendations are based on WARC's previous experience and the nutritional composition of the product (see Table 18).

Recommended Milk Replacers for Mammals in Hong Kong			
Order and Species	**Milk Replacer**		
	Animalac	**KMR kitten**	**Organic Echo: Pure Goat Milk**
Artiodactyla: Barking deer, Wild boar			√
Chiroptera: Bats (Frugivorous and Insectivorous)	√	√	
Carnivora: Leopard cat, Masked palm civet	√	√	
Pholidota: Pangolin		√	
Rodentia: Squirrel	√		
Rodentia: Porcupine	√		√

Table 18. Mammal milk replacers

Milk replacer	Guaranteed Analysis	Calorie content
Troy Animalac	Protein ……..29.7% Fats…….. 10.7% Carbohydrates ……49.2% Fibre……..not provided Essential vitamins, minerals, amino acids	Approx. 420 kcal/kg
KMR	Crude Protein, min…… 42.0% Crude Fat, min…… 25.0% Carbohydrates……not provided Crude Fibre, max …….. 0.0% Moisture, max……..5.0%	Approx. 740 kcal/kg
Organic Echo: Pure Goat milk	Protein ……..25.2% Fats…….. 31.2% Carbohydrates ……35.6% Crude Fibre, max …….. 0.0% Essential vitamins, minerals, amino acids	Approx. 520 kcal/kg

Table 19. Milk replacer nutrient analysis

When milk formula is introduced, it takes time for the gut flora to develop and get used to it. Checking the faeces is important to know what stage the animal is at, with formed faeces being ideal and indicating that the animal is adapting to the milk well. However, as long as the animal remains hydrated and warmed and shows stable weight gain, formed faeces are not critical.

Feeding volume and overfeeding

One must be careful to avoid overfeeding even if the animal continues to call for food. It is important to check the volume fed and the size of the abdomen; a bloated abdomen would normally suggest that the animal has reached its intake capacity. Recommended feeding volume and frequency for each species can be found in Table 20. Fig 43-46 shows the feeding paraphernalia, feeding process, faeces assessment and infant belly.

Recommended Milk Replacer Meal Volume and Feeding Frequency for Various Mammalian Species in Hong Kong					
Weight	**Age Group**	**1st day of admission**		**2nd day of admission/ Fully hydrated**	
		Volume/ meal	**Frequency**	**Volume/ meal**	**Frequency**
a) *Callosciurus erythraeuus* (Belly-banded Squirrel)					
<25g	New-born infant	0.2 – 0.5cc	6 – 8 X/day	0.2 – 0.5cc	6 – 8 X/day
25 – 40g	Unweaned	0.5 – 1cc	4 – 5 X/day	0.5 – 1.5cc	4 – 5 X/day
40 – 50g	Unweaned	1 – 1.5cc	4 – 5 X/day	1.5 – 3cc	3 – 4 X/day
>50g	Weanling	Should be taking solids at this age, introduce with baby cereal			
b) *Paguma larvata* (Masked Palm Civet)					
<180g	New-born infant	3 – 5% body weight	6 – 8 X/day	6 – 8% body weight	6 – 8 X/day
180 – 280g	Unweaned	5% body weight	4 – 6 X/day	6 – 10% Body weight	4 – 6 X/day
280 – 400g	Unweaned	5% body weight	3 – 4 X/day	8 – 10% Body weight	3 – 4 X/day
>400g	Weanling	Should be taking solids at this age, introduce with baby cereal and chopped fruit			
c) *Prionailurus bengalensis* (Leopard cat)					
<180g	Infant	3 – 4% body weight	6 – 8 X/day	5 – 6% body weight	5 – 6 X/day
180 – 400g	Unweaned	5% body weight	4 – 6 X/day	6 – 10% Body weight	4 X/day
>400g	Weanling	Should be taking solids at this age, introduce with Hill's a/d/ canned cat food			
d) *Muntiacus vaginalis* (Barking deer)					
<1.5kg	Day old infant	5% body weight	6 – 8 X/day	6 – 8% body weight	6 – 8 X/day
1.5 – 2kg	Unweaned	6 – 8% body weight	3 – 4 X/day	8 – 15% Body weight	3 – 4 X/day
>2kg	Weanling	Should be taking solids at this age, introduce solid food in milk			

Table 20. Milk replacer feeding volumes and frequency

Fig. 43. Various feeding paraphernalia for orphaned mammals, including (a) feeding syringes with rubber tips (b) feeding tubes and (c) milk bottles.

Suckling behaviour

Young infant mammals need to have some form of 'maternal' companionship and may try to suckle and cuddle. They may sometimes suck on their own body parts and those of enclosure mates in the absence of the mother. Be careful to watch for any such behaviour and check for any swelling or redness on infants. If multiple infants are housed together and sucking lesions are seen, the individuals may need to be separated to prevent injury.

Fig. 44. (a) Feeding infant Masked Palm Civet (*Paguma larvata*) with milk bottle; (b) Use of warm, moist cotton ball to gently wipe and clean the anal region and stimulate defecation and urination. This should be done at each feed

Fig. 45. Photo of infant squirrel showing the condition of the abdomen: (a) empty belly and (b) full belly (reaching intake capacity)

Keeping animals clean and helping to stimulate urine and faecal production

Mammalian parents groom their infants and stimulate defecation and urination. It is essential to clean the animals and simulate such actions. Check the state of the faeces; if the animal has diarrhoea, this may require medical attention.

Fig. 46. Consistency of the faeces: (a) diarrhoea, (b) slightly formed faeces, and (c) formed, more solid faeces

Prevention of habituation

Maternal care for mammals is generally extensive, and infant mammals often require companionship and cuddling with the mother and siblings. However, it is important to note that they will learn quickly, and are highly prone to habituation and imprinting. Therefore, except for essential contact and interaction (health checks and feeding), keep the animal

Fig. 47. Use of hanging bottles to offer food to un-weaned mammals helps to reduce visual association between food and caregiver

Fig. 48 Use of stuffed toys as companions for singly raised orphans

Fig. 49. Feeding syringe with teat inserted through teddy bear to reduce human association

away from human activity and DO NOT TREAT IT LIKE A PET. Try to reduce the visual association of food and caregiver when possible. A stuffed toy can be used as a "companion" (Figure 49) to give some comfort to the infant if it is being raised without companion animals.

Weaning

In the wild, juvenile mammals usually start to forage with their mothers before they are weaned and gradually begin to feed on solid food. In captivity, solid food can be introduced in the diet before the teeth have started to erupt. Depending on the species, dried feed pellets can be soaked or moistened with the milk formula to encourage weaning. The volume of milk replacer can be reduced gradually to transition from milk to a full solid diet.

Fig. 50. Rescued Wild Boar (*Sus scrofa*) piglets provided milk formula from a heavy dish

CHAPTER FOUR

GUIDELINES FOR BIRDS

Identification

The most important first step in bird rehabilitation is identifying the bird species. Even if you cannot identify the exact species or sub-species, you should at least determine the bird type. Helpful resources include reference books, the Internet, and local bird experts and bird watching groups. Establishing the identity of your bird will help you to work out what it needs in terms of correct handling procedures, housing, feeding and eventually release habitat, should it be successfully rehabilitated.

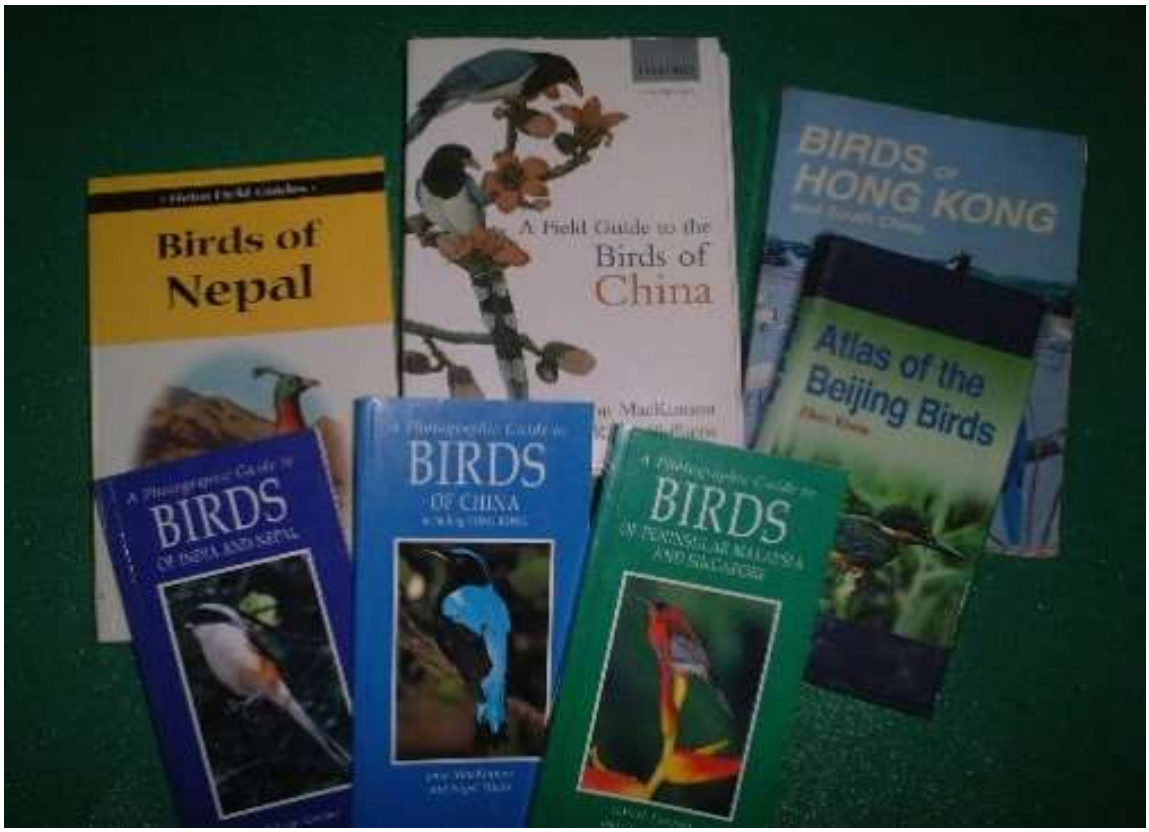


Fig. 51. An assortment of references and guide books is essential

Even without good reference materials, simple observations of the size and shape of the bird's bill and feet can aid in identifying the bird type in hand.

Bill Types

	**Wide rounded bill** for dabbling in water and tearing vegetation – Water birds such as Ducks, Geese and Swans
	**Sharp curved beak** for tearing meat - Raptors such as Eagles, Hawks and Owls
	**Small sharp pointed beak** for catching insects and piercing the skin of fruit – Songbirds such as Thrushes, Bulbuls
	**Strong sharp triangular beak** for cracking seeds and nipping off buds - Finches such as Sparrows and Munias
	**Strong curved beak** for cracking nuts and seeds – Parrots such as Cockatoos and Macaws
	**Long, pointed bill** for spearing fish - Herons, Egrets, Bitterns, Kingfishers
	**Long, slender, round-tipped bill** for probing soil in search of small crustaceans and insects - Waders, Woodcocks and Snipes

Table 20.

Feet Types

	**WATER BIRDS such as ducks and geese** have webbing between their toes for swimming. GULLS also have feet with webbing so they do not sink while walking in soft sand or mud near the water's edge
	**WADING BIRDS such as herons, egrets and waterhens** have long toes which spread the bird's weight over a large surface area, facilitating walking on soft surfaces near the water's edge (where wading birds like to eat)
	**RAPTORS such as eagles, hawks and owls** have large claws (called talons) to capture, kill, and carry prey with their feet
	**PASSERINES or SONGBIRDS such as doves, bulbuls, warblers, thrushes, etc.** have independent, flexible toes, ideal for grasping perches
	**WILD POULTRY such as Pheasants, Partridge and Quail** use their strong feet to scratch the dirt and leaf litter to uncover seeds and insects

Table 21.

Safety, Capture and Restraint

When capturing or restraining a bird, care should be taken to minimise potential harm to both the bird and the handler. Most birds can be caught by use of a net attached to a telescopic or fixed pole. The net should have a large opening, sufficient to surround the entire bird, with enough depth to contain the bird without further escape once caught. The mesh size should be smaller than the bird's head size to prevent the bird from attempting to push its way out or become tangled. Soft, non-knotted mesh is more suitable for smaller birds, as knotted mesh can be quite abrasive. Once removed from the net, the feet and wings should be held securely.

Fig. 52. Soft, non-knotted mesh in hand-net

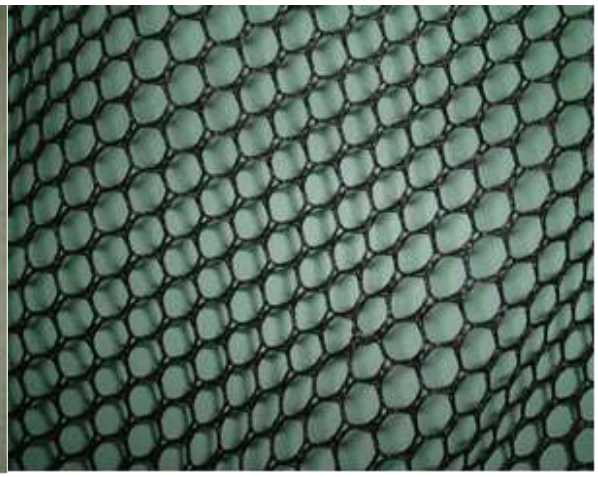


Fig. 53. Close up of soft, non-knotted mesh

Some larger species such as Egrets, Waterfowl, and Peafowl can be caught by hand. Once caught, the upper part of the bird's back and wings should be secured, bringing the bird's back close to your body so that you can use your stomach, chest and forearms for support and wing restraint, freeing up your hands to control the feet and head if necessary.

Safety

Safety equipment such as protective goggles and gloves should be worn while handling dangerous birds, especially Raptors, which have long powerful talons, and Egrets, Herons

Protective Eye Goggles

Full Face Visor

Leather Gauntlet Gloves

Fig. 54. Safety equipment for bird handling

and Bitterns, which often strike fast using their long sharp beaks. Towels can also be used as a means of restraint to wrap around the bird, preventing it from flapping its wings. If working at height (to access nests etc.) safety harnesses should be worn.

Restraint and stress

Birds are highly susceptible to stress, therefore handling and restraint time should be kept to a minimum. Care should be taken not to squeeze or hold the chest area too tightly, as this will prevent the bird from breathing (unlike mammals, birds do not have a diaphragm, instead relying on movements of the chest wall to shift air in and out).

Handling and feather damage

When handling birds it is important to take great care not to damage or accidentally remove any feathers. A bird relies on its feathers to fly, maintain body heat and provide waterproofing as discussed below. The loss of feathers during capture or handling can sometimes be unavoidable, especially when dealing with species such as Doves that have very loose feathering designed to aid escape if caught by a predator. Therefore it is best to reduce feather damage by using good handling techniques as well as minimising handling as much as possible.

Handling aggressive birds

Generally, birds are non-aggressive, however all have the ability to become aggressive when feeling threatened or cornered. Most small birds are not considered dangerous but can still give a considerable bite from the beak. Lightweight cotton gloves can be worn to prevent this.

The following species require special attention when handling see Table 22

	**Birds of Prey:** Typically face towards you when cornered and will strike out with their feet and talons. Leather gloves or gauntlets, should be worn at all times, and the bird held as illustrated in the photograph.
	**Parrots:** Thick cotton towels or leather gloves should be used to secure a parrot's head when handling to prevent bites. Parrots turn their head quickly and have extremely powerful bills. Once the
	**Long Billed Birds - Herons and Egrets:** Goggles or face shields must be worn to protect your face and eyes when handling species such as Egrets, Herons and Bitterns. They typically turn to face you when
	**Shrikes, Koels, and Coucals**: Although not dangerous, these birds can give a powerful twisting motion bite. Wearing thick cotton or thin leather gloves is recommended, or capture using a thin towel to secure the head and wings.

Table 22.

Transportation

If a bird requires transportation after capture, it should be transferred into a holding or transportation box.

Fig. 55. Note the ample ventilation holes. It is an IATA requirement that 25% of the vertical surfaces of carrying boxes/crates should be ventilated

Box Requirements

The box should be solid and sturdy so that it does not collapse or become weakened in any way during transportation or housing of the animal. The box should be constructed of a washable material so that it can be disinfected between uses. Solid walls (with rows of ventilation holes) made from wood are preferable; birds easily damage feathers on wire mesh. Upward sliding doors are easier to use, allowing the handler to open the door as much or as little as necessary in order to place or remove a bird, thus reducing its 'window' of escape.

The box should be fitted with an appropriate number of handles required for people to carry the weight of the box plus the animal inside. The inside of the box should be lined with a substrate such as Astroturf, a towel or newspaper. This will help absorb any fluids such as faeces or spilt drinking water, and more importantly provide the bird with something to grip, to prevent sliding during transportation. A floor substrate is often preferable over a fixed perch if the transportation time is short. Food and water need not be provided in the transportation box unless the bird is required to travel for several hours. Transportation time should be kept to a minimum to prevent stress.

Nervous birds or birds that may cause damage to themselves or their feathers during transportation may be placed in an appropriately sized, soft walled pet carrier, but care must be taken to prevent crushing of or damage to the carrier if being transported in a vehicle.

Stress Behaviour in Birds

Issues associated with stress are usually more apparent in captive birds e.g. poor health and feather condition, feather plucking, screaming, lethargy.

Stress in wild birds is usually associated with capture and captivity. Examples of stress behaviours are:

- Lying down once captured - Kites
- Rolling head from side to side – Kingfishers
- Rolling on to tail and back threatening to attack with feet – Birds of Prey
- Tucking head under wing as if sleeping – Egrets and Herons

Stress Reduction Measures

- Capture bird as quickly as possible, keeping staff safety a priority, and transfer to transportation / holding box.
- Box should be reasonably dark inside.
- Keep in quiet location.
- Transfer to final destination as soon as possible to prevent being held in box too long or travelling multiple trips.

Housing

Before transferring a bird into a cage or aviary, a quick assessment should be conducted to determine the most suitable type of housing required.

Bird assessment considerations include:

1) Fitness 2) Temperament 3) Space Requirements 4) Other/Special Requirements.

Sick or Temporarily Disabled Birds

Fig. 56. Birds displaying signs of sickness, disease or heavy internal/external parasitic loads should be housed in a hospital ward or intensive care and isolated from other birds to prevent spread of disease

Fig. 57. Birds with head, limb, eye or other injuries must be kept in an enclosure which restricts movement that may cause additional damage. Usually small, enclosed spaces with subdued lighting that deter flight are preferable

Fig. 58. Eurasian Wigeon (*Mareca penelope)* recovering from botulism in a quiet holding room with appropriate floor bedding

Nervous Birds

Nervous birds may require the cage to be screened off or a simple nest box or additional leafy branches placed inside, to provide somewhere to hide thus making them feel more at ease. For such cases the cage or enclosure should be located in a quiet area and disturbance kept to a minimum to reduce stress.

Contaminated Birds

Birds that have arrived covered in foreign substances such as oils and glues will need to be housed in a quiet warm environment such as the hospital ward or an intensive care unit until the bird's condition is deemed stable and the contamination is able to be removed.

Birds with Minor or No Injuries

Healthier birds should be provided with ample space, allowing and encouraging free movement, wing stretching and short flights, to keep flight muscles exercised prior to release.

Fig. 59. Exercise enclosure for rehabilitating birds

Perches, Ponds and Floor Substrates

Perches

The bird type determines the internal features necessary in the enclosure. Almost all bird species require something to perch on. Natural branches of varying diameters are preferable; the size of the bird's feet may dictate requirements. The branches should be placed in such a way that when perching on one, no other branches interfere with the bird's body. Interference could cause feather damage to the tail and wings, which could lead to a delay in the bird's release. It is important to remember that most birds will instinctively choose to perch on high branches, away from the threat of potential predators, therefore some branches should be placed as high in the cage as possible, but at a manageable level, so that the bird can be caught if necessary. This can also help to reduce stress.


Fig. 60. Enclosure perch type and placement

Ponds

Built in or temporary ponds are essential when rehabilitating wading or water birds. Plastic tubs, children's paddling pools and empty plastic sandpits can be used as removable or temporary pools. Ponds serve a variety of purposes. They can be used as a source of exercise, e.g. swimming for water birds, helping to keep muscles fit and active, and as a place of refuge when the bird feels stressed.

Water birds also require ample, prolonged access to clean water for daily washing and preening to maintain feather coat quality and waterproofing; without it, they quickly lose

Fig. 61. Spoonbill will both feed and drink from the pond, therefore it is essential that the water is changed daily

their waterproofing. Waterproofing is essential, not only for maintaining body temperature but also for buoyancy, and birds that have lost it succumb easily to cold weather and can even drown.

Shallow ponds are useful as feeding areas for wading birds in particular. Both live and/or dead food can be presented, encouraging natural feeding behaviour.

If using a pond for swimming, ensure it is full to the brim to enable birds to get out of the water easily. The pond floor surface should be textured to prevent the bird from slipping. If smooth plastic ponds or dishes are used it is helpful to cover the floor of the container with a textured, washable substrate such as Astroturf.

Fig. 62. Different food types and feeding methods made available for different species

Substrates

Floor substrates can be very diverse, and each is used for different reasons to facilitate the rehabilitation process. This is a short list of just some of their uses:

- To provide somewhere to hide e.g. branches, leaves.
- As a feeding source to encourage natural foraging – food placed amongst leaves or woodchip.
- As a textured surface to help prevent foot problems such as bumblefoot from developing – smooth stones, bumpy rubber or plastic human foot massage mats.
- As a barrier to potentially cold surfaces (concrete floor) – Astroturf, branches, leaves, woodchip.

Feeding

It is important to consider the natural feeding habits of a bird when deciding what to feed and how to present the food in captivity. As a simple rule, food for tree dwelling birds should be placed off the ground preferably on or near high branches while ground dwelling birds should be fed on the ground. While some passerine birds are happy to feed from a simple dish, other birds have more specific needs. As mentioned above, water and wading

(fish and crustacean eating) birds prefer to eat in water and so shallow ponds may be required. Birds which probe their beak into the ground in search of food require shallow to deep, soft, soil filled trays that can be loaded with food items such as worms and insects. Others prefer to search through leaf litter or grass for insects. Trays commonly used as cat litter trays work well for this. Ways in which to present food are only as limited as your imagination.

Figure 63. illustrates the basic food items that should where possible be available in the rescue centre feed store.

Fresh vegetables: leafy greens, carrots etc.

Fresh fruit: apples, bananas, tomatoes, papaya

Grains, Cereals and Pulses: corn, barley, beans etc.

Seeds: millet, hemp, sunflower etc.

Whole Meats: chicken, quail, mice, frogs etc. (freshly dead or frozen; NB live vertebrates are humanely dispatched before being offered as food)

Whole Fish/Seafood: fish, loaches, shrimp etc. (freshly dead or frozen)

Insects: crickets, grasshoppers, mealworms etc.

Fig. 63. Different examples of feed for bird species

Commercial Diets

As discussed in Chapter One, 'homemade' natural diets are preferred from the point of view of maintaining a bird's natural feeding behaviours and are also more likely to be accepted by the bird. However, it is difficult to provide a perfectly balanced diet in captivity, and so high quality, commercially produced bird diets (e.g. complete, balanced pellets) and/or supplements can be mixed into the homemade diet to reduce the risk of deficiencies. This is particularly important for birds that need to stay in captivity for longer periods of time.

Commercially produced liquid diets are essential for birds requiring crop feeding, such as very young birds, or sick or anorexic adults. Care should be taken to choose a high quality, species-appropriate formulation – for example, we use Mazuri High Energy Hand Feeding Formula 5D1W (https://www.mazuri.com) for young omnivorous birds, and veterinary critical care formulations such as EmerAid (https://www.emeraid.com; Omnivore, Piscivore and Carnivore versions available) for sick adult birds. The manufacturer's instructions on dilution, feeding volume and feeding frequency should be closely followed. Crop feeding should only be done by properly trained staff, due to the potential for complications.

Frozen Products

When using frozen products, it is important that the food item be fully thawed before being presented for feeding. Food items should ideally be defrosted slowly (e.g. overnight) in a refrigerator; if time is limited, they can be placed in water at room temperature 1-2 hours before feeding. Bacteria will multiply if defrosted prey items sit around for too long at room temperature, therefore they should be offered to diurnal species in the morning and to nocturnal species at the end of the day.

Quarantine

Any bird of unknown origin, posing potential disease risk or having been exposed to other potentially sick birds must be placed in quarantine for a period of 1 month before being placed with or near other birds or released. During this time, close observation, disease testing, treatment, deworming and vaccination may be carried out. In contrast, birds from a known local wild source showing no evidence of significant infectious disease may be released as soon as they are fit for return to the wild.

It is important to be able to identify a suspected pet or market bird from a wild sourced bird to determine the degree of quarantine required and whether rehabilitation or rehoming into long term captive care is appropriate.

Some simple signs to look for that may indicate the bird is from a captive or market source include:

- Plumage damage or wear, especially tail and wing tips
- Facial damage/abrasion especially above cere (bill)
- Overgrowth of bill/claws
- Familiarity with captive diets
- Signs of disease or injury associated with birds living in overcrowded conditions

CHAPTER FIVE

GUIDELINES FOR BIRDS OF PREY

Restraint

When handling raptors gloves should be worn. They should give adequate protection as well as allow the handler to feel what he or she is doing. Special attention is paid to the powerful feet as well as to the sharp bill.

Fig. 64. To catch and restrain a raptor in an enclosure it is best to use a net. Towels can also be very useful for covering the raptor's head and wrapping around the body. Gaining control of the feet, as shown for this Eagle Owl, is of the highest priority. The best way to hold larger raptors for examination is to hold one leg in each gloved hand with the raptor's back against your stomach. Hold the wings in with your forearms. It is essential to minimise plumage damage at all costs. If the raptor is struggling it is often best to hold it by the legs (which are generally robust) and allow the wings to flap freely until you can regain control of the body and wings

Initial Assessment

On admission, a raptor is given an initial assessment, preferably by the Veterinarian. The bird is thoroughly checked including the eyes, mouth, wings, legs and cloaca. An Admission Form is completed to ensure a standard procedure of examination is adopted for all birds. The bird is also weighed. An early assessment of the potential for release or placement should be made and if this possibility is considered low, for example if injuries are very severe, then euthanasia should be considered (see Appendix 5 for the euthanasia protocol). The raptor's species should also be identified, although most species will respond to the same husbandry, food and treatment.

Stabilisation

Most raptors admitted will be suffering from shock and dehydration, and many are emaciated. The breast muscles and abdomen are checked to determine how thin the bird is and whether there is anything in the stomach. The first course of action is always the administering of fluids either subcutaneously or orally. If the raptor is emaciated, then

initial feeding consists of an easily digestible glucose solution to allow the digestive system to recover. This is followed by roughage-free meat of high quality such as quail breast.

Initial Feeding

Food and water should be offered in plain view of the raptor. Food offered can include whole items such as mice and quail as well as cut up pieces of meat. Chicken and beef are fine for short-term use. If the raptor is well fed when admitted it might take 3 or 4 days before it will eat, but it is checked daily to make sure it does not become too thin or weak. If it can be done without stressing the bird too much, the raptor is weighed daily at this stage. Some raptors will be less inclined to eat if in a small observation box. If a raptor will not eat after some time and is getting very thin or weak then it is necessary to force-feed. This should only be done after all attempts to encourage normal feeding have failed. One person holds the bird while another carefully opens the beak and pushes a small, moistened ball of meat down the throat of the bird. Raptors normally eat between 5% (larger birds) and 10% (smaller birds) of their body weight every day. It is important not to overfeed otherwise the bird will never be hungry enough to start self-feeding in captivity.

Initial Housing

Depending on physical condition, raptors may be initially housed in a small, well-ventilated container with solid sides such as a hospital cage or a wooden box. This is to allow observation and treatment of the bird as well as to reduce the chance of feather damage. A minimum size would be about double the height of the bird in all three dimensions. A perch of suitable height to keep the tail off the floor is positioned in the box.

Holding Enclosures

If the raptor does not need close observation or intensive treatment, then it can be transferred to a holding enclosure.

Suitable dimensions for holding enclosures (L x W x H):

For small raptors e.g. kestrel	3m x 3m x 2m
For medium sized raptors e.g. buzzard	5m x 3m x 2m
For large raptors e.g. eagle	6m x 3m x 3m

Sometimes it is necessary to keep releasable birds in captivity for some time to allow wounds to heal or feathers to moult. It is essential that these birds do not do further damage to themselves because of captivity and so their housing should be well away from disturbances. Suitable long-term housing should be as large as possible and should feature a sheltered area as well as an open area. This allows the raptor the opportunity to shelter from the elements in times of harsh weather but also allows exposure to rain and natural sunlight. Perches of suitable thickness are placed at varying heights within the enclosure to allow even a weak flying bird to reach the upper branches with the highest perch being within the sheltered area. The highest perch should be positioned at about 2/3 the height

of the cage but if the bird's flight is very poor then the top perch should be lower to avoid injuries in a fall. The enclosures should be hosed down daily and thoroughly cleaned and disinfected monthly.

Fig. 65. Holding enclosures are designed to give the raptor space for more movement as well as to maintain more hygienic conditions. The bird can perch off the ground on a stand or swing perch. Holding enclosures should be constructed with minimal wire meshing as this can cause feather damage.

Quarantine

Raptors of known wild origin from a known local area which do not have signs of infectious disease do not need to undergo quarantine. Other raptors are quarantined for 1 month before being placed with or near other birds or released. During this time, they are dewormed and (if appropriate) vaccinated.

Long-Term Diet

For long-term feeding, raptors are fed whole food such as mice, young chickens and fish. All items are provided as carcasses. A calcium and vitamin supplement should be sprinkled onto the food. Diurnal raptors are fed during the day with leftover food being removed at the end of the day. Owls, which prefer to eat at night, have their food placed at the end of the day, with uneaten food being removed in the morning.

Fig. 66. Avian quarantine facility

Assessment for Release/ Placement

Once the raptor has stabilised from any injury or surgery it may have undergone and is eating in captivity, another assessment for release/placement potential should be made. The following criteria need to be met for the bird to be placed into either of the categories:

Release Potential

- Potential for full flight ability
- Vision and hearing unimpaired
- Both feet fully functioning
- Not imprinted on humans
- Suitable release site available

Placement Potential

- Suitable placement destination available (with clear conservation and education programme)
- Capable of moving around enclosures without injuries or falls
- No chronic injuries or infections

Birds that do not fall into one of these two groups should be immediately considered for euthanasia, as there will not be a positive outcome and the bird will face future welfare concerns.

CHAPTER SIX

GUIDELINES FOR AMPHIBIANS AND REPTILES

Initial Housing

Note: due to specific quarantine concerns for amphibians, please refer to Chapter Eight (Veterinary Aspects of Wildlife Rescue) for a detailed description of amphibian quarantine enclosure and husbandry requirements.

All newly admitted herpetofauna are subject to a minimum quarantine period of either three months (animals intended to join KFBG's permanent collection, or species of high conservation value) or 1.5 months (other cases; see Chapter Eight for more information); a longer period is required if obviously diseased on arrival. Animals with severe trauma or disease should be housed in an intensive care unit; a very basic and hygienic enclosure which the vet or person in charge can have easy access to during the treatment period.

Rescue centres occasionally have to accept and maintain a large number of herpetofauna at very short notice when seizure of illegal animals has taken place. Such animals have often been kept in cramped, poor quality conditions and undergone a lot of stress; these factors increase disease risk and make the provision of a hygienic quarantine enclosure all the more important. Hygiene concerns often necessitate the use of artificial materials and tank set-ups; many herpetofauna do extremely well in artificial captive environments, as long as key environmental parameters (temperature gradient, UV exposure and humidity) are optimum for the species. The correct setting of these parameters is crucial.

All quarantine enclosures should have a **drinking source** and a **hiding place**, since most herpetofauna on arrival are dehydrated and stressed. The water container should not be too large or too deep, as otherwise a weakened animal may drown. Terrestrial reptiles should be housed in a simple, uncluttered enclosure; newspaper is a suitable substrate, being cheap, clean and absorbent. Arboreal species should be offered appropriate climbing objects, as they are typically much happier when they can rest on a high point. Freshwater aquatic species and most amphibians must have an enclosure filled with clean freshwater; the floor of the water section can be bare or have a few scattered pebbles. A dry land area must be available so that the animal can rest, bask, and have the option of being dry. Semi-aquatic species should have two hiding places, one in water and one on land. For more terrestrial amphibians such as toads (e.g. *Bufo* spp.) and some salamanders (e.g. *Tylototriton* spp.), the enclosure should consist of a shallow water dish and moist fallen leaves or sphagnum moss as the substrate. The choice of suitable hiding places for amphibians and reptiles is endless, provided that thorough disinfection and cleaning is possible or else that the hide can be regularly replaced. Examples of artificial hiding places include halved flowerpots, split-open PVC tubes and a cardboard box with entrance hole.

To prevent a nervous or aggressive specimen from injuring itself by trying to escape or striking at the enclosure when disturbed, it is a good idea to keep the rescued animal in very dim light or total darkness initially. This can be achieved by leaving the animal in a dark room or by covering the enclosure with newspaper or cloth. Most herpetofauna are much more relaxed when they are left to adapt to their new surroundings in the dark and quiet.

Food can be offered to the animal when it has settled down. It may be surprising to learn that more than 50% of rescued herpetofauna will immediately start feeding even after the stress of being captured and transported; it is especially true for most snakes and lizards. However, for reptiles that take large food items (e.g. monitor lizards and pythons), the correct ambient temperature must be provided, and there should be no contact with the animal for at least the next 24 hours, otherwise food may be regurgitated.

After quarantine, if the animal shows no sign of any illness and has begun feeding, a larger enclosure with more environmental enrichment can be considered. The rescue centre can then decide on the best future for the animal concerned (i.e. placement in a conservation breeding programme or wild release).

Temperature and Lighting

Good control of ambient temperature and lighting is a major requirement for successful reptile and amphibian husbandry. In tropical and sub-tropical countries with humidity between 70-100% for most of the year, as in Hong Kong, the humidity is usually of no

Fig. 67. Some examples of a combined UV and heat lamp set up to provide a temperature gradient. The picture on the left shows the set up for an aquatic turtle and the picture on the right shows the set up for a lizard

concern to most herpetofauna except some desert and temperate species.

It is necessary to provide a thermal gradient for herpetofauna, since this is how they survive in the wild as ectotherms. If the species concerned are native, thermal regulation can be

achieved simply by leaving the windows open where they are housed to get natural ambient temperatures. The natural fluctuation of the local weather will be sufficient for the animals to carry out their normal physiological activities. However, be aware of their normal behaviour in the wild during winter; feeding may not be necessary during most winter for some species. For exotic species, creating the appropriate temperature gradients may require more effort and equipment, and outbreaks of respiratory disease may be seen if, for example, the local winter is colder than their native climate.

For species fond of basking, such as most lizards and chelonians, it is essential to provide a basking spot with UV output in the enclosure. It is suggested that a spot lamp with suitable wattage for the size of the enclosure is employed in order to provide the thermal gradient. However, it can be impractical to house every animal in an enclosure large enough to allow the animal to perform thermal regulation along a lamp-created gradient; it may be better to place a number of enclosures in a room set to the desired ambient temperature. For species for which basking is fundamental, a spot lamp can be used for each enclosure in a rota fashion; an hour under the basking spot should be enough for most reptiles to pursue their normal activities.

For amphibians, it is not necessary to provide a basking spot as long as the ambient temperature is within the species' optimal range for body functioning. A combination of high temperature and low humidity can actually kill most amphibians very rapidly.

Light requirements differ among different groups of herpetofauna. The best way to ensure that animals receive the right amount of UV radiation is to allow the animals free access to

Fig. 68. A UV heat bulb provides both UVA and UVB and heat for the basking reptile

natural sunlight, provided that the air temperature is within the species' preferred range. It is especially important to have plenty of ultraviolet radiation for the physiological as well as psychological needs of chelonians, lizards, and some diurnal snakes (e.g. Elaphe spp.). If direct sunlight is not available, because of air temperature in winter or inadequate facilities,

it is essential to provide UVA and UVB radiation in the form of commercially available electrical fluorescent tubes or bulbs. These must be regularly replaced.

Furnishing

While most herpetofauna do well in an artificial set up with virtually no natural objects, it is beneficial to carry out certain environmental enrichment techniques. Most herpetofauna will benefit from putting sterile branches and rocks in the enclosure, since this will greatly increase the surface area the animal can utilise. The time and energy an animal spends investigating and climbing these objects may prove valuable to its health and well-being in long-term captivity. For enclosures with newspaper as a substrate, climbing apparatus are particularly useful, as reptiles may find the smooth surface of newspaper difficult to get traction on.

If other substrate is preferred over newspaper, make sure the particle size is not so small that the animal may accidentally ingest mouthfuls when feeding. It is common to find intestines fully packed with soil or other small objects (.e.g. peat moss or fine sand) in post-mortems of herpetofauna.

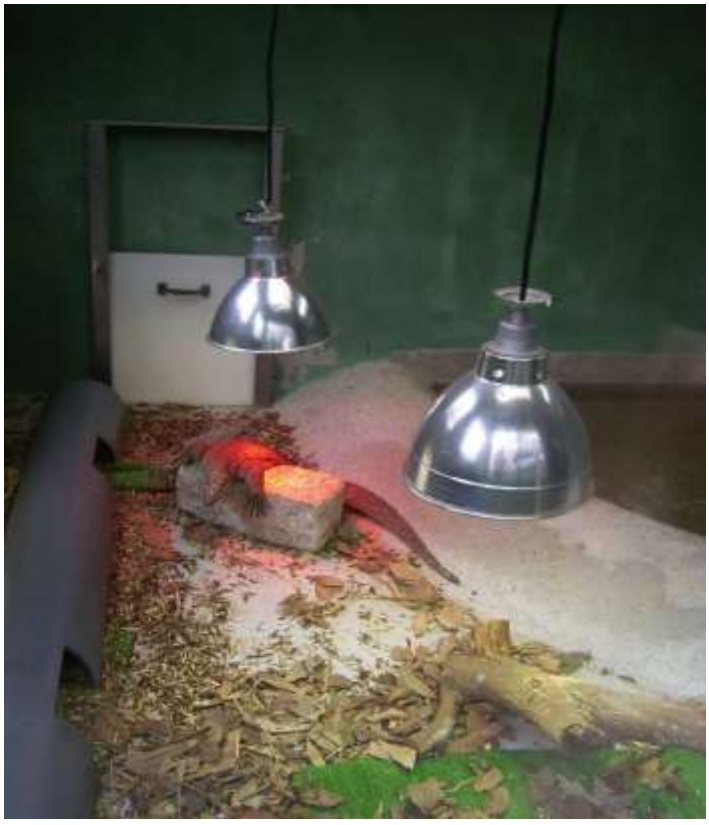


Fig. 69. Note the use of a cinder block, heat and UV lamps, a thick branch, dried leaves and Astroturf for furnishing

The water section can be extended and improved with aquatic plants and emerging boulders if the species is a good swimmer (e.g. most amphibians and aquatic reptiles). Aquatic and semi-aquatic turtles and lizards enjoy the cooling effect and security of a muddy pool, although one must be careful about the source of mud. Commercially available 'pond-mud' is a good choice.

Many semi-aquatic lizards (e.g. *Physignathus* spp.) and snakes (e.g. *Sinonatrix* spp.) will rest on overhanging branches above their water pool, if available. Live plants can be placed in enclosures, especially for amphibians and smaller reptiles, as they provide more moisture and hiding places as well as a climbing structure. Tree frogs (e.g. *Hyla* spp.) and iguanas (e.g. *Iguana iguana*), for example, will prefer to rest on green leafy plants rather than bare dead branches. Methods of improving captive conditions depend heavily on the species' requirements and the materials available to the rescue centre. Some

plastic imitation plants may be suitable additions to an enclosure and mixing live and artificial features is also possible.

Feeding

Non-living food is recommended by many authors for feeding all captive herpetofauna, with ethical considerations and the advantages of good hygiene and little risk of prey injuring the animal being fed. However, there are some individuals and groups that will only take live food. Most amphibians, especially anurans, and some carnivorous lizards will only voluntarily eat live and moving prey items. Dead food is only taken when the feeder manually simulates the movements of the prey. This may be acceptable to private collectors or organisations with few specimens but is not very practical where large collections of animals have to be cared for on a daily basis. Snakes and turtles, by contrast, present little problem when feeding with pre-killed food, with the exception of fish-eating and amphibian-eating snake species. It is known that sometimes reptiles (e.g. Boids, Varanids and some Chelonians) fast for a period without any apparent damage to their health; this may be related to natural seasonal patterns (e.g. breeding season) or dormancy periods. However, if a specimen has been offered pre-killed prey, and it refuses to feed for a prolonged period, it may be worth trying to offer live prey. Some individuals will only take live prey for a period, and switch to accepting dead food later.

Offer as wide a range of food items as possible to try to ensure a well-balanced diet. If the prey choice is restricted to a limited range, the food should be sprinkled with a high quality

Fig. 70. Seized Angonoka or Ploughshare Tortoises (*Astrochelys yniphora*) on temporary captive holding. This Madagascan species is believed to be the rarest tortoise in the world

commercial calcium (+/- vitamin) supplement. Insects should be gut-loaded. Commercially prepared processed foods are available for many species (or types of species) nowadays; however, much is still unknown about the exact nutritional requirements of most species, particularly those less commonly kept in captivity, and so even commercial preparations may not be suitable as a sole food source.

Health Care

Herpetofauna have a tendency to show little indication of disease until the disease is relatively advanced. The rehabilitator should keep a close eye on all specimens and monitor for subtle changes. The first indications of a sick animal are lethargy, reduced appetite, and/or spending prolonged periods under or on a heat source. Seek advice from a veterinarian experienced with herpetofauna if these or other signs are noted.

Options for Recovered Herpetofauna

There are generally three options for rescued herpetofauna: (1) lifelong captivity (for education or conservation breeding), (2) wild release, or (3) euthanasia. Key factors are the welfare of the individual and the conservation value of its species. It is wise to decide early on (ideally soon after arrival) whether euthanasia is appropriate, as this prevents wastage of time and resources later. Each option has its advantages and disadvantages, and ultimately the decision has to be made on a case-by-case basis.

Fig. 71. Rescued Radiated Tortoise (*Astrochelys radiata*) provided a semi-natural enclosure set up for long term holding and educational display

CHAPTER SEVEN

GUIDELINES FOR RELEASE

Mammals

Suitability for Release

When assessing suitability for release, please refer to the release criteria guidelines - APPENDIX 4 DECISION TREE FOR RETURN TO THE WILD (IUCN Guidelines, 2000) and APPENDIX 7 RELEASE GUIDELINES.

Whilst considering a mammal for release, thought should be given to the fact that mammals are intelligent with a well-developed capacity to learn. This can be beneficial during the release period in which they will adapt quickly to the new environment. However, this same adaptability will be working against the rehabilitator during the captivity period. The animals will learn to accept new food sources and begin to adapt to their captive life. If the captivity is prolonged, then efforts will be required to ensure that new "bad habits" or captivity induced behaviours are minimised or prevented. A captive animal that has learnt to associate humans and food will not be well prepared for a wild release.

Before release of any mammal, particularly large mammals, careful consideration should also be given to the potential threat the animal may cause (to the public, nearby agriculture or livestock) and any legal restrictions the release of that animal may fall under.

Release Types

In general mammal release will fall into two categories: either hard (direct) release, when a mammal is taken directly from the rehabilitation site and turned loose in the release site, or softer releases in which an animal is introduced to its release site in a controlled manner over a period of time, gradually reducing its reliance upon artificial resources. The hard release is the least time consuming for the rehabilitator and will be most suited to animals that have spent only a short duration in captivity, perhaps those that have had to recover from only mild or minor injuries (days rather than weeks or months in captivity).

Any animal that has spent a prolonged period in captivity (weeks or months) will be more suited to a so ft release in which an enclosure at the release site enables the animal to become familiar with the environment. After this familiarisation period, during which human visitation and contact is kept to an absolute minimum, the enclosure should be opened allowing the animal to leave of its own free will. Feeding and monitoring of the animal should be continued initially and gradually reduced over a period of days or weeks depending upon the animal's response to the wild environment and frequency of return visits to the release enclosure.

Fig. 72. Small mammal soft-release hack cage. In this example a leopard cat is being prepared for release into the wild.

In some situations, the animal may never return, making continued placement of food unnecessary, however a period of several days should be allowed to pass without evidence of the animal's return before feeding is stopped.

Release Site

Where possible all releases should be carried out near the original collection site. In reality, this may sometimes be unsuitable or impractical. In most cases, the best guidance is to follow the principles laid out in the IUCN Guidelines for Reintroductions and the IUCN Position Statement on Translocation of Living Organisms, as well as the principles laid out in the International Wildlife Rescue Council Minimum Standard Guidelines for rehabilitation and release. Local habitat, food, shelter, and wild population parameters should also be considered.

Monitoring

In an ideal release situation, some form of post-release monitoring should be carried out. However, effective methods may be beyond the reach of the average rescue centre. The most effective methods include radio and satellite tracking, however where funds and manpower are limited, these may need to be reserved for species of high conservation value. Simpler forms of monitoring can include visible marking or tagging of the animals (ear tags, hair clipping, dye markers). This allows remote recognition of the animal either by direct viewing or by remotely triggered cameras.

Fig. 73. A hard release of a healthy male barking deer that was rescued two days prior to the release. Healthy wildlife should be released back into their natural habitat as soon as possible

Fig. 74. Attaching a radio transmitter to a native Chinese Pangolin (*Manis pentadactyla*) prior to wild release and follow up monitoring

Any evidence collected as to the success or failure of a release effort is constructive information allowing modification, re-consideration, and improvement of future release efforts.

Birds

Birds, like other animals, should only be released into their native habitats and home ranges, or within their normal migration routes. Before release, a bird should have spent adequate time in a sufficiently large aviary to build its fitness for flight. A final physical examination is conducted to confirm that the bird is in good health and has full use of its limbs, that any previous injuries have healed sufficiently, that it is fully waterproof and that it can sustain flight without tiring quickly (see Appendix 19 - Bird Release Assessment Form). A large, soft mesh sided and soft-floored enclosure is recommended for pre-release flight testing (see Fig. 81).

Birds must be released into an appropriate habitat type for the species. A suitable habitat is one that provides food, water, and shelter and is not overpopulated.

Similarly to mammals, either soft or hard release methods may be chosen. Currently at KFBG, **soft release** techniques are generally used for hand-reared birds, most doves, and small passerines (e.g. sparrows, bulbuls, Japanese white-eyes). Soft release is easy to do for these species as it can be done on-site: there is plenty of suitable habitat in and around KFBG, so door hatches in the birds' outdoor enclosure can simply be opened to release them, and food can be provided for a period after release without much additional human labour.

By contrast, **hard release** is typically used for species where the preferred release location is off-site, as our caseload is very high and there is simply not sufficient manpower to travel around Hong Kong every day to service release enclosures in different locations. Examples of cases where an off-site hard release is appropriate:

- Mynahs and starlings are usually released in neighbourhoods with established populations of those species, as this is an indicator of suitable habitat (they are less commonly seen in the wild at KFBG)
- Waders must be released close to appropriate water bodies, in places such as Mai Po Marshes; KFBG's landlocked location would be inappropriate. Other wetland species such as Chinese pond herons should be released in marshland or close to streams. Lam Tsuen Valley, within which KFBG is situated, is suitable for several wetland species.
- Where possible, birds of prey are released in the area in which they were originally rescued, but most strong flying species can also be released on the upper slopes of Kwun Yum Shan (a mountain within KFBG). The high ground here lends itself well to raptor releases, as birds are able to fly into thermals, gain plenty of height and determine which direction they wish to fly.
- Migratory raptors that were injured while passing through Hong Kong can also be released on Kwun Yum Shan, for the same reason.

Post-release monitoring should be conducted whenever possible. The bird can be fitted with a variety of different markers or devices, from expensive satellite or radio transmitters to inexpensive coloured and numbered leg rings. The use of internationally recognisable coded leg-bands enables data to be collected if the bird is sighted in future, even outside Hong Kong. Generally speaking, post-release monitoring can be very time consuming, and

Fig. 75. Release into habitat appropriate for the species

this is an area where wildlife rescue centres can benefit from collaboration with ornithologists and bird enthusiasts.

Fig. 76. Hard release involves release directly into the wild. The bird can fly from its transportation box or directly from the handler or can be placed on a perch such as a tree branch. Large birds such as eagles may require height and it is often a good idea to release these species from high mountainous ground

Fig. 77. Fitness levels can be improved by allowing raptors to fly around a large flight cage or by adopting basic falconry techniques such as high jumping or flying short distances to the lure. Falconry techniques should only be employed if the appropriate in-house expertise is available and necessary permits are held by the institution

Fig. 78. Coloured leg bands/rings on a Black-faced Spoonbill

Fig. 79. Black-faced Spoonbill (*Platalea minor*) released into the wild with identification leg bands

Fig. 80. Radio telemetry is an efficient but resource-demanding post-release monitoring method for birds. Radio telemetry is particularly important for monitoring rare species after release and may enable an intervention if the bird gets into difficulty

Fig. 81. Suitable bird exercise facilities for rehabilitation prior to release

CHAPTER EIGHT

VETERINARY ASPECTS OF WILDLIFE RESCUE

The following chapter contains notes on veterinary protocols at KFBG. Please note that wildlife medicine is a continuously evolving field and much remains to be learnt about the species we work with. Therefore, recommended tests, drugs, doses and protocols are liable to change and the following is a guideline only. Please consult your own veterinarian and the latest literature when managing individual cases.

Wildlife Rescue Admission and Veterinary Work Up

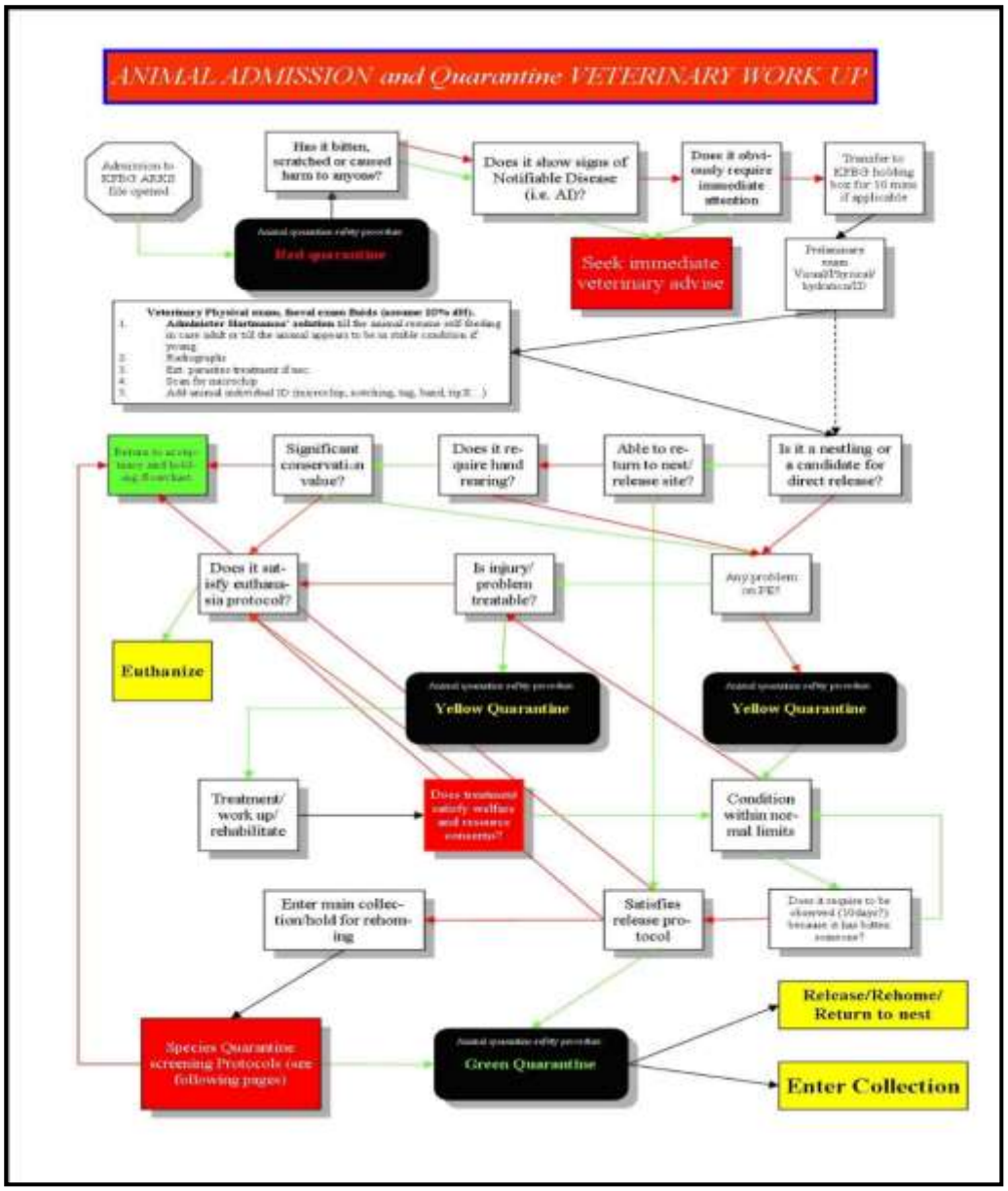


Fig. 82. Admission action tree for all animals arriving at KFBG

Avian Protocols

Avian Quarantine

Not required for birds of known local wild origin which will be released back into the wild following rehabilitation. Required for birds of unknown or animal market origin which are intended for placement, or for birds of known local wild origin which are not releasable and are intended for placement (either in KFBG's permanent collection or elsewhere).

Quarantine Period: **ONE MONTH**

Procedures required:

All species

Physical examination
Identification (microchip, leg bands etc.)
Body weight check
Radiographs (ventrodorsal, lateral)
Blood smear for WBC count
Biochemistry
Haematocrit (PCV) and Total Proteins (TP)
Deworm twice, 2 weeks apart, with fenbendazole @ 50mg/kg orally
Two faecal checks, 2 weeks apart
Treatments for external parasites

Psittacine (Parrots)

PBFD (LiHep — MIL Lab HK)
Polyoma virus
Chlamydia (Psittacine, Columbiformes)
- PCR
- Chlamydia antibodies test
- Chlamydia antigen test

As necessary

DNA sexing (EDTA — MIL Lab HK)
Endoscopic sexing
Avian Influenza choanal/cloacal swab (swab in viral medium – Govt lab)
Avian Influenza blood titre (Govt lab)
Avian Influenza vaccination

Avian Annual Checks

'Annual' checks of long-term resident birds are no longer done annually, due to high caseload, but are carried out on an as-needed or opportunistic basis. For example, if a bird needs to be restrained or anaesthetised for another reason, the opportunity may be taken to do a clinical exam, bloods and/or radiographs.
Birds are however routinely checked for intestinal parasites, with faecal tests (group or individual) done every **6 months**.

Should annual checks be carried out, the following are required:

Selected individuals

Identification check (microchip, leg bands etc.)
Physical examination
Body weight check
Radiographs (ventrodorsal, lateral)
Blood smear for WBC count
Biochemistry
Haematocrit (PCV) and Total Proteins (TP)
One deworm with fenbendazole @ 50 mg/kg orally

Psittacine

Chlamydia (Psittacine, Columbiformes)
PBFD (LiHep — MIL Lab HK)

As necessary

DNA sexing (EDTA — MIL Lab HK)
Avian Influenza choanal/cloacal swab (swab in viral medium – Govt lab)
Avian Influenza blood titre (Govt lab)
Polyoma virus
Proventricular Dilatation Disease (Crop biopsy)

Avian Influenza Testing and Positive Result Response

Levels and frequency of AI testing are directed by the Hong Kong Government's Agriculture, Fisheries and Conservation Department (AFCD). Currently, birds coming to KFBG from the Society for the Prevention of Cruelty to Animals (SPCA) are not routinely tested prior to release; birds coming from AFCD are tested by AFCD and we need to wait for the result before we can release them (in some cases we can send out our own test – PCR for faster turnaround). KFBG's Live Education Display birds are tested vaccinated once or twice per year and titre checked twice per year.

All dead chickens from KFBG's Sustainable Living and Agriculture Department are delivered to the Wild Animal Rescue Centre. Oropharyngeal and cloacal swabs are taken from every dead chicken (including both 'sentinel' and 'non-sentinel' chickens) and sent to the Government Laboratory along with the carcass. Details of these chickens are clearly written on the laboratory submission form.

If there is suspicion of AI in a bird at KFBG, AI testing will be carried out as directed by a veterinarian.

A prompt response will be expected from AFCD, and the immediate rescue centre staff response on receiving notice of an AI positive bird should be:

(i) Open a conversation channel with AFCD on receiving the result from the lab
(ii) Make the room/ward where the bird is presently housed a HIGH (RED) QUARANTINE ROOM

(iii) Raise the KFBG Biosecurity Measures to KFBG Serious Response Level (Red) whether or not KFBG is on Alert Response Level or No Response Level
(iv) No staff are permitted to enter the room without direct authorisation from the Senior Vet or Department Head
(v) No animal movements are permitted in or out of the room
(vi) No tools/cages/instruments are permitted to move in or out of the room
(vii) Isolate all animals that have been in contact (even briefly) with the affected bird with consideration for ALL infectious pathways and implement suitable barrier techniques
(viii) High biosecurity measures should be put in place (masks, gloves, goggles, and wet disinfectant mats) for that room
(ix) Do a survey of all the staff who have been in contact with the affected animal and follow advice from AFCD or other relevant Government departments, which might involve isolation/testing
(x) Liaise with AFCD for any additional measures
(xi) The subject bird will be collected by AFCD personnel.

Avian Basic Treatments

Anti-inflammatory

- ***MELOXICAM*** oral suspension 1.5 mg/ml (trade name Metacam)
  - For minor injuries
    - **0.7 ml/kg orally twice a day**
  - For major injuries, trauma, fractures, open wounds, etc. combine with:
- ***TRAMADOL*** oral suspension 100 mg/ml
    - **0.1 ml/kg orally twice a day**

Antibiotic

- ***AMOXICILLIN CLAVULANATE*** oral suspension 91.4 mg/ml (trade name Augmentin)
  - Deep open wounds or suspected cat attacks
    - **1.64 ml/kg orally twice a day**

Avian Influenza Vaccination (RE-6 RE-8 (updated 2020)) Ref: Philippa et al, 2007

BIRD BW	VOLUME (ml)
< 200g*	0.1
<1.4 Kg	0.25
1.4 Kg<BW<7 Kg	0.5
7 Kg <BW<12 Kg	0.75
12 Kg<BW<44 Kg	1.25
>44 Kg	2.5

*no ref for this dose, but the volume is too big otherwise

Table 23.

Avian Fluid Therapy

All fluid amounts shown are in millilitres (ml). Fluid therapy is typically given subcutaneously

	DAY 1	DAY 2-3...		DAY 1	DAY 2-3...		DAY 1	DAY 2-3...		DAY 1	DAY 2-3...
BW (g)	5% BW BID	3.75 % BW BID	BW (g)	5% BW BID	3.75 % BW BID	BW (g)	5% BW BID	3.75 % BW BID	BW (g)	5% BW BID	3.75 % BW BID
10	0.5	0.4	120	6	4.5	550	27.5	20.6	1300	65	48.8
15	0.8	0.6	130	6.5	4.9	600	30	22.5	1350	67.5	50.6
20	1	0.8	140	7	5.3	650	32.5	24.4	1400	70	52.5
25	1.3	0.9	150	7.5	5.6	700	35	26.3	1450	72.5	54.4
30	1.5	1.1	160	8	6	750	37.5	28.1	1500	75	56.3
35	1.8	1.3	170	8.5	6.4	800	40	30	1550	77.5	58.1
40	2	1.5	180	9	6.8	850	42.5	31.9	1600	80	60
45	2.3	1.7	190	9.5	7.1	900	45	33.8	1650	82.5	61.9
50	2.5	1.9	200	10	7.5	950	47.5	35.6	1700	85	63.8
60	3	2.3	250	12.5	9.4	1000	50	37.5	1750	87.5	65.6
70	3.5	2.6	300	15	11.3	1050	52.5	39.4	1800	90	67.5
80	4	3	350	17.5	13.1	1100	55	41.3	1850	92.5	69.4
90	4.5	3.4	400	20	15	1150	57.5	43.1	1900	95	71.3
100	5	3.8	450	22.5	16.9	1200	60	45	1950	97.5	73.1
110	5.5	4.1	500	25	18.8	1250	62.5	46.9	2000	100	75

Table 24.

Reptile Protocols (Snakes, Lizards, Chelonia)

Reptile Quarantine

Quarantine Period: **3 MONTHS or 1.5 MONTHS**, case-dependent (see below).

Introduction

From a medical point of view, we separate reptiles arriving at KFBG into two categories:
1. Animals that will be introduced into KFBG's collection or species with high conservation value
2. Animals that will not be introduced to the collection and that will stay permanently at the WARC area in permanent Quarantine Status (but for a **minimum of 1.5 months**) until a further placement is found

The first category will go through a **full quarantine period of 3 months** with the appropriate tests (see below).
The second group will be treated as necessary according to clinical findings or needs. These animals will probably be sent to other institutions and additional missing tests will be completed according to the international export/import quarantine requirements.

Procedures required:

All species

Physical examination
Identification check (microchip etc.)
Body weight check
Radiographs (dorsoventral, lateral, +/- craniocaudal; the latter two with horizontal beam for Chelonia)
Blood smear for WBC count
Biochemistry
Haematocrit (PCV) and Total Proteins (TP)
Two dewormings, 4 weeks apart (or more, as necessary) with fenbendazole @ 100 mg/kg orally (25 mg/kg in pythons)
Two faecal examinations (or more, as necessary)
Treat for external parasites
Cloacal Salmonella culture

As necessary

Endoscopic sexing
Chelonian herpesvirus PCR (swab - MIL Lab HK)
Mycoplasma PCR (swab - MIL Lab HK) and Mycoplasma culture (swab in bacterial medium - PathLab HK)
Full post-mortem examination if dead during quarantine
Ophidian Paramyxovirus (Viperidae, Boidae, Elaphidae, Colubridae)

1. One blood test on arrival
2. One blood test after 90d

Inclusion Body Disease testing (Boidae)

Reptile Annual Checks

'Annual' checks of long-term resident reptiles are no longer undertaken annually, due to high caseload, but are carried out on an as-needed or opportunistic basis. For example, if a reptile needs to be restrained or anaesthetised for another reason, the opportunity may be taken to do a clinical exam, bloods and/or radiographs.

Reptiles are however routinely checked for intestinal parasites, with faecal tests (group or individual) done **every 6 months**.

Should annual checks be carried out, the following are required:

Selected individuals

- Physical examination
- Identification check (microchip etc.)
- Body weight check
- Radiographs (dorsoventral, lateral, +/- craniocaudal; the latter two with horizontal beam for Chelonia)
- Blood smear for WBC count
- Biochemistry
- Haematocrit (PCV) and Total Proteins (TP)
- Treat for external parasites
- Cloacal Salmonella culture
- One deworming with fenbendazole @ 100 mg/kg orally (25 mg/kg in pythons)
- If positive for protozoa or cestodes: metronidazole @ 100 mg/kg orally
- As necessary: praziquantel @ 8 mg/kg intramuscularly

As necessary

- Endoscopic sexing
- Chelonian herpesvirus PCR (swab - MIL Lab HK)
- Mycoplasma PCR (swab - MIL Lab HK) and Mycoplasma culture (swab in bacterial medium - PathLab HK)

Golden Coin Turtle (*Cuora trifasciata*) annual checks

Only **10 individuals** will be checked every year as a population sample.

Selected individuals

- Physical examination
- Identification check (microchip etc.)
- Body weight check
- Radiographs (dorsoventral, lateral, craniocaudal; the latter two with horizontal beam)
- Blood smear for WBC count
- Biochemistry
- Haematocrit (PCV) and Total Proteins (TP)
- Treat for external parasites
- Cloacal Salmonella culture

One deworming with fenbendazole @ 100 mg/kg orally
If positive for protozoa or cestodes: metronidazole @ 100 mg/kg orally
As necessary: praziquantel @ 8 mg/kg intramuscularly

As necessary

Endoscopic sexing
Chelonian herpesvirus PCR (swab - MIL Lab HK)
Mycoplasma PCR (swab - MIL Lab HK) and Mycoplasma culture (swab in bacterial medium - PathLab HK)

Reptilian Basic Treatments

Anti-inflammatory

- ***MELOXICAM*** injectable 5 mg/ml (trade name Metacam)
  - For fractures and neurological signs
    - **0.04 ml/kg intramuscularly every 24 hrs**
- ***TRAMADOL*** injectable 50 mg/ml
    - **0.2 ml/kg intramuscularly every 72 hrs**

Antibiotic

- ***CEFTAZIDIME*** injectable 90 mg/ml (trade name Fortum)
  - Infected wounds
    - **0.22 ml/kg intramuscularly every 72 hrs**

Reptilian Fluid Therapy

Rehydrate all reptiles in warm shallow water (25-30°C; adjust to animal's preferred optimal temperature zone) with Reptoboost® (by Vetark, www.vetark.co.uk; see Fig.85) @ 1 scoop per 500ml water for at least 30 minutes. If longer, change the water every 30 minutes to keep it warm.
If the animal is weak, ensure that the nostrils are always above water level.

Fluids can be administered @ 2% body weight (BW) subcutaneously (SC) or intracoelomically (ICe) once or twice a day
The solution to be chosen depends on the status of the animal.
Types of fluids:

1. If emaciated and dehydrated-
   Two parts 2.5% dextrose in 0.45% saline and one part Lactated Ringer's Solution or equivalent
2. If the animal is dehydrated but still eating-
   One part Lactated Ringer's (or equivalent) and one part water for injection

Fig. 83. Subcutaneous fluid administration

Fig. 84. Intracoelomic fluid administration

Fig. 85. Reptoboost® is an electrolyte and energy support product for enteral

Fig. 86. Radiated Tortoise (*Astrochelys radiata)* rehydration by soaking in warm Reptoboost solution. It is important that the water level remains above the cloaca and below the nostrils

Amphibian Pre-Acceptance

1. Set up animal holding tanks (see below):
    a. aerated lid
    b. bedding
        i. wet paper towel
        ii. leaves which have been previously disinfected and frozen for **24 hrs**
    c. animal hide
    d. place the tank at an angle with a little water in it
2. 2 tanks per animal or group should be available for the quarantine period
3. Prepare a transport "tank" for holding of the animals if collected from the wild
    a. Cup with lid and packed with wet moss so that the animal cannot hurt itself

Fig. 87. Preparation for amphibian captive holding

Amphibian Acceptance

1. Acceptance papers
2. Open ZIMS file
3. ID
4. Weight
5. Chytrid swab & PCR test
    a. For conservation reasons, every individual must be tested no matter its origin or destination.
    b. Recommended when possible to have a baseline test of all animals in the facility prior to introducing new animals – make it a “Chytrid Free Zone”
6. Very small animals may be housed as a group

Amphibian Handling

1. Handle each individual with gloved hands (wet gloves) at the capture, throughout the quarantine period and any time afterwards. Most amphibians have porous skin and may be susceptible to contamination when being handled; in addition, some amphibians produce defensive toxins which may be harmful to handlers.

Fig. 88. Quarantine biosecurity preparation for amphibians

Amphibian Medical Checks – On Arrival

1. Visual examination
2. Collect a faecal on arrival or the following morning; perform faecal wet mount for parasites

Amphibian Quarantine – Medical Procedure

1. Quarantine for 30 days
2. 1 faecal/week
    a. Prophylactic antiparasitic treatment based on risk assessment for the individual (treatment may not be necessary even if faecal positive)
3. For group animals: treat all if needed
4. Treat as necessary according to individual signs and symptoms

Amphibian Quarantine - Husbandry

Equipment (Animal Holding Tanks)

1. Plastic tanks with aerated lids (2 tanks per animal or group)
2. Plastic hides (two available per tank)
3. Paper towel as flooring
4. Disinfected sterilized
    a. Moss
    b. Dry leaves
    c. Wooden branches
5. Live leaves
6. Small food trays (two available per tank)
7. Water spray bottles
8. Water bottles with bent nozzle (wash bottles)
9. Non-powdered gloves

Equipment (Side Equipment)

1. Water tray to place tank in (pest management)
2. Suitable equipment to keep the animal tank tilted (tile, wood)
3. Chlorhexidine disinfectant
4. 1x Tupperware with diluted chlorhexidine to soak live leaves in
5. 1x Tupperware with water to soak live leaves in
6. 1x blue tub with diluted bleach for disinfecting tanks, hides, etc
7. Forms: K____ Quarantine schedule daily work
8. Forms (each tank): Animal daily checks
9. Thermometers
10. Weigh scale (g)
11. Tupperware for live food items (as many as needed)

Procedures

1. Clean gloves ready to be used on every tank
2. Individual tank instruments
3. Spot clean every day
4. Complete clean and disinfection every 3 days (2 tanks available per animal or group of animals)
    a. 5-10% of normal household bleach to soak the tank for 15-30minutes
    b. leave tank to dry for 24 hrs (hence 2 tanks required – one tank to use while the other is soaked and dried)
5. Feed according to the nature of the amphibian: if nocturnal feed in the evening
    a. Give a good quality vitamin and mineral supplement (Ca:P close to 1:1) several times per week with food (AZA Amphibian Husbandry Resource Guide, 2012)
6. Specific number of prey items > always count them
7. Water tray below the tank/s or Vaseline (or substitute) around the tanks to protect from ants and cockroaches

Amphibian - Medical Treatments If Needed

1. Rehydration
    a. soaking in 0.6% saline solution for 30 minutes SID (not in the holding tank)
2. Antibiotics
    a. Baytril solution
    b. Baytril otic
    c. Amikacin
    d. Terramycin eye ointment
    e. Chloramphenicol eye ointment
    f. Tobramycin eye ointment
3. Antiparasitics
    a. Fenbendazole orally 50-100 mg/kg PO, repeat in 2-3 weeks PRN.
    b. Ivermectin 0.2-2.0 mg/kg topically, repeat in 2-3 weeks OR 0.2-0.4 mg/kg PO, SC, repeat q 14d PRN.
4. Chytridiomycosis treatment
    a. Itraconazole bath (oral solution diluted in amphibian Ringer's): 0.0025% bath for 5 min q 24 hr x 6d (causes fewer side effects than longer treatment and higher concentrations; see Brannelly *et al*, 2012)
5. Chytridiomycosis disinfection
    a. See table below

Chemical/product	Active ingredient (%)	Exposure time (active ingredient)	100% kill
Sodium chloride	10	5 min, 2 min	Yes
	10	1 min, 30 s	No
	5	5 min	Yes
	5	2 min, 1 min, 30 s	No
	2.5 to 1	5, 2, 1 min, 30 s	No
Household bleach (active ingredient: sodium hypochlorite)	4 to 1	10, 5, 2 and 1 min, 30 s	Yes
	0.2 to 0.01	10 min	Yes
	0.4	5, 2, 1 min and 30 s	No
	0.4	10, 5, 2 and 1 min, 30 s	No
Potassium permanganate	2	10 min, 5 min	Yes
	2	2 min, 1 min	No
	1	10 min	Yes
	1	5, 2 and 1 min	No
	0.1 to 0.001	10, 5, 2, 1 min	No
Formaldehyde solution	1	10 min, 5 min	Yes
	1	2 min, 1 min	No
	0.1	10 min	Yes
	0.1	5, 2 and 1 min	No
	0.01 to 0.001	10, 5, 2, 1 min	No
Path-X™ agricultural disinfectant (active ingredient: DDAC)	1×10^{-2} to 1×10^{-3}	5, 2 and 1 min, 30 s	Yes
	1×10^{-4}	5 min, 2 min	Yes
	1×10^{-4}	1 min, 30 s	No
	1×10^{-5} to 1×10^{-6}	5, 2, and 1 min, 30 s	No
Quaternary ammonium compound 128 (active ingredient: DDAC)	Full strength to 1×10^{-3}	5, 2, and 1 min, 30 s	Yes
	1×10^{-4} to 1×10^{-6}	5, 2, and 1 min, 30 s	No
Dithane	1×10^{-2} to 1×10^{-6}	5, 2, and 1 min, 30 s	No
Virkon	1 mg ml^{-1}	5 min, 20 s	Yes
Ethanol	70%	5 min, 20 s	Yes
Benzalkonium chloride	1 mg ml^{-1}	5 min, 20 s	Yes

Table 25. Summary of effect of chemical disinfectants on *Batrachochytrium dendrobatidis* zoospores and zoosporangia after exposure at listed concentrations and times. DDAC: didecyl dimethyl ammonium chloride. Table from Johnson *et al*, 2003.

Amphibian - Laboratory

1. Histopathology
    a. Whole animal

Amphibian - Quarantine Housing

The photographs below show examples of suitable enclosures for amphibians in quarantine. For a detailed introduction to key considerations for amphibians in captivity, please see Chapter Six.

Fig. 89. Enclosure set ups for small amphibians in quarantine

Primates

Quarantine

Quarantine period: **FOUR MONTHS**

Procedures required:

Physical examination
Identification check (microchip, hair clip, ear notching)
Body weight check
Radiographs (ventrodorsal chest, ventrodorsal abdomen, lateral chest, lateral abdomen)
Blood smear for endoparasite identification (direct blood smear, thick and thin)
Haematology (EDTA tube)
Biochemistry (LiH tube)
Haematocrit (PCV) and Total Proteins (TP) in-house
One deworming with ivermectin @ 0.2mg/kg SC
Three faecal examinations
Treat for external parasites
Cloacal culture for Salmonella, Shigella, Yersinia and Campylobacter on entry and exit
Serology:

- Macaques: Herpes B
- Great Apes: Hepatitis B, Retrovirus, Parainfluenza, Measles, and Cytomegalovirus performed based on history
- Gibbons: Human anti-HSV1, anti-HSV2 (Japan), Gibbon-ape Leuk V. (GaLV), Hepatitis B
- Hepatitis B virus screening (PathLab HK)
    - HBcAb-IgG and HBsAg
    - If one or both of these is positive, then follow up with HBeAg, HBeAb, HBsAb, HBcAb-IgM and HBV DNA
    - See table below for interpretation of results

(Protocol adapted and table taken from Heckel *et al*, 2001)

HBsAg	HBsAb	HBcAb-IgG	HBcAb-IgM	HBeAg	HBeAb	HBV DNA	Status of HBV infection
–	–	–	–	–	–	–	No HBV infection
–	+	+	–	–	–	–	Passed HBV infection; immunity
–	+	+	–	–	–	+	Passed HBV infection; low-level HBV carrier
–	–	+	–	–	–	–	Passed HBV infection; immunity questionable
–	–	+	–	–	–	+	Passed HBV infection; low-level HBV carrier status questionable
+	–	–	(+)	–	–	+	Very early phase of HBV infection
+	–	+	–	+	–	+	Acute or chronic HBV infection; high infectivity
+	–	+	–	–	+	+	Asymptomatic HBV carrier; low infectivity

Table 26. Hepatitis B virus serology and corresponding status of infection. Table from Heckel *et al*,

Tuberculosis test

- Evaluate the radiographs
- IPPD once a month for 3 times
    - 1500IU administered intradermally and evaluated at 24, 48 and 72 hours (AAZV)
      0.1 ml human (avian) TB in L upper eyelid
      0.1 ml bovine TB in R upper eyelid
- Sterile tracheal wash to send for culture

Vaccinations

Tetanus toxoid

- Absorbed human product 0.5ml SC
- at 3, 6 and 9 months of age and then every 3-5 years
- or 2 vaccinations 4-6 weeks apart, then after 6-12 months, then every 5 years

Rabies

- 1 ml of animal vaccine every 3 years or as per manufacturer instructions (only killed virus preparation)

Hepatitis B (gibbons with negative titre)

- 2 vaccinations 1 month apart and then booster every 5 years or according to the titre

Primate - Annual checks

Procedures required:

Annual checks are carried out on an ad hoc basis.

All individuals

Physical examination
Identification check (microchip, hair clip, ear notching)
Body weight check
One deworming with ivermectin @ 0.2mg/kg SC
Faecal examinations
Treat for external parasites
Tuberculosis test

- Sterile tracheal wash to send for culture (if necessary)
- Evaluate the radiographs
- IPPD
    - 1500IU administered intradermally and evaluated at 24, 48 and 72 hours (AAZV)
      0.1 ml human (avian) TB in L upper eyelid
      0.1 ml bovine TB in R upper eyelid

Vaccinations according to individual's schedule

Selected individuals

Physical examination
Identification check (microchip, hair clip, ear notching)

Body weight check
Radiographs (ventrodorsal chest, ventrodorsal abdomen, lateral chest, lateral abdomen)
Blood smear for endoparasite identification (direct blood smear, thick and thin)
Haematology (EDTA tube)
Biochemistry (LiH tube)
Haematocrit (PCV) and Total Proteins (TP) in-house
One deworming with ivermectin @ 0.2mg/kg SC
Faecal examinations
Treat for external parasites
Cloacal culture for Salmonella, Shigella, Yersinia and Campylobacter on entry and exit
Tuberculosis test

- Sterile tracheal wash to send for culture
- Evaluate the radiographs
- IPPD
    - 1500IU administered intradermally and evaluated at 24, 48 and 72 hours (AAZV)
      0.1 ml human (avian) TB in L upper eyelid
      0.1 ml bovine TB in R upper eyelid

Vaccinations according to species' needs:

Macaques	Tetanus and rabies
Callitrichids	Tetanus and rabies
Lemurids	No vaccinations

Carnivora – Canidae, Felidae, Procyonidae, Ursidae, Mustelidae

Quarantine

Quarantine Period: **FOUR MONTHS**

Procedures required:

- Identification check (microchip, hair clip, ear notching)
- Physical examination
- Body weight check
- Blood smear
- Haematology (EDTA tube)
- Biochemistry (plain tube)
- Haematocrit (PCV) and Total Proteins (TP) in-house
- Three faecal examinations
- Cloacal culture for Salmonella, Shigella, Yersinia and Campylobacter on entry and exit

Serology

- Felidae: Feline Immunodeficiency Virus, Feline Leukaemia Virus, Feline Infectious Peritonitis, Toxoplasmosis, Heartworm.
- Canidae: Heartworm, Canine distemper, canine parvovirus

Vaccinations

- Felidae: FVRCP (killed) and rabies (killed) with boosters given tri-annually.
- Canidae: DHLP-P (MLV) annually and rabies (killed) with boosters given tri-annually.
- Mustelidae
    - Ferrets: Canine distemper (MLV) annually and rabies (killed) given tri-annually.
    - Skunks: Canine distemper (MLV) annually and rabies (killed) given tri-annually.
    - Otters: Canine distemper (MLV) and Feline FVRCP annually and rabies (killed) given tri-annually.

Carnivores - Annual checks

Procedures required:

All individuals

- Identification check (microchip, hair clip, ear notching)
- Physical examination if handling is possible
- Body weight check
- Faecal examinations
- Treat for external parasites
- Vaccinations according to the individual's schedule

Selected individuals

- Identification check (microchip, hair clip, ear notching)
- Physical examination

- Body weight check
- Blood smear
- Haematology (EDTA tube)
- Biochemistry (plain tube)
- Haematocrit (PCV) and Total Proteins (TP) in-house
- Three faecal examinations
- Treat for external parasites
- Ivermectin @ 0.2 mg/kg SC
- Cloacal culture for Salmonella, Shigella, Yersinia and Campylobacter on entry and exit

Serology

- Felidae: Feline Immunodeficiency Virus, Feline Leukaemia Virus, Feline Infectious Peritonitis, Toxoplasmosis, Heartworm.
- Canidae: Heartworm, Canine distemper, canine parvovirus

Vaccinations

- Felidae: FVRCP (killed) and Rabies (killed) with boosters given tri-annually.
- Canidae: DHLP-P (MLV) annually and rabies (killed) with boosters given tri-annually.
- Mustelidae
- Ferrets: Canine distemper (MLV) annually and rabies (killed) given tri-annually.
- Skunks: Canine distemper (MLV) annually and rabies (killed) given tri-annually.
- Otters: Canine distemper (MLV) and Feline FVRCP annually and rabies (killed) given tri-annually.

Artiodactyla - Hippopotamidae, Camelidae, Cervidae, Giraffidae, Bovidae, Suidae, Capridae, Ovidae

Artiodactyls - Quarantine
Quarantine Period: **ONE MONTH**

Procedures required:

- Identification check (microchip, hair clip, ear notching)
- Physical examination
- Body weight check
- Blood smear
- Haematology (EDTA tube)
- Biochemistry (LiH tube)
- Haematocrit (PCV) and Total Proteins (TP) in-house
- Three rectal/faecal cultures, one week apart: the first will be a general culture including Salmonella and Campylobacter; the second and third will be for Salmonella only.
- Three faecal parasite checks by direct and flotation examination.
- Entrance and exit weight if possible.
- Serology screen
  i. Camelidae: Brucellosis
  ii. Cervidae: Brucellosis, Blue tongue, and Malignant Catarrhal Fever
  iii. Giraffidae: Malignant Catarrhal Fever
  iv. Bovidae: Brucellosis and Malignant Catarrhal Fever (+/- Infectious Bovine Rhinotracheitis, Bovine Viral Diarrhoea)
  v. Capridae: Brucellosis, Blue Tongue, Caprine Arthritis Encephalitis, Q Fever and Malignant Catarrhal Fever
  vi. Ovidae: Brucellosis, Q Fever and Blue Tongue
  vii. Hippopotamidae: None
  viii. Suidae: Brucellosis and Pseudorabies
  Tuberculosis test with PPD Bovis ID in the left eyelid.
  Johne's Serology, faecal culture for Johne's.
  Lepto serology - if history indicates the potential for this disease within the herd
- Vaccinations (according to location, enclosure and risk assessment)
  i. Bovidae, Camelidae, Cervidae, Giraffidae: Clostridial Disease (Covexin 8 except in Cervidae) with annual boosters.
  ii. Suidae: Bordetella bronchisepticum, Erysipelothrix rhusiopathiae, Pasteurella multocida with annual boosters.

Anti-inflammatory

- ***MELOXICAM*** oral suspension 1.5 mg/ml (trade name Metacam)
    - For fractures, wounds and neurological signs
        - **0.07 ml/kg orally once a day** as a guideline; dose can vary widely among species

Antibiotic

- ***AMOXICILLIN CLAVULANATE* oral suspension 91.4 mg/ml (trade name Augmentin)**
    - For infected wounds / bacterial infections
        - **0.2 ml/kg orally twice a day**

Fluid Therapy

Bats

Lactated Ringer's Solution.

All injections are given subcutaneously

Weight (g)	Dose (ml)	Frequency (hours)
Pups:		
Less than 1.0	0.1	Every 6 to 8
1.0 to 5.0	0.25	Every 6 to 8
Juveniles or Adults:		
3.0 to 10.0	0.25	Every 8
10.0 to 20.0	0.5	Every 12
20.0 to 35.0	0.75	Every 12
35.0 to 65.0	1	Every 12

Table 27. Subcutaneous fluid doses for bats. Table from Lollar and Schmidt-French, 1998)

Wild boar, porcupine and other mammals

Lactated Ringer's Solution

6.5% of body weight, subcutaneously, once a day or as necessary

Weight (grams) × 6.5 ÷ 100 = ml of fluids total

e.g. 2kg = 2,000g × 6.5 ÷ 100 = 130ml of fluids

Quarantine Levels

FULL (RED)	All compulsory
MASK	
GLOVES	
GOGGLES	
FOOTBATH	
NORMAL (YELLOW)	All recommended
MASK	
GLOVES	
GOGGLES	
FOOTBATH	
No QUARANTINE (GREEN)	All recommended
MASK	
GLOVES	

Table 28.

RED Quarantine status

- Animal with infectious/suspected infectious disease
- Animal awaiting AI/infectious disease lab result
- Animal considered as such on veterinarian's discretion

YELLOW Quarantine status

- Animal that is clear from the above result, but which is required to complete the quarantine period (including all the quarantine screenings) before being released/relocated.

GREEN Quarantine status

- Animal that is clear from RED Quarantine and has completed the assigned period of YELLOW Quarantine (all the tests gave negative result) and is ready to be released/ relocated.

Please refer to **Appendix 16** for details concerning quarantine procedures.

Veterinary Aspects of Raptor Rehabilitation

Effective rehabilitation involves input from many people, each with their own area of expertise. The veterinarian is part of a team and veterinary medicine and surgery are part of a process to rehabilitate and ultimately release a bird back to the wild.

Wild birds are particularly challenging, as they will usually be presented with an unknown history and may mask signs of disease as part of their 'self-preservation instinct'. The excitement and stress of unfamiliar surroundings may make a bird appear healthier than it really is. About 50% of birds entering the rehabilitation programme at KFBG are released. Be prepared for losses and be prepared to euthanise immediately if the presenting problem is obviously not compatible with release back to the wild.

Transport

Birds should be transported in secure, darkened, and well-ventilated boxes. Flooring should contain material to allow the bird to grip. Size should not be too large as the bird may flap its wings and incur injuries due to panic behaviour. Boxes should be cleaned or disposed of and not stored in a damp environment as this will allow build-up of pathogens especially *Aspergillus* sp.

Arrival

Upon arrival, the bird is directly transferred to a holding cage / box. During this transfer, a cursory inspection is made to ensure no immediate veterinary attention is required. The bird is then allowed to settle for about 10 minutes, to allow recovery from the stress of handling and transport. This also makes assessment of respiration more realistic. During this period, one has the opportunity to obtain a history from the organization or individual handing the bird over. Questions such as location (e.g. found in oiled water, or near a nest), previous treatment (may have been referred by another clinic or concerned individuals), and the person's contact details (should further questions arise) will provide valuable information.

Initial Assessment

It is important to remember that wild birds brought into the hospital have failed the test in the wild and even if the problem is not immediately apparent, there will be some underlying problem. The bird may be an orphan, exhausted, suffering from trauma or have been exposed to poisoning or oil.

Orphaned Birds

These are birds that have strayed and fallen from the nest. These nestlings should be returned to the nest as soon as possible if the site can be located. The decision to keep and hand raise an orphan should not be made lightly: the bird may require intensive feeding (depending on age) and imprinting may leave you with a bird that cannot be released back to the wild.

Exhausted Birds

Young birds may be inexperienced feeders or may have been pushed out of their habitat during the dispersal stage of the breeding season. Adults may have faced inclement weather, be exhausted after migration, have experienced a decline in prey species, have visual defects preventing food capture, have suffered trauma or have been exposed to toxins or disease.

Trauma

This is a very common presentation. Whatever the form of trauma, it has debilitated the bird to the extent that it could be captured. It will often be weak and emaciated (depending on the trauma time frame).

Distance Examination

It is important to start the examination before handling the bird. This allows assessment of some parameters that cannot be assessed as well during restraint (such as posture, demeanour, lameness, and resting respiration).

Distance examination may allow detection of subtle problems such as a tail bob indicating laboured breathing, or a dropped wing suggesting a musculoskeletal problem (e.g. a fracture).

This will allow modification of the approach adopted to restrain the bird. For example, a bird displaying laboured breathing may be put into an oxygen rich environment PRIOR to restraint to minimize acute respiratory compromise, collapse and even death.

Physical Examination

A full physical examination will require restraint. In turn this requires consideration of the handler's safety from talons and beaks and consideration of the bird's stress level and ability to breathe (do not restrict chest movements). Always be prepared to stop the examination and put the bird down if it becomes excessively stressed (in which case anaesthesia may be appropriate) or suddenly weak during examination. A bird may collapse during examination necessitating emergency protocol. The system of examination can be based on one's own preferences, as long as it is methodical and systematic, so all organs or structures are examined.

Initial Therapy and Diagnostics

Fluid Therapy

Most wild birds will be experiencing some degree of shock, dehydration and circulatory collapse on arrival at the WARC.

We assume all birds are 10% dehydrated. A variety of fluid solutions are available, but usually one will have to institute fluid therapy before any clinical pathology results are available.

Lactated Ringer's or Hartmann's solution is an ideal initial choice. It will correct electrolyte and fluid deficits and mild acidosis. These fluids are isotonic so they will not draw fluid out

of cells by osmosis. They contain few calories so animals not eating may need to have supplemental calories.

If dextrose is added by the intravenous (IV) or subcutaneous (SC) route, ensure it is not greater than 3% or it will be hypertonic and draw fluid out of cells. Dextrose 5% in Lactated Ringer's is a balanced electrolyte solution but should only be administered IV or orally; if given SC it will draw interstitial fluids out into the subcutis, increasing dehydration. Also, beware giving it per os (PO) as this will draw fluids into the gastrointestinal tract and is therefore not recommended in severely dehydrated birds.

2.5% dextrose / 0.45% sodium chloride solution can be given SC, IV or PO and will provide animals with a little energy. Fluid therapy can be modified later based on biochemistry, electrolytes, PCV, TP etc.

Route of Fluid Therapy

Choices include IV, intra-osseous (IO), SC, PO, and intramuscular (IM). Never use intra-peritoneal (IP) in birds due to the presence of air sacs.

Severely debilitated (e.g. laterally recumbent) birds may require rapid fluid replacement to correct hypovolaemia. The IV route is usually the best. IV can be via the right jugular, ulnar, or medial metatarsal veins. A rapid bolus IV @ 10 ml / kg / min can be administered. If the bird is in extreme shock or circulatory collapse, and it is difficult to access the collapsed veins, cutting down to the jugular could be attempted. Alternatively, use the IO route. The needle is inserted into the distal ulna or proximal tibia, and fluids given at the same rate as for IV administration. For birds not requiring such rapid replacement the SC route is usually the best: it entails a bit less restraint and thus less stress to the bird. It can also allow quite large volumes. Sites available include inguinal region and lateral flank. Divide large volumes between multiple sites. Avoid the neck due to the cervicocephalic air sacs.

The SC route is commonly used for ongoing maintenance fluid therapy. The oral route can also be used for ongoing maintenance but should never be used in birds that are vomiting or severely debilitated. The tube is passed to the right of glottis; palpate the neck to ensure the tube is not in the trachea. If when palpating the trachea, a second rigid tubular structure is located, the tube is properly located in the oesophagus. If only one tube is palpated, check the location of the tube before administering fluids.

Volume of Fluid

Fluid therapy has to replace the deficit (as previously stated, we commonly assume 10%) and meet the daily metabolic (maintenance) losses, which are assumed to be 50 ml / kg / 24 hrs.

The deficit is calculated as follows: % dehydration x body weight (g) = fluid deficit in millilitres. Normally 50% of the deficit should be replaced in first 24 hours, and the remainder over the next 48 hours, whilst providing maintenance needs.

For example

Patient : Eagle Owl presents with a fractured wing
Body weight 3kg
Estimated to be 10% dehydrated

Fluid requirements:

Deficit : 3,000g x 10/100 (10%) = 300ml

Maintenance : 3 x 50 = 150ml / day

Plan : Day 1 : 150ml (50% of deficit) + 150ml (maintenance) = Total 300ml
⇨ Administer 75ml 4x/day.

Day 2 : 75ml (25% of deficit) + 150ml (maintenance) = Total 225ml
⇨ Administer 56ml 4x/day

Day 3 : As for day 2

Note: If there are significant ongoing losses such as severe diarrhoea or vomiting, these need to be factored in and relevant replacement calculated. Birds in severe shock may need colloid or blood.

Nutritional Support

Some birds are unable initially to accept oral fluids and nutrition but may be able to go on to solids within 24 hours. Therefore, rehydrate with 2.5% dextrose solutions and once hydrated they can be given 5% dextrose orally. When able, move gradually on to more complex foods, e.g. veterinary critical care formulations (maltodextrans and amino acids) and then blended meat.

Severely emaciated and dehydrated birds will be severely debilitated and carry a guarded prognosis. Correcting fluid deficits with 2.5% dextrose solution will provide some calories; this needs to be given IV for best response. Solid food at this point will probably kill the bird; even Hill's a/d will be too much at this stage. The most important factors are fluids, warmth, and dextrose. If later the bird can accept oral fluids, then one can use higher concentration dextrose solutions. Gradually move to critical care formulations (easily assimilated from gut with little energy expenditure from the bird).

Commercial products like Hill's a/d, Oxbow Critical Care Carnivore or EmerAid Intensive Care Carnivore are recommended; various recipes for homemade diets also exist.

One may need to administer metoclopramide (2 mg / kg IM) if the bird is regurgitating or crop stasis exists.

Regular smaller feeds are recommended rather than single large feeds if the bird is not self-feeding, to avoid development of sour crop.

Once an assessment has been made that the bird can process solid or semi-solid food, one can begin providing a slurry of blended meat. There is no need to feed casting material (bone and feathers) to sick birds.

Formulas exist for calculating energy requirements. Remember disease and illness produce a hypermetabolic state.

Environmental Support

Sick birds must be maintained at an appropriate temperature so they do not expend energy maintaining body temperature. An ambient temperature of 30°C or even higher may be needed. Ensure humidity is adequate or heat may dehydrate the bird. Birds with oil / feather damage will suffer even greater body heat loss. Normal body temperature in birds is between 40 - 42°C.

Diagnostics

Working with injured wildlife requires some degree of competency in basic laboratory procedures and their interpretation.

Blood Testing

1 % of body weight is safe to withdraw from an animal, i.e. from a 1 kg bird one can withdraw 10ml and from a 100 g bird 1 ml.

Fresh blood should be placed in microhematocrit capillary tubes for PCV and TP assessment; further fresh blood should be used to make a smear for microscopic evaluation. Blood should be placed in an EDTA (purple top) tube for haematology and in a lithium heparin (green top) tube for biochemistry. If minimum blood is available then priority would normally be PCV, TP, blood smear, and if enough available LiHep for biochemistry.

Blood smears should be examined for RBC morphology, parasites and estimated white cell count (EWCC).

An EWCC is performed by examining 10 high dry fields (x40) and counting the leukocytes. Divide the number by 10 to get an average and then multiply by 2000. Need to correct for PCV by multiplying by observed PCV / Normal PCV (usually estimated to be 40).

Estimated White Cell Count
Number of white blood cells in 10 fields @ x40 magnification / 10 x 2000 x Observed PCV / Normal PCV = number of cells/µl.

A PCV below 32% suggests anaemia and above 58% dehydration (or polycythaemia). Dehydration may mask the anaemia initially, and a follow up PCV after rehydration might reveal the true PCV. RBC morphology may help identify the anaemia.

Plasma proteins can be measured with a refractometer; while not always very accurate this will give a quick estimation. Elevated TP with normal A/G ratio is expected with dehydration. Also consider inflammation – therefore albumin / globulin ratio and absolute values are important. Gastrointestinal, renal and hepatic disease can cause severe hypoproteinaemia as will severe emaciation.

Faecal analysis

Faeces should be analysed for parasites and one can also do a faecal gram stain. Faeces are directly examined on the slide with a drop of warmed saline and a cover slip for protozoa detection. A faecal flotation is performed to detect worm eggs.

Bandaging

The joint above and below the fracture must be immobilised.

The most common bandage employed is the figure of 8 bandage (see Fig. 8, although this shows a dove rather than a raptor). While seldom used for final stabilization of fractures it provides initial support while the patient is stabilized. One may decide to perform this under GA to minimize further damage especially to soft tissues.

Metacarpal	No joint below, only carpus needs immobilizing, therefore figure of 8 wrap only.
Radius and ulna	Elbow joint above, carpal joint below; figure of 8 wrap.
Humerus	Shoulder joint above, elbow joint below; body wrap.

Table 29.

Beware tendon contraction, try to remove bandage ASAP (2-3 weeks maximum) to avoid patagial membrane and joint stiffness.

Address associated wounds.

Fig. 90. Eastern Spotted Dove (*Spilopelia chinensis*) with a bandaged wing

CHAPTER NINE

BEHAVIOURAL AND ENVIRONMENTAL ENRICHMENT

Environmental Enrichment and Wildlife Rescue

"Environmental enrichment is a concept which describes how the environments of captive animals can be changed for the benefit of the inhabitants. Behavioural opportunities that may arise or increase as a result of environmental enrichment can be appropriately described as behavioural enrichment." (Shepherdson, 1994)

Although it may not at first be an obvious concern or priority related to animal rescue, environmental enrichment should always be a consideration. This especially applies where animals end up being maintained in captivity for long periods of over several months. Short-term residents can also benefit immeasurably from even minor modifications to their environment: enrichment can help mental well-being and stress management, and also be used as a strategy to increase and evaluate an animal's physical and mental fitness for release.

Enrichment is essential when an animal is in captivity for prolonged periods, e.g. several months. Ideally rescue centres should not be holding animals for so long; unfortunately, in reality this happens. For example, in cases involving the illegal trafficking of internationally protected animals, local authorities may request the rescue centre to hold the animals while prosecution actions are pursued.

In brief environmental enrichment is a process for improving or enhancing captive wildlife environments and care within the context of their behavioural and natural history by providing animals with the opportunity to express highly motivated behaviour patterns and solve problems.

The habitat where an animal lives is made up of a rich mix of diverse stimuli. The organism must respond appropriately in order to survive and reproduce. Being in captivity, away from all those stimuli, can drastically alter animal behaviour, thus increasing the need for us to provide the necessary enrichment. Considering the captive environment:

- Allows animals control over their lives
- Provides animals with more choice
- Allows animals to perform natural behaviours, particularly "appetitive" (i.e. foraging) behaviours
- Reduces or eliminates frustration
- Provides a stimulating captive environment for occupants

- Provides an environment that allows animals to be more active and develop appropriate musculature and cardiovascular health
- Allows for a full range of social interactions

Proactive versus Reactive Solutions

Captive animals of different species may show abnormal behaviours that are uncommon or even absent in natural populations. Some of the behaviours arise from being exposed to stressful situations, others may arise due to boredom. Animals need to have both their physiological and psychological needs met. Once you understand the needs of the animal, based on their natural history and behaviour, you can design an enrichment programme that is appropriate for them, reducing the possibility of unwanted, abnormal behaviour. A proactive approach is about actively enriching the habitat of an animal to prevent or decrease the onset of behavioural problems.

A reactive approach, on the other hand, applies to cases where the animal(s) have already developed abnormal, stereotypic behaviour. This can sometimes be tricky because there is a fine line between trying to distract the animal from exhibiting those abnormal behaviours and inadvertently rewarding the animal for displaying such behaviour.

Most rescue animals remain in captivity for only a short period and do not have time to develop abnormal behaviours related to their captive conditions. Some level of stress will be present in most wild animals even during short-term captivity.

How does environmental enrichment improve well-being?

- It increases behavioural diversity
- It increases the range of natural species-specific behaviour
- It increases an overall use of the captive environment
- It increases the ability of an animal to cope with potential challenges, e.g. stress
- It decreases the occurrence of abnormal behaviour, e.g. stereotypic behaviour, aggression, self-injurious behaviour
- It builds physical fitness

5 Enrichment Categories

Not Mutually Exclusive

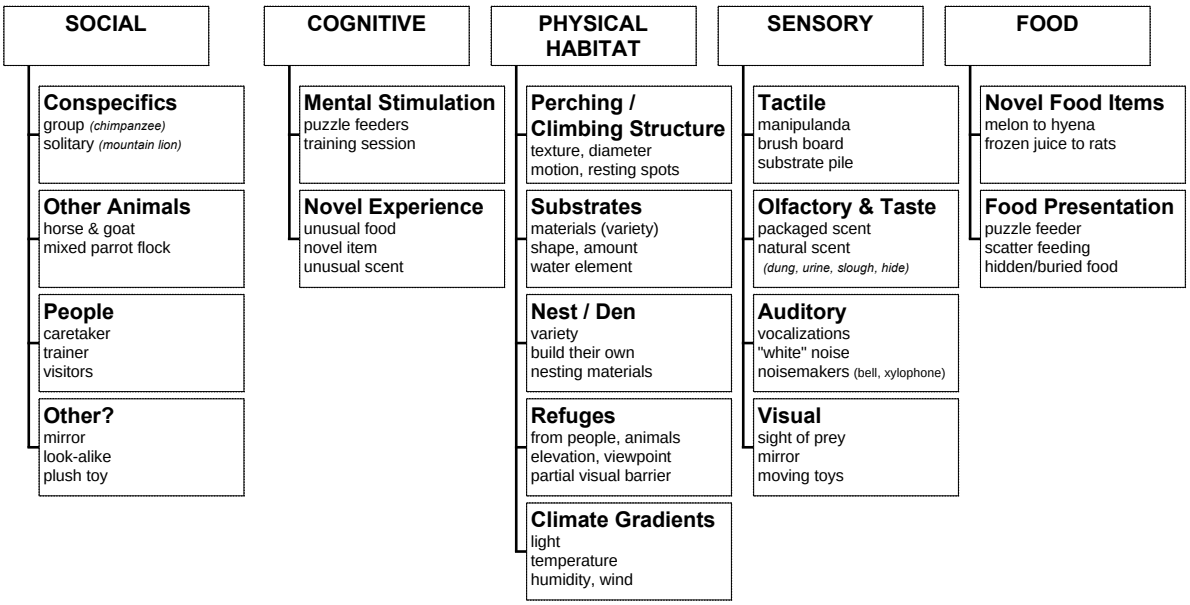


Fig. 91

Naturalistic Approach

This involves recreating as closely as possible, the complexity of a wild environment in captivity to provide stimulation for the animals.

Fig. 92. A Mindanao Water Monitor (*Varanus cumingi*) in a naturalistic enclosure. Natural exhibit furniture that is renewed regularly stimulates investigation

Behavioural Engineering Approach

This involves providing devices and mechanisms that can stimulate natural behaviour.

Fig. 93. Structures allow for climbing, swinging and brachiating

Fig. 94. Naturalistic environment allows for climbing, swinging, hiding and brachiating

Enrichment Categories (Developed by The Shape of Enrichment)

Category 1 - Social

Social Grouping

Social animals should be housed with others of the same species as far as possible. Solitary animals can be housed alone or with other compatible species. Individual compatibility has to be considered for all cases.

Fig. 95. Social groups and mixed species exhibit. Under rescue conditions this form of enrichment would only be considered for animals under medium- to long-term holding

Interaction with People

Human interaction should be minimised in wildlife rescue and rehabilitation cases. However, animals which are intended for permanent placement in an educational or conservation breeding programme may benefit from human socialisation.

Keepers work with animals on a daily basis and animals should be able to choose whether to interact with or avoid keepers. An animal-keeper relationship can be further developed through positive training sessions. Devices may also be set up to encourage positive interactions between animals and visitors.

Fig. 96. Keeper socialising parrots (parrot introduction)

Category 2 - Cognitive

Problem-Solving

Providing animals with opportunities to problem-solve with the use of devices and puzzle feeders

Fig. 97. Macaque with puzzle feeder for treats

Fig. 98. Mesh feeders for daily feeding – mammals and birds

Novel Experiences

Providing animals with new or unusual edible or non-edible items to investigate or manipulate

Positive Reinforcement Training (PRT) – permanent placement cases only

Training sessions are a good tool to encourage mental stimulation

Fig. 99. Raptor with novel ball feeder

Fig. 100. Positive reinforcement training facilitates medical procedures

Category 3 - Physical

Exhibit Features

In order to accommodate species-appropriate behaviour, the habitat must have adequate space for resting, locomotion (terrestrial, arboreal and/or aquatic as appropriate), and sanitation. The most basic component of the physical or inanimate environment is the enclosure structure (its size, shape and design) and the substrate within it.

Landscaping, Furniture and Substrates

Substrates – Leaf litter, soil, mulch, pebbles, sand, wood shavings, straw, etc.

Fig. 101. Straw and mulch substrate for indoor dens

Fig. 102. Leaf litter, tree bark chips and soil substrate

Fig. 103. Varied furniture, natural components and textures

Fig. 104. Water pools for mammal and birds

Fig. 105. Shower/ sprinkler systems

Climbing Structures - Logs, branches, rockwork, ropes etc.

Stationary and dynamic climbing structures add some unpredictability and encourage usage of different muscle groups. Modifying these regularly can stimulate natural behaviours and build physical fitness.
Branches and perches should vary in diameter and texture and have to be appropriate for animal use. Dynamic branching systems are made up of a series of branches loosely interconnected in such a way as to promote movement of the branches in different directions.

Fig. 106. Contained enclosure set-up with branching, ropes and other movable structures

Fig. 107. Dynamic branching system

Utilising Space

Utilising three-dimensional area to increase/maximise limited habitat space.

Fig. 108. Open enclosure set-up with natural branching, ropes and other movable structures

Fig. 109. Adding furniture to the top half of the primate enclosure increases usable space

Other furniture - Hide boxes, shelter

Fig. 110. Hide boxes and shelters for mammals and birds

Visual Barriers/Refuges

Visual barriers allow subordinate or timid animals to retreat from dominant animals, human view or stressful situations. Distressed animals typically exhibit abnormal behaviours.
Visual barriers can be thick vegetation, well-placed structures, netting etc.
They can be permanent or temporary and can be placed either inside or outside the enclosure.

Fig. 111. Hiding areas as visual barriers

Fig. 112. Natural planting as visual barriers

Fig. 113. Internal visual barriers (permanent and temporary)

Category 4 - Sensory

Tactile (Touch)

Exposure to various types of material and textures, touching and feeling inanimate objects such as scratching posts, scrub brushes, snake skins, etc., or interactive with items of different consistencies and textures (snow, bubbles, ice, etc.)

Fig. 114. Monitor Lizard rubbing on rope covered log

Fig. 115. Ocelot (*Leopardus pardalis*) rubbing on scrub brush

Toys

Objects without food with the sole intention of manipulation: fire hose balls, kegs, barrels, cardboard, piñatas, wheels, rubber toys, punching bags, feathers, clothing, balls of various types and sizes, rocks, wood, seashells, pine cones, plastic or paper objects such as boxes, paper towels, containers, etc. These devices stimulate curiosity and may increase play and hunting behaviours.

Fig. 116. Fishing Cat (*Prionailurus viverrinus*) playing with a rope ball

Olfactory (Smell)

Different fragrances, e.g. herbs, spices, perfume, animal scents, food extracts, etc, can be used around the habitat to encourage exploratory behaviour.

Visual (Sight)

This may involve the use of colour dyes, murals, cool-spectrum (green) lights, mirrors, motion (TV, video, DVD, video games), sun-catchers, disco balls, etc. Consider elevated platforms and perches to allow visual access to other animal habitats, provided this does not increase stress for the occupants of either habitat.

Fig. 117. Zebra Mongoose *(Mungos mungo*) investigating fresh Pandanus leaves

Fig. 118. Cotton-top Tamarin (*Saguinus oedipus*) investigating cinnamon stick

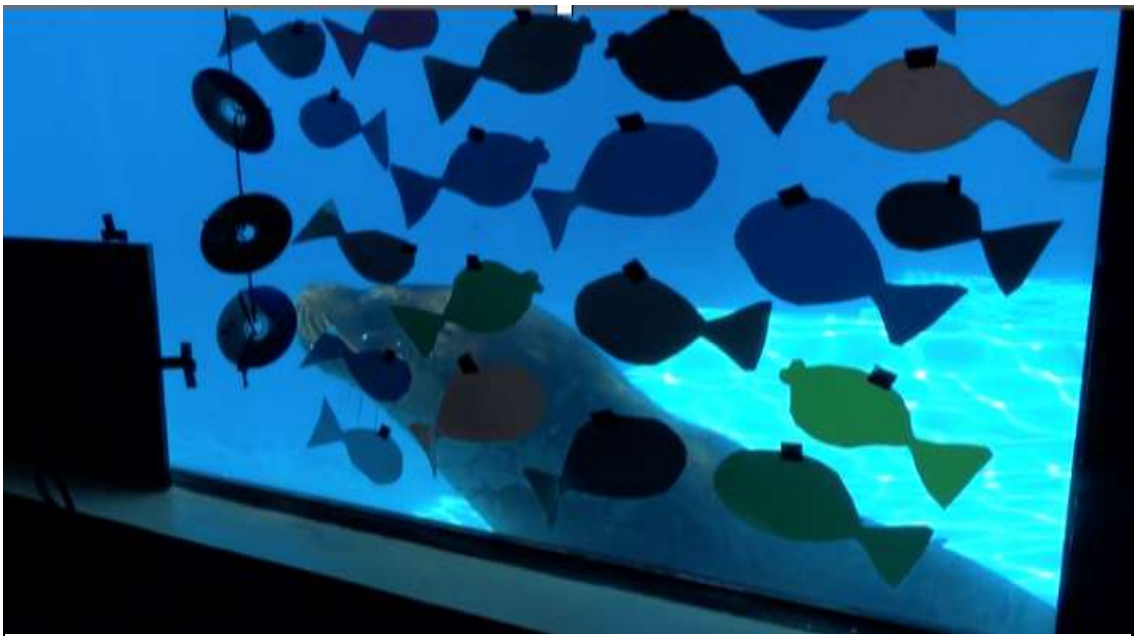


Fig. 119. Coloured paper cut-outs of shapes with California sealions (*Zalophus californianus*)

Fig. 120. Marmoset gum feeder provides both olfactory and taste stimulation

Auditory (Sound)

Vocalization from other animals (e.g. predator or prey calls, mating calls), sounds from the natural environment, music and artificial nature sounds, etc.

Fig. 121. Website - Choice of nature sounds

Climate Gradient (Temperature and Humidity)

Used most often for reptiles – thermoregulation

Fig. 122. Misting systems (humidity)

Fig. 123. Heat lamp (temperature gradient)

Category 5 - Food

Presentation - The method by which food is delivered to the animals

Goal - Increase foraging behaviour and time spent actively searching for and processing food.

Fig. 124. Hanging food for Bats and Tortoises

Variety

Different items that are part of their regular captive diet can be offered daily or as part of a diet rotation (weekly, seasonal).

Fig. 125. Containers and food boards

Fig. 126. Cage-top/ Outside enclosure feeding

Fig. 127. Varying sizes: food offered whole, chopped, shredded etc

Fig. 128. Scatter feeding/ hidden food

Fig. 129 Varying consistencies: food offered frozen in ice

Fig. 130 Kebabs – “meal on sticks”

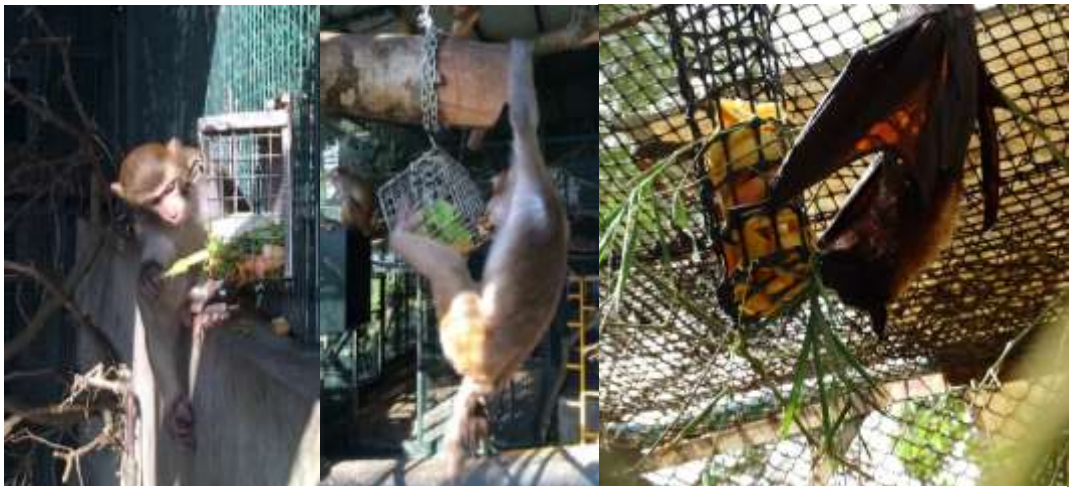


Fig. 131. Hanging and fixed mesh feeders for Macaques and Bats

Fig. 132. Twig feeder for Raptors

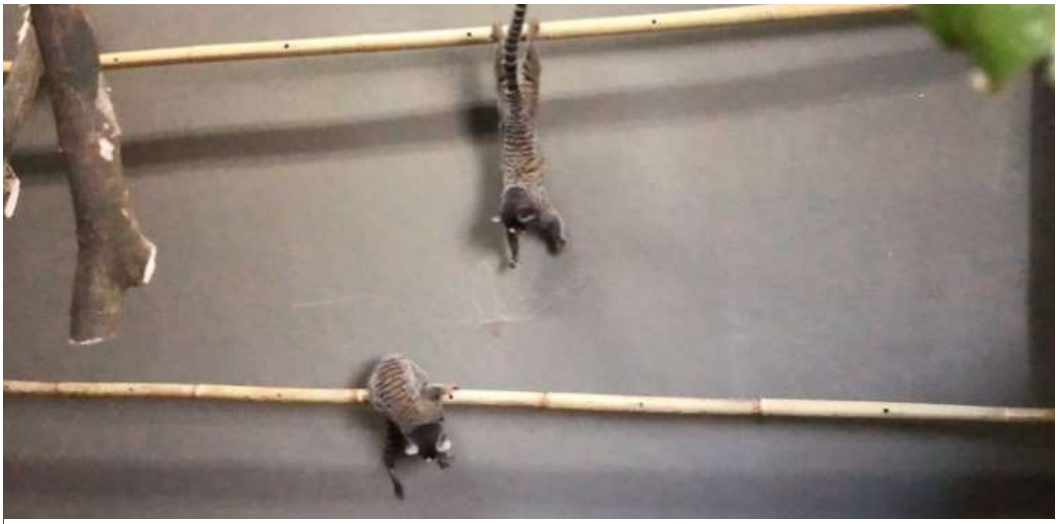


Fig. 133. Insect “highway” for Marmosets (bamboo with holes containing insects)

Novelty - Items that are not usually a part of their regular captive diet

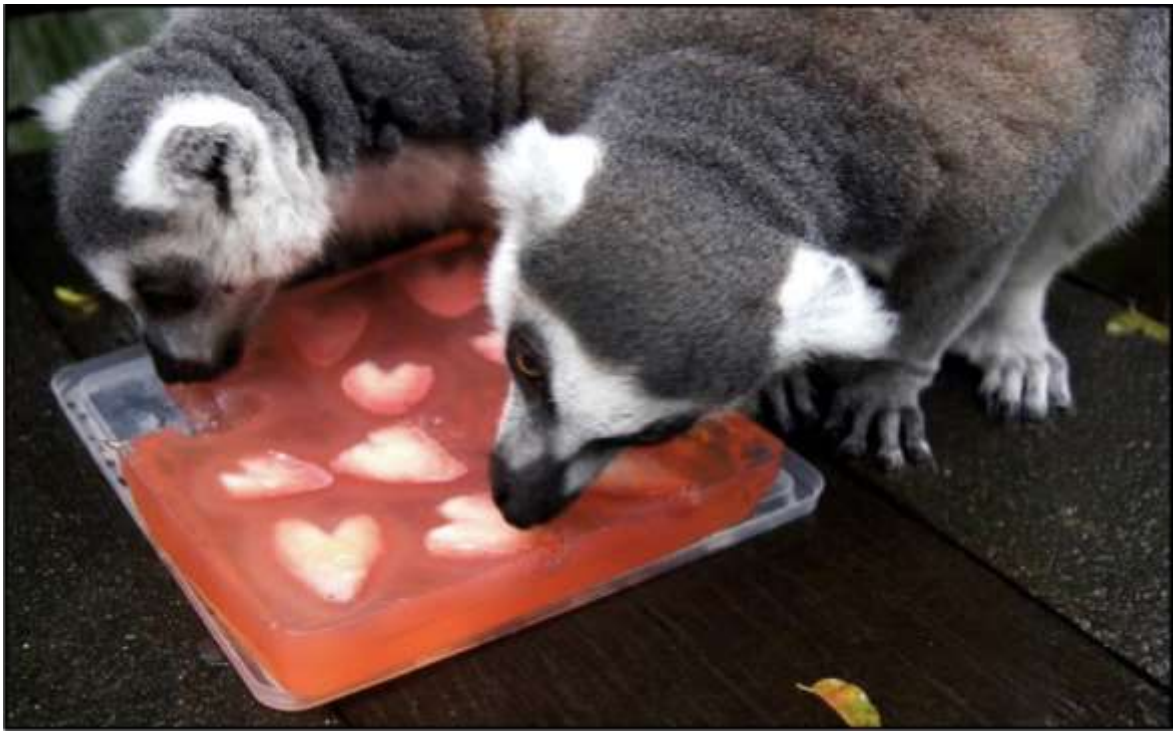


Fig. 134. Feed enrichment with jelly.

Fig. 135. Introduction of seasonal fruits

Time budget allocation

In the wild, searching for food is one of the most frequently found species-typical and time-consuming behaviours. Increasing the frequency of feeding can alter the animals' time budget, to mimic feeding behaviour in the wild.

Operant Conditioning

Primarily for animals that are to remain in captivity for educational purposes but can also be used to habituate rescued animals to husbandry routines and crating.

Behavioural conditioning techniques can be incorporated to facilitate husbandry and veterinary procedures, and reduce unnecessary animal stress associated with these procedures.

Reinforcement

Reinforcement is a consequence that strengthens a behaviour and increases the likelihood that the behaviour will occur again.

Positive Reinforcement

This method is most widely used by animal keepers because it achieves the best result. Positive reinforcement training involves giving the animal something that it desires to reinforce a given response. Working with the animal regularly increases the frequency of the correct response to the cue given.

Reinforcers include favourite foods, verbal praise, playtime, physical interactions with the animal (e.g. petting, stroking, scratching, etc) – anything that the animal sees as desirable.

E.g. Animal is being trained to touch a target. Target is presented, the verbal cue is given by the trainer: "Target". Animal touches the target. Animal gets a reward.

Uses

For husbandry purposes - e.g. to aid shifting from den to den, daily visual checks, crating, weight checks etc
For veterinary purposes – e.g. injections, blood draws, medicating etc
For behavioural purposes – e.g. reducing aggression (cooperative feeding method), reducing abnormal behaviours etc

Safety considerations

Sufficient enrichment items should be provided to prevent unhealthy and potentially aggressive competition. If possible, each individual animal in the habitat should have access to at least one enrichment device. A general rule of thumb is to offer at least one more item than the number of animals housed in the enclosure.

Only items that are appropriate for that particular species should be provided. Giving an animal a device that it will not use or cannot use is pointless. Some animals are more sensitive to certain materials (e.g. snakes that are stuck to tape cannot usually free themselves without losing scales).

Destructible items should be free of staples, tape, synthetic string and other potentially harmful material.

All items must be assessed carefully to reduce any risk of injury to the animal and cage-mates. Assess risks of e.g. entanglement, suffocation, ingestion, lacerations, entrapment, heavy weights, etc.

Make sure that scents used for enrichment are not too overwhelming for the animal. When using any scents, do not spread it around the entire enclosure; limit the placement to one area. This way, the animal can choose to interact with the scent voluntarily or avoid it without being overwhelmed.

With sound enrichment, make sure animals are provided with an option for escape from the noise. One must also be aware of the sounds used; some recorded vocalisations may elicit stress or confrontation from the animals. As with any enrichment offered, the question asked should always be – will the action add enrichment, or might it cause abnormally high levels of stress to the animal?

An enriched environment, due to its complexity, could present an increased risk to the enclosure occupants. Therefore, it is our responsibility as animal caregivers to mitigate the

Fig. 136. Unsafe items – Loose rope loops and frayed rope ends posing entanglement and ingestion risks

risks and reduce the probability of animal injuries, enclosure breakage or animal escapes by

predicting all possible ways in which an animal might utilise the enrichment provided. All enrichment, especially new features, should be offered under observation, and there must be a plan in place to remove the enrichment in the event that it presents a hazard to the captive species.

Fig. 137. Unsafe wire ends

Fig. 138. Safe wire ends

Fig. 139. Safe rope ends with no risk of fraying

All photos in this chapter provided by Debbie Ng or KFBG unless otherwise indicated.

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USEFUL WEBSITE ADDRESSES

International Organisations

The Convention on International Trade in Endangered Species of Wild Fauna and Flora: http://www.cites.org
IUCN Species Survival Commission Red List of Threatened Species: http://www.iucnredlist.org/
Institute of Zoology Chinese Academy of Sciences: http://english.ioz.cas.cn/

General Wildlife Rehabilitation

International Wildlife Rehabilitation Council: : http://www.IWRC-online.org
The Wildlife Rehabilitation Information Directory: https://wildliferehabinfo.org/
Wildlife Information Network (Wildpro): http://www.wildlifeinformation.org/home.html
Wildlife International: http://www.wildlifeinternational.org/EN/rehab/care/care.html

Mammals

Species Survival Commission Mammal Specialist Groups: https://www.iucn.org/ssc-groups/mammals

Reptiles

Turtle Survival Alliance: https://turtlesurvival.org/
Chelonian Research Foundation: http://www.chelonian.org
World Chelonian Trust: http://www.chelonia.org/
Tortoise Trust: http://www.tortoisetrust.org
Hong Kong Society of Herpetology Foundation: http://www.hkherp.org/

Avian

Hong Kong Bird Watching Society: http://www.hkbws.org.hk/
Hong Kong Bird Watching Society: http://www.hkbws.org.hk/BBS/
The Science of Birds: http://www.Ornithology.com

Books, Equipment and Online Courses

Books: http://www.nhbs.com/
UV guide for Reptiles: http://www.uvguide.co.uk/index.htm
Reptile & Exotic Animal Husbandry Equipment: http://lllreptile.com/

ACKNOWLEDGEMENTS

Present and past members of the Fauna Conservation Department have contributed to the content of these Operational Guidelines since the Rescue Centre was established in 1994. Ideas and working methodologies have been developed using established best practices and useful, sometimes unique, suggestions over the years from colleagues, friends and partners.

A special mention goes to the following staff who have provided updates to the present edition of the Wild Animal Rescue Centre Operational Guidelines:

Dr. Alex Grioni, Paul Crow, Tamari Yu Ka Ying, Serena Chung Pui Ue, Amanda Crow, Debbie Ng Gek Hoon, Stephanie Wong Joan-Ling, and Wan Lok Man.

Fig. 140. Packing Pig-nosed Turtles (*Carettochelys insculpta*) prior to their repatriation shipment to West Papua, Indonesia

APPENDICES

APPENDIX 1

ANIMAL ACCEPTANCE PROTOCOL

The acceptance protocol for injured and sick wild animals was formulated following dialogue with the Agriculture, Fisheries and Conservation Department (AFCD) and the Society for the Prevention of Cruelty to Animals (Hong Kong) (SPCA) in October 1996. The protocol clarifies what species may be accepted by the Fauna Conservation Department.

Animal Acceptance Protocol

The Wild Animal Rescue Centre (WARC) will consider acceptance of animals that fall into one or more of the following categories;

1) If suspected to be a species of wild animal that is native to Hong Kong.
2) If the species is of significant conservation value. This includes:
    a) Species listed as Threatened or above in the IUCN Red List of Threatened Animals (normally those not commonly bred in the commercial trade)
    b) Species listed by CITES and not commonly bred in the pet trade
    c) Species that have been shown to be under threat by current research or trends but that have not been formally listed yet.

- The Wild Animal Rescue Centre (WARC) has the right to turn away any animals. Life-time cost of animals being presented for rescue and rehabilitation will be an acceptance consideration and this aspect of operation will be monitored by the Head of Department.
- A non-native wild animal that is CITES listed, requires permission from the AFCD before it is accepted by KFBG.
- Any animals that do not fall into these categories will not be accepted by KFBG unless special authorisation is given by the Head of Department.

Procedures for Accepting Animals

An acceptance form must be filled in detailing the name of the person/organisation handing over the animal.

Responsibility regarding the acceptance of animals

Once an animal is accepted by KFBG then KFBG assumes responsibility to make decisions about the future of that animal within the framework of the law. This does not apply to animals being held in temporary housing on behalf of the AFCD.

Non-acceptance of Animals

Animals turned away should be referred to the SPCA if they are common pet species or domestic species that are suitable for the SPCA re-homing programme. All other animals should be referred to the AFCD.

APPENDIX 2

ANIMAL HOLDING AND PLACEMENT

Animal Holding and Placement

All animals held at KFBG by the Fauna Conservation Department, whether newly admitted or long-term residents, must fulfil the criteria below.

The animal must enjoy, or have potential to enjoy, an acceptable quality of life, for the rest of its natural life, in one of the following locations:

a) In the wild
b) In a KFBG educational display
c) In a local accredited* conservation/education programme
d) In an overseas accredited conservation/education programme

Any animal that does not fulfil these criteria must be considered for suitable placement or euthanasia.

* Accredited institutes include those recognized by IUCN or international zoo associations.

The Definition of an Acceptable Quality of Life

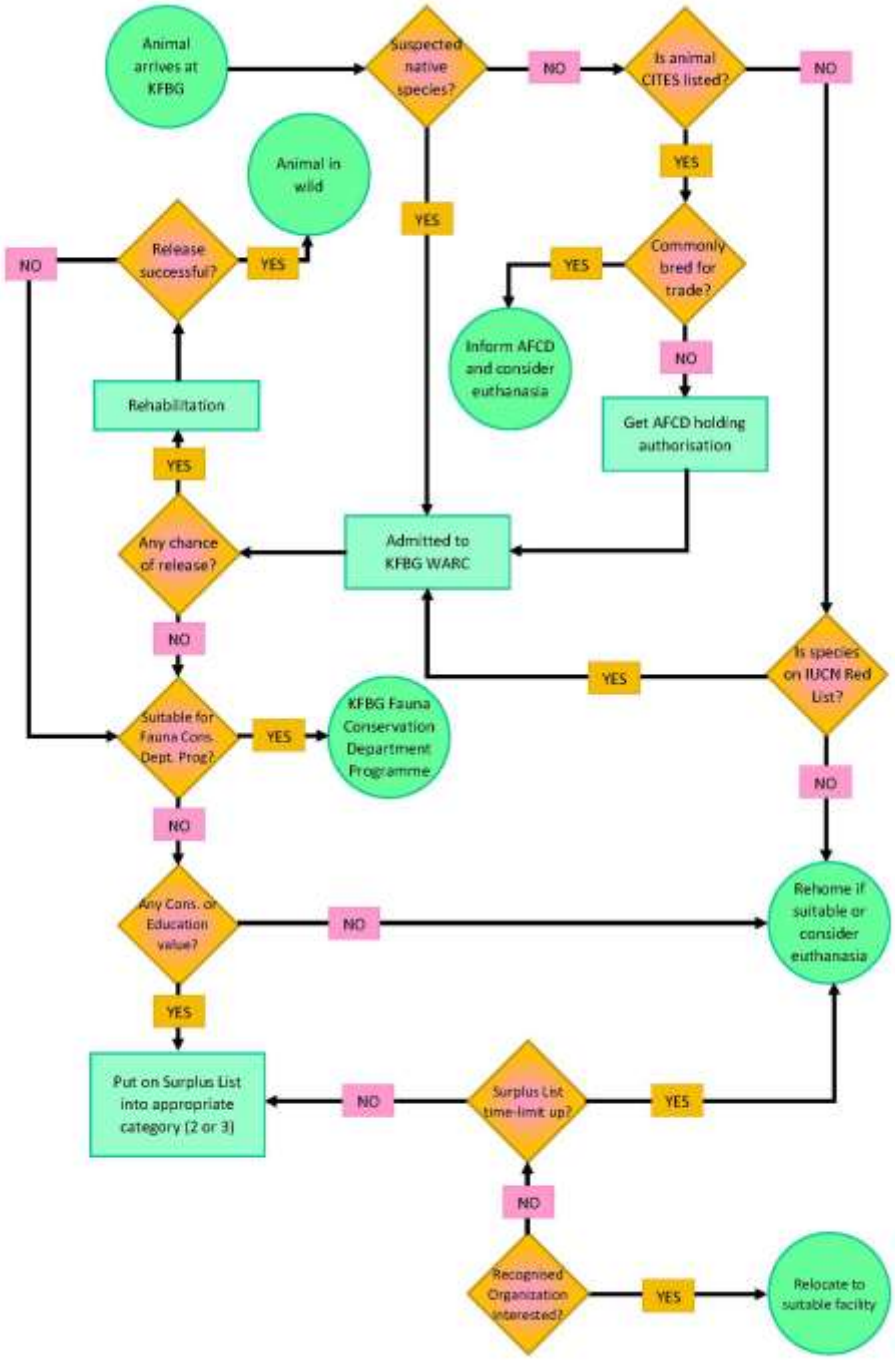
An acceptable quality of life in captivity should include all of the following;

1. Enough space to allow the animal to move around to significantly different parts of the enclosure.
2. The animal must have the physical ability to move about the enclosure with relative ease and be able to do so in a manner that approximates normal behaviour for the species, without risk of serious falls or repeated injuries.
3. The animal must be able to cope with the conditions of confinement both mentally and physically (i.e. it should not be stressed by its confinement)
4. The animal should have enough personal space from other animals and people.
5. The correct temperature range and adequate shelter should be available.
6. Ample and nutritionally complete diet.
7. A right to and provision of at least a basic level of enrichment - adequate to prevent recognized symptoms of its deficiency.

An acceptable quality of life should result in healthy, well-nourished animals that show content behaviour close to normal for the species and have no chronic injuries or wounds that would be incompatible with quality of life.

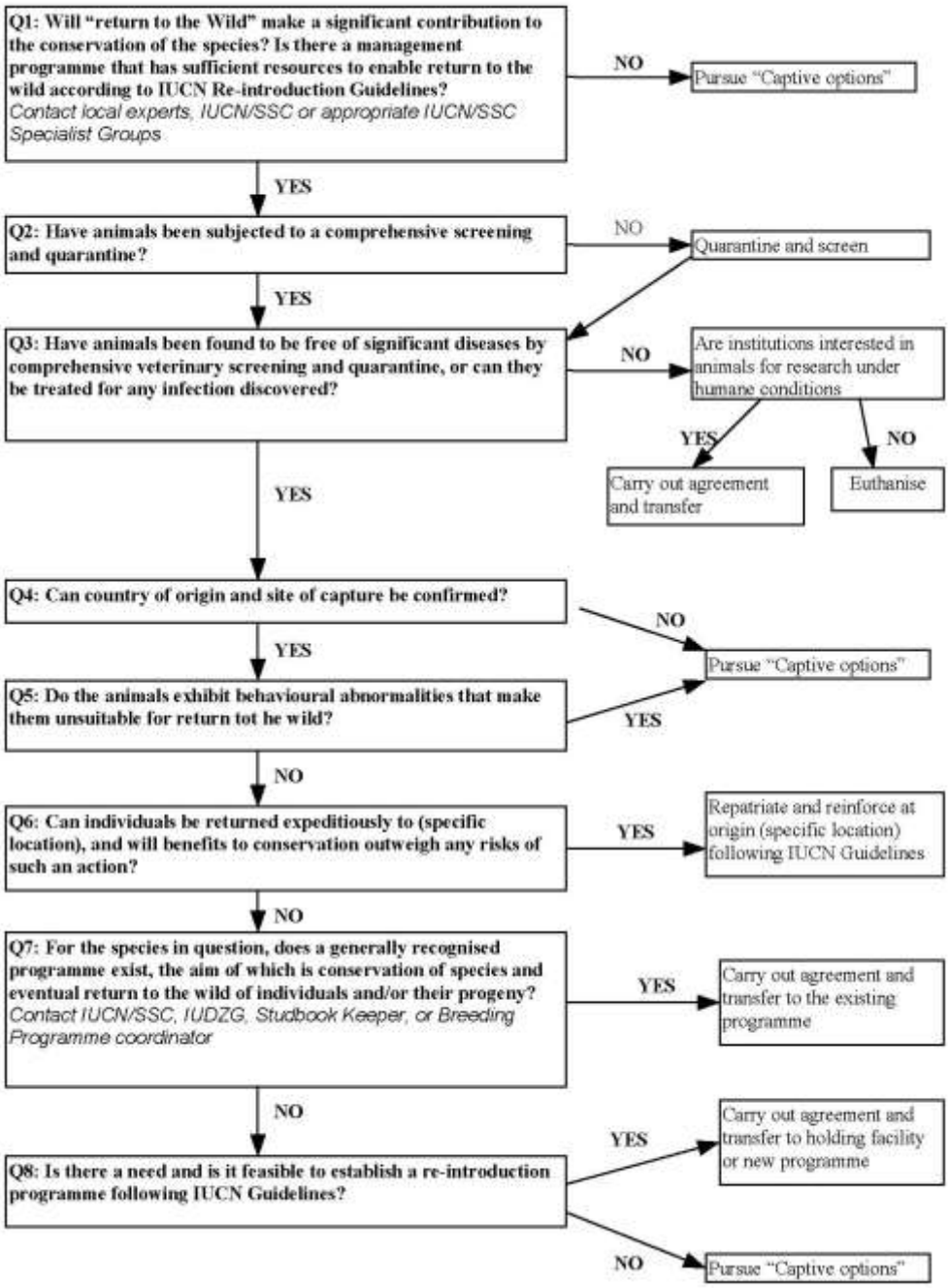
APPENDIX 3

WARC ANIMAL ACCEPTANCE, HOLDING AND PLACEMENT FLOWCHART



APPENDIX 4

DECISION TREE FOR RETURN TO THE WILD (IUCN Guidelines, 2000)



***NB:** Following this tree may not be necessary if the animal is native, known to have originated locally and injuries are minor enough for near immediate release to be considered.

APPENDIX 5

EUTHANASIA PROTOCOL

Any non-releasable wild animal that would not enjoy an acceptable quality of life in captivity should be euthanized.

Any non-releasable wild animal that is of no or minimal conservation value should be euthanized, unless it can enter an accredited Education Programme and is deemed of appropriate safe and calm temperament.

In cases involving legal actions or with special government interest, the Head of the Fauna Conservation Department should be notified before euthanasia is carried out. Exceptions may include those animals that require immediate euthanasia because of pain and suffering; in these cases the Veterinarian will be responsible for the immediate decision.

Some examples of cases that we have encountered that are candidates for euthanasia are given below:

- A bird admitted with an irreparable long-bone fracture for which amputation is the only likely treatment, resulting in a bird that cannot be released and cannot sufficiently move around its enclosure.
- A snake admitted with its fangs removed which would not be able to feed properly.
- A venomous, non-releasable snake that is of insufficient educational or conservation value to justify the cost of captive safety requirements.
- A common pet trade animal of no conservation value or educational value such as an unfriendly green iguana for which space is unavailable (If CITES listed and on Government holding, the authorities should be notified first).

APPENDIX 6

SAFETY PROTOCOL (WORKING IN ANIMAL ENCLOSURES)

The guidelines below should be followed when entering any animal enclosure and are suggested as the minimum measures taken to provide safety.

Allocation of Safety Equipment

Safety Equipment should be provided at suitable locations near all animal enclosures. The following are the minimal generic provisions:

- Helmet
- Goggles
- Gloves
- Face mask

Use of Safety Equipment

Staff members are advised to use the appropriate safety equipment when working in cages. Examples of jobs requiring safety equipment:

- Branching cages – helmet, gloves
- Working with herons – goggles
- Working with quarantined animals – protective face mask

Dangerous Animals

Staff will not be permitted entry into enclosures housing dangerous animals. Such cages will be marked with a clear sign and locked. Entry into such cages will only be given under the supervision of the officer in charge or under special instructions from the officer in charge. In such cases special measures will be undertaken to prevent injury from the animal.

APPENDIX 7

RELEASE GUIDELINES

Before any animal that has been admitted to the Wild Animal Rescue Centre (WARC) is considered for release, the following criteria should be fulfilled.

Condition

- The animal must have the physical ability to perform the natural feeding techniques that the species uses.
- The animal must have the physical ability to protect and defend itself in a normal manner.
- The animal must have the mental ability to perform points 1 and 2 above.
- The animal must have the fitness required to perform points 1 and 2 above.

Release Site and Time

The animal must be native to the area where it is to be released. Efforts should be made to ensure that animals are genetically compatible with those residents in the area. Exceptions may include birds and bats which disperse by flight.

- The release site must be the correct habitat for the animal.
- The release must take place at the time of year that the species normally occurs in the area.
- The release must not adversely affect existing populations.

Note: Advice from experts familiar with the species and its habitat needs should be sought wherever appropriate.

Approval

All releases should be assessed on a case-by-case basis. Before any release takes place, it is important that the WARC team discuss the case.

Post-Release Identification Devices and Monitoring

Whenever possible, post release monitoring should be undertaken. This includes marking the individual released (with a ring tag or microchip) as well as field observations or the use of tracking equipment.

APPENDIX 8

SNAKE ACCEPTANCE PROCEDURES

Background

The Fauna Conservation Department runs a joint rescue project for native snake species in collaboration with the Hong Kong SAR Police Force and with the knowledge and sanction of the Agriculture, Fisheries and Conservation Department (AFCD) of HKSAR Government. Under this project, police are instructed that they can deliver stray snakes on a 24-hour drop off basis, 7 days a week. Snakes if native and healthy are relocated to the wild at a safe distance from human habitation and snakes which are of unknown origin or seriously injured are euthanized.

Snake Acceptance During Office Hours (Fauna Staff in Attendance)

1. When police arrive on the premises with a snake, reception staff should immediately contact a Fauna Conservation Officer (CO). Reception staff may refuse to take any snakes that arrive in containers not of the recommended design if conservation staff are not available. Snakes should be in a canvas sack within a wooden box.
2. After informing a CO (and unless otherwise instructed), the police should be directed to the Wild Animal Rescue Centre (WARC).
3. At the WARC, a CO will take charge of the boxed snake.
   NB: NO CONTACT SHOULD BE MADE WITH THE SNAKE AT THIS TIME (**Only the designated staff can open snake boxes and bags to identify species)**
4. The Police should then be provided with replacement (spare) box and bag set.
5. The snake should remain undisturbed until such a time that a staff member approved by the Head of Department, Fauna Conservation, is available to check the identification of the species of snake and if necessary, to handle venomous snakes.
6. Once identified by the approved handlers as a non-venomous species, cases may be passed to other staff with appropriate experience, for inspection or release.
7. Venomous species of snake remain the responsibility of approved handlers only and should be labelled as such.
8. Prior to release or disposal, all information on the received snake should be noted in the 'snake rescue project manual'. Full reports are sent to the police and AFCD on a quarterly basis.

Snake Acceptance Outside Office Hours (in the Absence of Fauna Staff)

1. When police arrive on the premises with a snake, they should be received by the security guard on duty (the contact number for the security team is posted on the main gate). The first task is to ascertain if the snake is correctly bagged and boxed by asking the officers present.
   NB: THE BOX SHOULD NOT BE OPENED AT ANY POINT.
   NB: SNAKES INCORRECTLY BOXED SHOULD BE TURNED AWAY – IF BOXING IS IMPROVED, THEY CAN BE RETURNED LATER.
2. Correctly delivered snakes (still in the locked box) should be placed in the designated snake holding room and the police should be given a replacement box and bag set and hand over any related paperwork.

APPENDIX 9

SELF-EVALUATION OF FACILITIES

(Based on IWRC (International Wildlife Rehabilitation Council) Minimum Standards for Wildlife Rehabilitation 2000)

Introduction

The information and questions contained in this form are a means for rehabilitation facilities and individual rehabilitators to do a self-evaluation or self-review. The form helps to review areas including;

- Housing
- Medical treatments and diagnostics
- Disease prevention and contamination
- Food preparation
- Disinfections
- Good housekeeping
- Not all items contained in the form will apply to every facility.

Facility Review

I. *Receiving Area*

Public Information

a) Are there written policies or procedures for staff and volunteers dealing with wildlife problems?
b) Does the organization have information available to the public on the services it provides for wildlife?

Procedures

a) Does the organization have operational policies available to staff members and volunteers (e.g. operations manual, rules derived from Board decisions, or training materials)?

Records

a) Is there a medical record for each animal that has a medical problem?
b) Do animals without medical problems have records (e.g. orphans)?
c) Are the records legible?
d) Are records adequately completed (i.e. can the progress of the animal be followed by reviewing the record)?
e) Is there a system to identify each animal to its record?

Facilities

a) Is the reception area neat and presentable?
b) Is it organized so that resident patients are not subject to stress during the intake of new animals?

Telephone Services

a) For those providing help, assistance, and directions to the public, are protocols established to provide assistance in the following areas:
b) Humanely preventing or reducing wildlife problems, conflict situations, and injury?
c) Determining if animals in fact need to be rescued?
d) Providing strategies and techniques to give opportunities for mother animals to retrieve temporarily displaced young or to re-nest?
e) Suggesting safe capture, restraint and transport techniques to minimize risk of injury to animals and to humans?

II. *Intake/ Exam Area*

a) Is the area clean?
b) Is the area set up so that animals can be examined safely?
c) Are First-Aid supplies available?
d) Are there scales available to weigh animals as part of intake and assessment?
e) Are animals awaiting exam/treatment provided a warm, quiet and dark place?
f) Are facilities arranged and/or constructed to minimize stress on the animals?
g) Are the sound and activity levels minimized to reduce stress on the animal?
h) Are capture and handling equipment easily accessible and in good working order?
i) Are they used safely?
j) Are capture, handling, and restraint procedures safe for animals and humans?
k) Are the people handling wildlife trained in safe handling techniques?

III. *Facilities for Intensive Nursing Care*

a) Available at a veterinary facility
b) Available on-site
c) Are the following available for use when necessary?
d) Incubators
e) Heat sources (lamps, pads)
f) Is the area clean?
g) Is it a low-use area?

IV. *Surgery*

a) Available at veterinary clinic/hospital
b) Available on-site
c) Is the area aseptic?
d) Is there resuscitative equipment available?
e) Is there a pre-surgical prep area?
f) Is the surgical equipment in good working order?
g) Is an anaesthetic maintained?

V. *Radiology Services*

a) Available at veterinary clinic/hospital
b) Available on-site

VI. *Initial Care Facilities*

a) Do the cages meet caging standards for the species handled?
b) Are they constructed so that they can be cleaned and disinfected (e.g. stainless steel, fibreglass, sealed wood, coated port-a-pets)?
c) Are the cages cleaned regularly (as appropriate for the species and cage type)?
d) Is the area adequately ventilated in an appropriate manner?
e) Is there adequate lighting (full-spectrum light at the appropriate hours)?
f) Are isolation facilities available (on-site, at a veterinary clinic, elsewhere)?
g) Is the area away from the main flow of human activity?
h) Is there access to the area by domestic pets?

VII. *Primary Exercise Caging*

a) Do they meet caging standards for the species being handled?
b) Are they cleanable?
c) Is there a regular cleaning schedule?
d) Are they safe to the handlers and animals being held (e.g. no loose or sharp wires or nails, double doors, etc.)?
e) Are they secure (e.g. locking, sturdy, safe from predators)?

VIII. *Pharmacy*

a) Is the area clean and organized?
b) Are needed medications on hand? Are other medications available by prescription or through sponsoring organizations?
c) Are controlled drugs kept in locked, secure location?
d) Is there a log for controlled drugs?
e) Are antibiotics, parasiticides, vaccines, etc., available either in the pharmacy or on a prescription basis?
f) Are emergency medications available?

IX. *Disinfecting*

a) Is there a standard procedure and schedule for cleaning and disinfecting cages, feeding utensils, syringes, food storage containers, and food, water, and bathing bowls?
b) Are cleaning and disinfecting supplies available and stored properly?
c) Is human protective gear (gloves, masks, goggles) available?
d) Are instructions on the proper use of disinfectants displayed?
e) Is there a designated area for storage, cleaning and disinfecting of dirty items?
f) Is there a designated area for storage of clean and disinfected items?

X. *Pathology Services*

a) Available on-site
b) Available through veterinarian
c) Commercial account
d) Can the following services be provided to wildlife when necessary?
e) Haematology (PCV, Diff., Hb, WBC, Clot Time, ESR, Serum Chemistries)?
f) Parasitology?
g) Microbiology?
h) Necropsy Services?
i) If done in shelter:
j) Are separate instruments used for tissue gathering and necropsy?
k) Are dead animals disposed of in accordance with applicable ordinances or regulations?

XI. *Food Preparation and Storage*

a) Is the area clean, orderly?
b) Are adequate foodstuffs and supplies available?
c) Are foodstuffs (chicks, rats, fish) stored separately from dead (rehabilitation) animals?
d) Are perishable foodstuffs dated (open formula)?

XII. *Housekeeping and Maintenance*

a) Is there a reasonable schedule for;
i. Daily cleaning?
ii. Weekly cleaning?
iii. Seasonal cleaning?
b) Is there a continuing program for repair and upkeep of the facility?

XIII. *Library*

a) Is there a continuing program for acquisition of pertinent publications on wildlife rehabilitation?
b) Are manuals/books available on providing humane solutions to human/wildlife conflicts?
c) Are publications available that describe each species and its natural history?

XIV. *Safety*

a) Is there a fire alarm?
b) Is there a fire extinguisher(s)? Are eating, drinking, smoking, etc., restricted to designated areas?
c) Is there a first-aid kit available for staff/volunteers?
d) Are material data safety sheets (MSDSs) readily available/easily accessible for those chemicals used at the facility (disinfectants, cleansers, certain drugs, etc.)?

XV. *Organizational Standard*

a) Does the individual or organization comply with local ordinances and have current state/provincial/federal permits for the work being done?
b) Is there a grievance policy for staff/volunteers?
c) Is there a training policy for staff/volunteers?
d) Are there continuing training opportunities for staff (paid and volunteer) who have completed basic skills training (staff training sessions, IWRC and NWRA programs, etc.)?
e) Is there a liability insurance policy for volunteers to protect the facility and/or organization?
f) Is there a worker's compensation policy for employees?
g) What after-hours services are available for emergency cases (on-call person, emergency veterinary clinic service, etc.)?
h) Are there written policies to instruct the volunteers regarding rules of the organization as they relate to animal care, reporting procedures, rules on conduct?

XVI. *Continuing Education*

a) Is pertinent information collected on wildlife rehabilitation?
b) Does the permittee's organization collect such information and share it with other members?
c) Does the permittee and/or others in the organization attend continuing education classes or conferences on wildlife rehabilitation?

Fig 141. Necropsy being performed by a KFBG veterinarian

APPENDIX 10

ACCEPTANCE AND TRANSFER FORM

Kadoorie Farm Acceptance/ Transfer Form

Acceptance **Transfer** **(Circle as appropriate)**

Invertebrate	Fish	Amphibian	Reptile	Bird	Mammal

Species					
Numbers					
Date of transfer					
Time of transfer					
Transfer		PUBLIC / AFCD / SPCA / KFBG / Other			
To	From				
Location / Office to transfer					
Case Number (if any)					
ESP Number (if any)					
K Number (if any)					
ID Number (if any)					
Received by		Contact			
Signature			HKID	(First 4 digits only)	
Delivered by		Contact			
Signature			HKID	(First 4 digits only)	

PLEASE NOTE:

POSSESSION OF CERTAIN SPECIES IN HONG KONG WITHOUT A LICENCE MAY RESULT IN GOVERNMENT INVESTIGATION AND/ OR PROSECUTION.

Public surrendering animals to KFBG release all right of control over that animal.

APPENDIX 11

CASE HISTORY FORM

CASE HISTORY

1) When was this animal collected .....

2) Where has this animal come from? (Please circle)

Wild Area	Urban Built Area	Urban Park	Market Place	Illegal import/ export	Illegal trade – Pet trade
Other (please describe):					

3) Why has the animal been brought in? (Please circle)

Injury	Sickness	Weakness	Contaminated	Trapped	Abandoned by Parent
Unable to Fly / Walk / Move		Confiscated	Stray		Surrendered Dumped by Owner
OTHER					

4) Any possible cause of injury / sickness? Please describe

.....

5) Has animal been given any food or water? Please describe

.....

6) Has animal been given any medical attention? Please describe

7) Have any observations made during its time in captivity that may assist in its future care? (Please describe)

.....

8) Has the animal been in close contact with any other animals or their Food / Water / Waste in your care or transport? (Please circle)

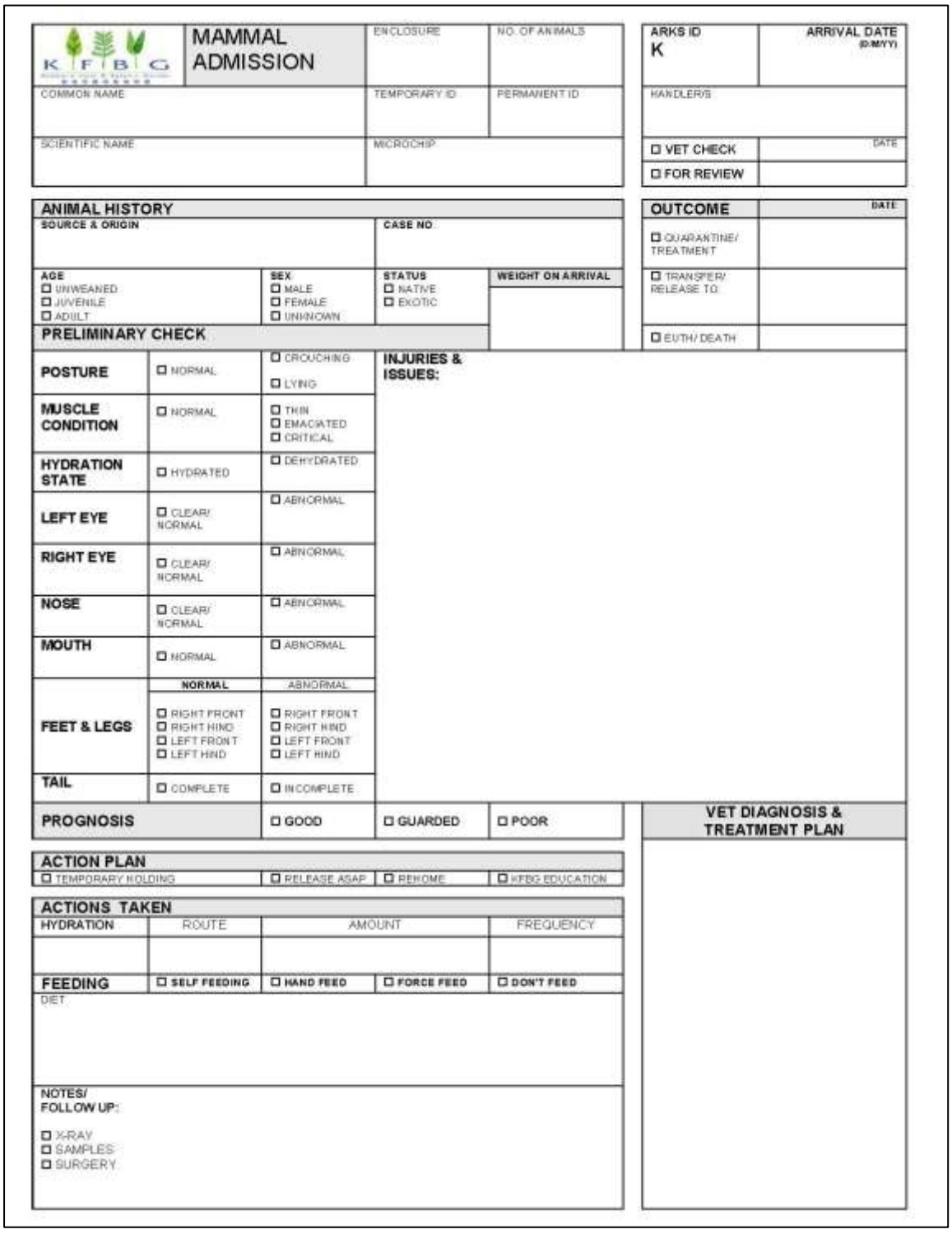
NO DO NOT KNOW (Can enquiry @ later date) YES – What type(s) of animal(s) and from what source? (Please describe)

9) Has the animal caused any human injury? NO / YES – Details

OTHER NOTES:

APPENDIX 12

MAMMAL ADMISSION FORM



MAMMAL ADMISSION	ENCLOSURE	NO. OF ANIMALS	ARKS ID: K	ARRIVAL DATE (D/M/YY)
COMMON NAME	TEMPORARY ID	PERMANENT ID	HANDLER/S	
SCIENTIFIC NAME	MICROCHIP		☐ VET CHECK	DATE
			☐ FOR REVIEW	

ANIMAL HISTORY				OUTCOME	DATE
SOURCE & ORIGIN		CASE NO.		☐ QUARANTINE/ TREATMENT	
AGE ☐ UNWEANED ☐ JUVENILE ☐ ADULT	SEX ☐ MALE ☐ FEMALE ☐ UNKNOWN	STATUS ☐ NATIVE ☐ EXOTIC	WEIGHT ON ARRIVAL	☐ TRANSFER/ RELEASE TO	
				☐ EUTH/ DEATH	

PRELIMINARY CHECK			INJURIES & ISSUES:
POSTURE	☐ NORMAL	☐ CROUCHING ☐ LYING	
MUSCLE CONDITION	☐ NORMAL	☐ THIN ☐ EMACIATED ☐ CRITICAL	
HYDRATION STATE	☐ HYDRATED	☐ DEHYDRATED	
LEFT EYE	☐ CLEAR/ NORMAL	☐ ABNORMAL	
RIGHT EYE	☐ CLEAR/ NORMAL	☐ ABNORMAL	
NOSE	☐ CLEAR/ NORMAL	☐ ABNORMAL	
MOUTH	☐ NORMAL	☐ ABNORMAL	
	NORMAL	ABNORMAL	
FEET & LEGS	☐ RIGHT FRONT ☐ RIGHT HIND ☐ LEFT FRONT ☐ LEFT HIND	☐ RIGHT FRONT ☐ RIGHT HIND ☐ LEFT FRONT ☐ LEFT HIND	
TAIL	☐ COMPLETE	☐ INCOMPLETE	

PROGNOSIS	☐ GOOD	☐ GUARDED	☐ POOR

VET DIAGNOSIS & TREATMENT PLAN

ACTION PLAN			
☐ TEMPORARY HOLDING	☐ RELEASE ASAP	☐ REHOME	☐ KFBG EDUCATION

ACTIONS TAKEN				
HYDRATION	ROUTE	AMOUNT		FREQUENCY
FEEDING	☐ SELF FEEDING	☐ HAND FEED	☐ FORCE FEED	☐ DON'T FEED
DIET				

NOTES/ FOLLOW UP:

☐ X-RAY
☐ SAMPLES
☐ SURGERY

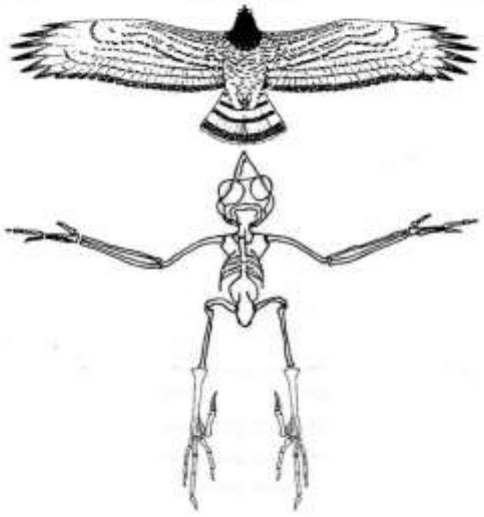
APPENDIX 13

AVIAN ADMISSION FORM

K F B G	**AVIAN ADMISSION**	ENCLOSURE	NO. OF ANIMALS	ZIMS ID K	ARRIVAL DATE (D/M/YY)
COMMON NAME		TEMP ID	PERMANENT ID	HANDLER(S)	
SCIENTIFIC NAME		MICROCHIP		□ VET CHECK □ FOR REVIEW	DATE

ANIMAL HISTORY				**OUTCOME**	DATE
SOURCE & ORIGIN		**CASE NO.**		□ QUARANTINE/ TREATMENT	
AGE □ HATCHLING □ NESTLING □ FLEDGING	□ JUVENILE □ ADULT	**SEX** □ MALE □ FEMALE □ UNKNOWN	**STATUS** □ NATIVE □ EXOTIC	**WEIGHT ON ARRIVAL**	□ TRANSFER/ RELEASE TO:
					□ EUTH/DEATH

PRELIMINARY CHECK			RIGHT — VENTRAL VIEW — LEFT
POSTURE	□ NORMAL	□ SITTING □ LYING	
MUSCLE CONDITION	□ NORMAL	□ THIN □ EMACIATED □ CRITICAL	
HYDRATION STATE	□ HYDRATED	□ DEHYDRATED	
LEFT EYE	□ CLEAR/ NORMAL	□ ABNORMAL	
RIGHT EYE	□ CLEAR/ NORMAL	□ ABNORMAL	
NOSTRILS	□ CLEAR/ NORMAL	□ ABNORMAL	
MOUTH	□ NORMAL	□ ABNORMAL	
BEAK	□ NORMAL	□ ABNORMAL	
LEFT FOOT	**GRIP** □ STRONG □ WEAK	□ LESIONS □ OTHER	
RIGHT FOOT	**GRIP** □ STRONG □ WEAK	□ LESIONS □ OTHER	



PROGNOSIS	□ GOOD	□ GUARDED	□ POOR	**UPDATE** □ ZIMS □ Paperwork □ HKBWS

ACTION PLAN		
□ TEMPORARY HOLDING	□ RELEASE ASAP	□ KFBG EDUCATION

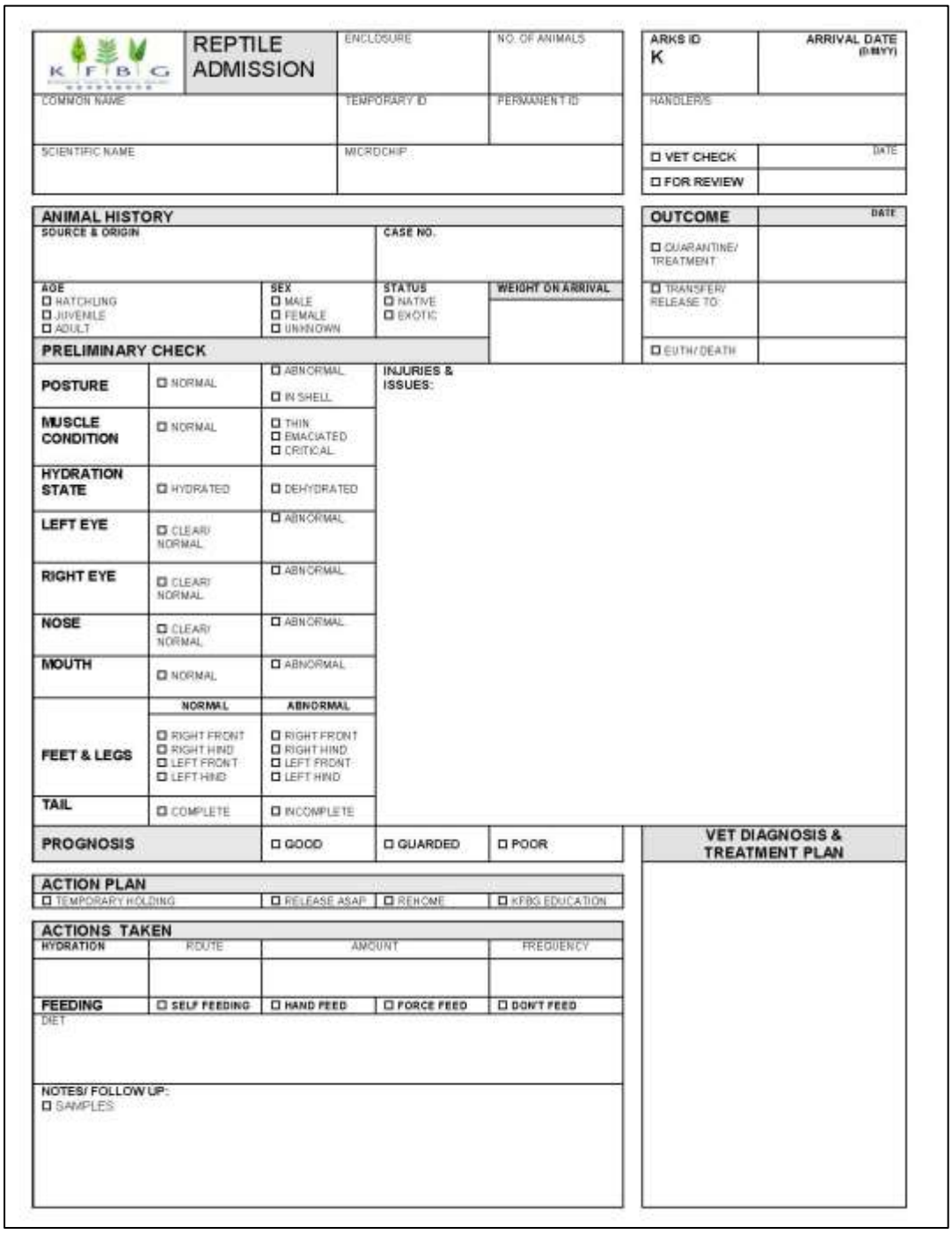
ACTION TAKEN				
HYDRATION	ROUTE	AMOUNT		FREQUENCY
FEEDING	□ **SELF FEED**	□ **HAND FEED**	□ **FORCE FEED**	□ **DON'T FEED**

OFFER DISH FOOD		
□ Passerine pellet □ Insectivore pellet	□ Live insects □ Chopped fruit	□ Corn and Beans □ Vegetable
□ Offer_____Prey items	□ _____Mixed fish	□ Others_____

HF/FF	_____ cc Passerine/ Insectivore/ Dove diet/ In+beef	QID/TID/BID/SID/Hourly

APPENDIX 14

REPTILE ADMISSION FORM



REPTILE ADMISSION

ENCLOSURE	NO. OF ANIMALS	ARKS ID: K	ARRIVAL DATE (D/M/YY)
COMMON NAME	TEMPORARY ID	PERMANENT ID	HANDLER/S
SCIENTIFIC NAME	MICROCHIP	☐ VET CHECK	DATE
		☐ FOR REVIEW	

ANIMAL HISTORY

SOURCE & ORIGIN	CASE NO.	OUTCOME	DATE
		☐ QUARANTINE/ TREATMENT	

AGE	SEX	STATUS	WEIGHT ON ARRIVAL	☐ TRANSFER/ RELEASE TO:	
☐ HATCHLING ☐ JUVENILE ☐ ADULT	☐ MALE ☐ FEMALE ☐ UNKNOWN	☐ NATIVE ☐ EXOTIC		☐ EUTH/ DEATH	

PRELIMINARY CHECK

			INJURIES & ISSUES:
POSTURE	☐ NORMAL	☐ ABNORMAL ☐ IN SHELL	
MUSCLE CONDITION	☐ NORMAL	☐ THIN ☐ EMACIATED ☐ CRITICAL	
HYDRATION STATE	☐ HYDRATED	☐ DEHYDRATED	
LEFT EYE	☐ CLEAR/ NORMAL	☐ ABNORMAL	
RIGHT EYE	☐ CLEAR/ NORMAL	☐ ABNORMAL	
NOSE	☐ CLEAR/ NORMAL	☐ ABNORMAL	
MOUTH	☐ NORMAL	☐ ABNORMAL	
	NORMAL	**ABNORMAL**	
FEET & LEGS	☐ RIGHT FRONT ☐ RIGHT HIND ☐ LEFT FRONT ☐ LEFT HIND	☐ RIGHT FRONT ☐ RIGHT HIND ☐ LEFT FRONT ☐ LEFT HIND	
TAIL	☐ COMPLETE	☐ INCOMPLETE	

PROGNOSIS	☐ GOOD	☐ GUARDED	☐ POOR

VET DIAGNOSIS & TREATMENT PLAN

ACTION PLAN

☐ TEMPORARY HOLDING	☐ RELEASE ASAP	☐ REHOME	☐ KFBG EDUCATION

ACTIONS TAKEN

HYDRATION	ROUTE	AMOUNT	FREQUENCY

FEEDING	☐ SELF FEEDING	☐ HAND FEED	☐ FORCE FEED	☐ DON'T FEED

DIET

NOTES/ FOLLOW UP:
☐ SAMPLES

APPENDIX 15

HOSPITALIZATION AND TREATMENT RECORD

KFBG	ID:		TREATMENT PLAN
PAGE 1 / ENCLOSURE	ZIMS ID K	CONFINED FOR: □ FEED UP / HAND REAR & RELEASE □ VETERINARY TREATMENT □ OBSERVATION □ OTHER	
ARRIVAL DATE	SPECIES		

DATE	WEIGHT	NOTES	TREATMENT/ ENCLOSURE MOVE

APPENDIX 16

GENERAL QUARANTINE PRINCIPLES

Introduction

The KFBG Wild Animal Rescue Centre will endeavour to ensure that animals in quarantine and their waste will remain separated from all non-quarantine cases. Where possible, quarantine animals will be provided a dedicated facility. Due to the nature of a rescue centre and the flow of animals through it, it is recognised that total isolation may not always be possible. In such cases, husbandry and management practices will be modified to ensure that the best and most realistic quarantine barriers possible are in place.

3 Colour Coded Levels of Quarantine		
Level	Protection	Requirement
FULL (RED)	Mask Gloves Goggles Footbath	Compulsory Compulsory Compulsory Compulsory
NORMAL (YELLOW)	Mask Gloves Goggles Footbath	Recommended Recommended Recommended Compulsory
NO QUARANTINE (GREEN)	Mask Gloves Footbath	Recommended Recommended Recommended

Qualifying Statements

1. All new cases are categorized as normal quarantine (yellow) until such a time that the attending veterinarian states otherwise.
2. The red level denotes that animals have to be isolated and they possibly carry an infectious/zoonotic disease.
3. The green level denotes that animals have finished the required quarantine period and are ready to be RELEASED/RELOCATED/REHOMED (note: some local wild animals may not require a fixed quarantine period, to be decided by the veterinarian).
4. The Veterinarian will notify staff regarding the level of quarantine and is responsible to ensure that the animal records clearly indicate the quarantine status and any related Health and Safety management issues that arise as a result. The procedure should be clear to all staff working in the relevant areas.
5. The above management practices are in place to safeguard staff and animals from possible disease risk associated with working with animals.
6. The management guidelines apply to all animal cases admitted to the WARC and animals held under permanent exhibit. The guidelines set out standard practice and

deviation will only be allowed on a case by case basis under the instruction and approval of the attending veterinarian.

7. In any animal handling, care and husbandry situation other protocols relating to health and safety or access may also apply and should be followed in addition to these management practices.
8. In all cases wash/disinfect hands before and after handling or husbandry work. Utilize the appropriate clothing and cleaning equipment and agents provided. Utilize dedicated tools when provided or instructed to do so. Always take care to minimize your and other staff's risk of contamination. Immediately report any personal injury or practices that may put a staff member at risk.
9. It is the responsibility of the supervising officer in charge of a case to ensure all staff in contact with a case are aware of the quarantine requirements. A colour coded flagging system as shown above will indicate the risk levels. A red card will be placed on enclosures containing high risk "full quarantine" cases. Enforcement responsibility lies with the case supervisor, which will normally be the veterinary officer, senior conservation officer or conservation officer. The department head is responsible for ensuring that all agreed safety equipment is available. Staff should report immediately if any safety equipment is lost or faulty in order to get immediate replacements.

Special Consideration

1. All dead chickens will be delivered to the WARC. They will be placed outside the VH in the designated plastic bin and await disposal – 1. Sentinels will be sent to the Govt lab with "non-AI vaccinated" printed on the lab form. 2. Non-Sentinels will also be sent to the Gov lab with clear indication of the vaccination status.
2. Birds entering the WARC acceptance procedures may be asymptomatic but later test POSITIVE for Avian Influenza (Govt. Lab). In this case, a prompt response is expected from AFCD, but the immediate Farm staff response on receiving notice of an AI positive bird should be:
    - Open a conversation channel with AFCD on receiving the result from the lab
    - Make the room/ward where the bird presently is as HIGH QUARANTINE ROOM (RED)
    - Raise the KFBG Biosecurity Measures to KFBG Serious Response Level (Red) whether or not KFBG is on Alert Response Level or No Response Level
    - No staff are allowed to go in without direct permission from the Vet or DH
    - No animal movements are allowed in-out of the room
    - No tools/cages/instruments are allowed in-out of the room
    - Isolate all animals that have been in contact (even briefly) with the affected bird with consideration for ALL infectious pathways and implement suitable barrier techniques
    - High biosecurity measures should be put in place (masks, gloves, goggles and wet disinfectant mats) for that room

- Do a survey of all the staff who have been in contact with the affected animal and follow advice from AFCD/Hygiene Department which might involve isolation/testing
- Liaise with AFCD for any additional measures
- The subject bird will be collected by AFCD personnel.

3. All mammals, if reported to have bitten someone, may be required to be held for observation for ten days, in order to confirm that the mammal shows no signs of RABIES.

Fig. 142. Female Rhesus Macaques (*Macaca mulatta*) on exhibit after quarantine

APPENDIX 17

ROUGH BIRD FEEDING GUIDE

		Combinations	**Species**
1		• Corn • Peas • Beans • Seeds • Mixed cereals • Chopped soft fruit	• Pigeons • Doves
2		• Mixed Seed • Millet • Rape Seed • Small amount fruit & insects	• Finches • Sparrows • Canaries • Munias • Hawfinches • Buntings
3		• Commercial songbird /Chicken feed • Mixed soft fruit & Insects	• Songbirds • White eyes • Hwamei • Mynahs • Starlings • Bulbuls • Magpie Robins

4		• Commercial Songbird/ Chicken feed • Insects • Leafy vegetable	• Chickens • Pheasants • Water hens • Rails • Quails
5		• Quail • Mice • Chicks (From frozen, properly defrosted)	• Eagles • Owls • Hawks • Falcons • Kites
6		• Commercial parrot food, Sunflower seed • Fruit/Vegetable (larger pieces are OK)	• Parrots • Parakeets • Lories • Lorikeets • Lovebirds • Cockatoos
7		• Fish/ frogs/ shrimp • Chicks/ mice (size to fit bird bill/mouth)	• Egrets • Herons • Bitterns

APPENDIX 18

BIRD WEIGHTS AND FEEDING GUIDELINES

嘉道理農場暨植物園公司
Kadoorie Farm & Botanic Garden Corporation

HK BIRD WEIGHTS AND DIET REFERENCE

SPECIES	WEIGHT RANCE			DIET			
	Pre Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Red-footed Booby *Sula sula*			650g (thin)				
Great Cormorant *Phalacrocorax carbo*			1.5 – 2.3kg	7	Variety of insects, amphibians, fish, crustaceans	Ad lib	
Grey Heron *Ardea cinerea*		1kg	1.2 – 1.35kg	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (30 fish)	
Chinese Pond Heron *Ardeola bacchus*		170 – 250g	250 – 350g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (30 fish)	
Night Heron *Nycticorax nycticorax*		280 – 330g	300 – 600g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (200 fish)	
Striated Heron *Butorides striatus*		149g	160 – 200g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (15 fish)	
Cattle Egret *Bubulcus ibis*			230 – 350g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (15 fish)	
Great Egret *Egretta alba*	400g		700g – 1.1kg	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (30 fish)	
Intermediate Egret *Egretta intermedia*			400g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (20 fish)	
Pacific Reef Egret *Egretta sacra*			550g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (20 fish)	
Little Egret *Egretta garzetta*	0 – 200g	180 – 350g	300 – 440g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (20 fish)	
Yellow Bittern *Ixobrychus sinensis*			50 – 80g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (10 fish)	
Chestnut (Cinnamon) Bittern *Ixobrychus cinnamomeus*			80 – 120g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (10 fish)	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Black Bittern *Dupetor flavicollis*		140 – 240g	200 – 270g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (15 fish)	
Schrenks Bittern *Ixobrychus eurhythmus*		95 – 113g	60 – 105g	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (10 fish)	
Black Faced Spoonbill *Platalea minor*			1.2 – 1.7kg	7	Variety of insects, amphibians, small fish, crustaceans	Ad lib (30 fish)	
Common Shelduck *Tadorna tadorna*			900g – 1.2kg		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Ruddy Shelduck *Tadorna ferruginea*			1 – 1.3kg		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Northern Pintail *Anas acuta*			700 – 900g		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Northern Shoveler *Anas clypeata*			450 – 650g		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Eurasian Wigeon *Anas Penelope*			500 – 700g		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Common Teal *Anas crecca*			250 – 350g		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Gargany *Anas querquedula*			300g		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Mandarin Duck *Aix galericulata*			250 – 300g		Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
White fronted Goose *Anser albifrons*					Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Swan Goose *Anser cygnoides*					Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Bean Goose *Anser fabalis*					Poultry/ Duck pellets, cracked corn, millet, green vegetables	Ad lib	
Japanese Quail *Coturnix japonica*			60 – 70g	4	Insects, crustaceans, seed, chicken feed, plant matter	Ad lib	
Yellow Legged Button Quail *Turnix turnix*		49g	50g	4	Insects, crustaceans, seed, chicken feed, plant matter	Ad lib	
Slaty-breasted (Banded) Rail *Gallirallus striatus*		120g	100g	4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
Band-bellied Crake *Porzana paykull*			95 – 110g	4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
Slaty-legged Crake *Rallina eurizonoides*		77 – 102g	100g	4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
White Breasted Waterhen *Amaurornis phoenicrus*	40 – 100g	100 – 130g	120 – 190g	4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
Watercock *Gallirallus cinerea*			180 – 295g	4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
Common Moorhen *Gallinula chloropus*			200 220g	4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
Pheasant Tailed Jacana *Hydrophasianus chirugus*		140 – 160g		4	Insects, molluscs, crustaceans, seed, plant matter	Ad lib	
Grey Headed Lapwing *Vanellus cinerus*		218 – 253g		4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	
Black Winged Stilt *Himantopus himantopus*		134g			Molluscs, insects, diatoms, brine shrimp	Ad lib	
Pied Avocet *Recurvirostra avosetta*			260 – 190g	4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Black-Tailed Godwit *Limosa limosa*		140g		4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	
Eurasian Curlew *Numenius arquata*		640g		4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	
Greater Sand Plover *Charadrius leschenaultii*			100 – 120g	4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds		
Black-Tailed Godwit *Limosa limosa*							
Spotted Redshank *Tringa erythropus*			120 – 150g	4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	
Common Sandpiper *Actitis hypoleucos*				4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	
Sharp-tailed Sandpiper *Calidris acuminata*		68g		4	Insects, Larvae, molluscs, worms, some vegetable matter, seeds	Ad lib in soil	
Eurasian Woodcock *Scolopax rusticola*			180 – 300g		Earthworms & Insects	Ad lib in soil	
Greater Painted Snipe *Rostratula benghalensis*		101 – 112g	110 – 125g		Earthworms & Insects	Ad lib in soil	
Common/ Fan Tailed Snipe *Gallinago gallinago*			75g		Earthworms & Insects	Ad lib in soil	
Streaked Shearwater *Calonectris leucomelas*		287g	400 - 588g	7	Mainly Fish	Ad lib	
Black tailed Gull *Larus crassirostris*		357g	508g	7	Mainly Fish	Ad lib	
Herring Gull *Larus argentatus*		950		7	Mainly Fish	Ad lib	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Black-Headed Gull *Larus ridibundus*			170 - 250g	7	Mainly Fish	Ad lib	
Common Tern *Sterna hirundo*			70 – 100g	7	Mainly Fish	Ad lib	
Spotted Dove *Streptopelia chinensis*	Up to 60g	60 – 110g	110 – 140g	1	Corn, beans, peas, seeds, cereals & soft fruits	Ad lib	
Emerald Dove *Chalcophaps indica*			82 – 110g	1	Corn, beans, peas, seeds, cereals & soft fruits	Ad lib	
Oriental Turtle Dove *Streptopelia orientalis*			160g	1	Corn, beans, peas, seeds, cereals & soft fruits	Ad lib	
Feral Pigeon *Columba livia*			274g	1	Corn, beans, peas, seeds, cereals & soft fruits	Ad lib	
Oriental Cuckoo *Cuculus saturatus*		82g	75g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib (insects main diet)	
Large Hawk Cuckoo *Hierococcyx sparverioides*			118g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib (insects main diet)	
Hodgson's Hawk Cuckoo *Hierococcyx fugax*			71g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib (insects main diet)	
Asian Lesser Cuckoo *Cuculus poliocephalus*			80g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib (insects main diet)	
Koel *Eudynamis scolopacea*	Up to 104g	100 – 160g	160 – 250g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib (insects main diet)	
Greater Coucal *Centropus sinensis*	Up to 200g	200 – 260g	270 – 350g	3	Song Bird feed/chicken feed, Insects, soft fruits, meat	Ad lib (insects main diet)	
Lesser Coucal *Centropus bengalensis*			70 – 110g	3	Song Bird feed/chicken feed, Insects, soft fruits, meat	Ad lib (insects main diet)	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Red Winged Crested Cuckoo *Clamator coromandus*			69g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib (insects main diet)	
Savanna Nightjar *Caprimulgus affinis*			80g		Insectivore (minced beef & insect mash)	May need to be hand fed	
Grey Nightjar *Caprimulgus indicus*		111g	90g		Insectivore (minced beef & insect mash)	May need to be hand fed	
Common Kingfisher *Alcedo atthis*			17 – 30g	7	Fish, shellfish, Insects	Ad lib (10 fish)	
White-breasted Kingfisher *Halcyon symrnensis*		84g	78g	7	Fish, shellfish, Insects	Ad lib (10 fish)	
Blyths Kingfisher *Alcedo hercules*			60 – 70g	7	Fish, shellfish, Insects	Ad lib (10 fish)	
Little (House) Swift *Apus affinis*	Up to 18g	18 – 25g	20 – 30g		Insectivore (minced beef & insect mash)	Must be hand fed	
Barn Swallow *Hirundo rustica (gutturalis)*			14g		Insectivore (minced beef & insect mash)	Must be hand fed	
Oriental Skylark *Alauda gulgula*			44g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Tree Sparrow *Passer montanus*	9 – 14g	19 – 22g	20g	2	Mixed seeds, insects, soft fruit	Ad lib	
Olive-backed Pipit *Anthus hodgsoni*			20 – 25g	2	Mixed seeds, insects, soft fruit	Ad lib	
Red-whiskered (Crested) Bulbul *Pycnonotus jocosus*	17g	24g	30 – 49g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Chinese Bulbul *Pycnonotus sinensis*		27g		3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Black Bulbul *Hypsipetes leucocephalus*			45 – 50g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Bohemian Waxwing *Bombycilla garrulus*		Summer: 45 – 55g Winter: 55 – 65g		3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Oriental Magpie Robin *Copsychus saularis*	18 – 23g	30g	34 – 42g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Blue (Violet) Whistling Thrush *Myophonus caeruleus*	Up to 90g		128 – 140g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Blackbird *Turdus merula*			100 – 104g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
White's (Scaly)Thrush *Zoothera dauma*			123g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Lanceolated Warbler *Locustella lanceolata*			12g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Pallas's Leaf Warbler *Phylloscopus proregulus*			5g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Black-Faced Laughing Thrush *Garrulax perspicullatus*			100 – 130g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Hwamei *Garrulax canourus*			45 – 60g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Fork Tailed Sun Bird *Aethopyga christinae*			5g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Japanese White-Eye *Zosterops japonica*		6g	7 – 11g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Long-tailed Shrike *Lanius schach*			50 – 60g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

SPECIES	WEIGHT RANCE			DIET			
	Pre-Fledge	Sub Adult	Adult	Diet No.	Food Type	Min. Quantity per day	Bill Type
Brown Shrike *Lanius cristatus*			21g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Black-naped Oriole *Oriolus chinensis*			60 – 80g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Silver Oriole *Oriolus mellianus*			70 – 80g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Common Magpie *Pica pica*		90 – 160g	110 – 180g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Blue Magpie *Urocissa erythrorhyncha*			120 – 150g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Crested Myna *Acridotheres cristatellus*			50 – 111g	3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Black-necked Starling *Sturnus nigricollis*	75g			3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Silky Starling (Red Billed Starling) *Sturnus sericeus*		60g		3	Song Bird feed/chicken feed, Insects & soft fruits	Ad lib	
Spotted Munia *Lonchura punctulata*			9g	2	Mixed seeds, insects, soft fruit	Ad lib	
White backed Munia *Lonchura striata*			13g	2	Mixed seeds, insects, soft fruit	Ad lib	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

BIRDS OF PREY	WEIGHT RANCE			DIET			
	Juvenile	Male	Female	Diet No.	Food Type	Min. Quantity per day	Bill Type
Bonelli's Eagle *Hieraaetus fasciatus*		1995g (thin)		5	Mice, day old chicks	5	
Black Kite *Milvus migrans (lineatus)*		650 – 900g	750g – 1.2kg	5	Mice, day old chicks & fish	4	
Common Buzzard *Buteo buteo*		450 – 650g	550 – 900g	5	Mice, day old chicks & fish	3	
White-Bellied Sea Eagle *Haliaeetus leucogaster*		2 – 2.8kg	2.2 – 3kg	5 & 7	mice, day old chicks & fish	6	
Black-Shouldered Kite *Elanus caeruleus*		213 – 230g	230 – 275g	5	Mice, day old chicks	2	
Black Baza *Avicedo leuphotes*		130 – 160g	150 – 200g	5	Mice, day old chicks	1	
Crested Goshawk *Accipiter trivirgatus*		220 – 450g	400 – 700g	5	Mice, day old chicks	2	
Northern Goshawk *Accipiter gentilis*		500 – 650g	600 – 800g	5	Mice, day old chicks	4	
Saker Falcon *Falco Cherrug*			800g – 1.2kg	5	Mice, day old chicks	3	
Japanese Sparrowhawk *Accipiter gularis*		100 – 120g	110 – 160g	5	Mice, day old chicks	1	
Besra *Accipiter virgatus*		125 – 140g	170 – 246g	5	Mice, day old chicks	1	
Crested Serpant Eagle *Spilornis cheela*		860g – 1.6kg	1.3 – 1.9kg	5	Mice, day old chicks	4 - 5	
Grey- Faced Buzzard *Butastur indicus*		280 – 400g	350 – 550g	5	Mice, day old chicks	2	

HK BIRD WEIGHTS AND DIET REFERENCE

(Cont'd)

BIRDS OF PREY	WEIGHT RANCE			DIET			
	Juvenile	Male	Female	Diet No.	Food Type	Min. Quantity per day	Bill Type
Common Kestrel *Falco tinnunculus*		120 – 170g	130 – 190g	5	Mice, day old chicks	1	
Amur Falcon *Falco amurensis*			163g	5	Mice, day old chicks	1	
Hobby *Falco subbuteo*		130 – 155g		5	Mice, day old chicks	1	
Peregrine Falcon *Falco peregrinus*		400 – 600g	600g – 1kg	5	Mice, day old chicks & fish	3	
Eastern Grass Owl *Tyto longimembris*		300 – 400g	350 – 450g	5	Mice, day old chicks	2	
Oriental Scops Owl *Otus sunia*		60 – 80g	70 – 90g	5	Mice, day old chicks	1	
Mountain Scops Owl *Otus spilorephalus*			70 – 100g	5	Mice, ay old chicks	1	
Collared Scops Owl *Otus lempiji*	80 – 120g	120 – 160g	140 – 180g	5	Mice, day old chicks	1	
Asian Barred Owlet *Glaucidium cuculoides*	100 – 130g	130 – 185g	150 – 200g	5	Mice, day old chicks	1	
Brown Hawk Owl *Ninox scutulata*			181 – 225g	5	Mice, day old chicks	1	
Eurasian Eagle Owl *Bubo bubo*		1.2 – 1.6kg	1.5 – 2.2kg	5	Mice, day old chicks	4 – 5	
Brown Fish Owl *Ketupa zeylonensis*		1.1 – 1.3kg	1.3 – 1.6kg	5 & 7	Mice, day olf chicks & fish	4 – 5	

NOTE: Diet No. refers to Bird Feeding Guide Document

APPENDIX 19

BIRD RELEASE ASSESSMENT FORM

Release Assessment form for Bird

Assessment based on the Animal 's condition		
Physical condition		**Explanatory note**
Body Scoring	Critical/ Emaciated/Thin/Normal/Fat	Proportion of muscle and fat is within the normal range of the species at similar age and gender
Weight	Overweight / Good / Underweight	Weight within the normal range of the species at similar age and gender
Fitness Scoring	Fit / Unfit	Determined by muscle condition and whether it can sustain flight (not tired easily)
Feathers	Complete/ Moulting / Damaged / Missing	
Waterproof	Yes/No	Do the feathers repel water when sprayed
Locomotive skills	Good/ Requires training / In doubt	Able to walk, perch, fly, land and catch food
Injury Recovery	Injury resolved/ No	No active injury
Sign of Disease	Yes / No	No sign of active disease and clinical illness
Behaviour		
Ability to Preen	Yes / No	Judge by feathers condition and degree of waterproofing
Normal Behaviour	Yes / No	Exhibit normal behavior of the species (e.g. perch high up on branch)
Avoid Predation	Yes / No	Whether there is an Instinct to hide and avoid potential predator
Ability to Escape from Predation	Yes / No	Judged by how easily can be caught
Foraging Behaviour		
Foraging Skills	Yes / No	Possesses ability to catch, maneuver food and hunt live prey
Prey Recognition	Yes / No	Judged by the ability to self-feed on different food/prey items
Other factors		
Age of Independent Survival	Yes / No	Refer to the species normal age of independence from parents in the wild or can be returned to nestling site
Adapt to Captivity	Yes / No	Can the animal survive under captive care without stress?
Possible knowledge of the wild	Yes / No	Does the animal require to establish territories or already has possible territories in the wild
External Factors that may influence release decision		
Habitat	Yes / No	The availability of release locations with suitable habitat for the survival of the species
Migrating Season	Yes / No	Does the animal migrate and does a migrating population still exist at the site of release
Weather	Yes / No	Is weather condition suitable for release
Timing of Release	Morning / Afternoon / Dusk / Night	Timing for release should be determined by the species' active foraging time
Release Technique	Hard release / Supportive and hack cage release	Release techniques to be determined by the individual's ability to forage and establish territory
Individual Identification	Yes / No	Required for post release monitoring purposes
Monitoring	Yes / No	Any plan for post release monitoring
Suitable for release ☐	Recommend- training ☐	Continue observations ☐

Specimen Assessed: ..... **ID:** ..... **Record #**.....

Assessment Date: ..... **Assessed by :**

Re-assessed date if required:

APPENDIX 20

NON-FLYING MAMMAL RELEASE AND ASSESSMENT FORM

Assessment form for Non-Flying Mammals

3.2 Prey Recognition (Only for predatory mammals)	**Previous exposure to :**		Judged by the previous exposure of the diversity of potential prey items. An animal ready for release must have exposure to at least three types of prey items from the list.
	a) Small mammals (?g)	Yes / No / N/A	
	b) Bird	Yes / No / N/A	
	c) Lizard	Yes / No / N/A	
	d) Snake	Yes / No / N/A	
	e) Frog	Yes / No / N/A	
	f) Fish	Yes / No / N/A	
	g) Live insects	Yes / No / N/A	
4. Other factors			
4.1 General veterinary health check completed	Yes / No		Faecal, Blood, Deworm, M'chip, X Ray, vaccine
4.2 Age	**(i) Age of Independent Survival**	Yes / No	Refer to the species normal age of independence from parents in the wild
	If "No" for (i), Possibility to return to parents or surrogate parents or discovery site	Yes / No	Determined by the known location of parents or if communal groups available that may possibility adopt the dependent animals
Adapt to Captivity	Yes / No		Can the animal survive under captive care without stress?
Territorial animal	Yes / No		Does the animal require to establish territories or already has possible territories in the wild
Possible knowledge of the wild	Yes / No		Previous experiences living in the wild – usually judged by the age of admission
External Factors that may influence release decision			
Habitat	Yes / No		The availability of release locations with suitable habitat for the survival of the species
Season	Yes / No		Does the season of the proposed released date have high enough productivity that could support and allow good chance of survival of release individual
Weather	Yes / No		Is weather condition suitable for release
Timing of Release	Morning / Afternoon / Dusk / Night		Timing for release should be determined by the species' active foraging time
Release Technique	Hard release / Supportive and hack cage release		Release techniques to be determined by the individual's ability to forage and establish territory
Individual Identification	Yes / No		Required for post release monitoring purposes
Monitoring	Yes / No		Any need or plan for post release monitoring

Suitable for release ☐ Proposed released location: _____

Recommend- further training ☐ Proposed Training on : _____

Continue observations ☐ Proposed re-assessment on : _____

Specimen Assessed: ..... **ID:** ..... **Record #**.....

Assessment Date: ..... **Assessed by :**

Re-assessed date if required:

APPENDIX 21

CODE OF ETHICS POSTER Page 1

APPENDIX 22

CODE OF ETHIC POSTER Page 2

APPENDIX 23

Wild Animal Rescue Centre PUBLIC AWARENESS POSTER

APPENDIX 24

PUBLIC AWARENESS ADVISORY POSTER – Birds (Download from www.kfbg.org)

APPENDIX 25

INFORMATION DECISION TABLE (Notifying the Authorities)

Programme	Native Species	Cap 170 protected	CITES Listed	Examples	Origin	Outcome	AFCD prior permission Significant Treatment/ Euthanasia required Y/N	AFCD Prior permission Disposal of Carcass required Y/N	Relevant divisions of AFCD
Wild Animal Rescue:	✓	✓	✓	Raptors, Hwa Mei, Macaques	HK Wild Public/SPCA/ AFCD	Release to Wild	N*	Y	WFCD
	✓	✓		Barking Deer, Porcupine All Birds, Bats			N*	Y	WFCD
Permit AF GR CON 09/51	✓			Wild Boar			N	Y	WFCD
Wild Animal Rescue:	✓	✓	✓	Raptors, Macaques	AFCD / HK Customs Dept Confiscations ESP Cases Stray Pets	Temp. holding for AFCD until alternate placement found	Y	Y	ESPD
	✓	✓		All birds			Y	Y	WFCD, IED or AMD
AF GR CON 07/10			✓	Lorises, Parrots, Raptors, Turtles, Iguanas			Y	Y	ESPD
APO/Exemption/13/10				Turtles, reptiles			Y	Y	IED or AMD
Education: Live Animal Displays	✓	✓	✓	Raptors, Macaques	Non releasable animals entered via Wild Animal Rescue Programme/ Donation from AFCD Private purchase/ Private Donation Private purchase/ Private Donation/	Long term Placement at KFBG. *CITES Permit obtained	N* (Cap 170 listed animals of local origin) Y (Cap 586 listed animals of non-local origin)	Y	WFCD or ESPD
Cap 139	✓	✓		All Birds, porcupines, Barking Deer, Squirrels, Bats		Long term Placement at KFBG	N*	Y	WFCD
	✓			Wild Boar			N	Y	WFCD
			✓	Turtles, Flamingos, Parrots		Long term Placement at KFBG. *CITES Permit obtained	N	Y	ESPD
				Turtles, reptiles, insects, fish		Long term Placement at KFBG	N	N	Outside the ambit of AFCD

*As per AF GR CON 09/51 Conditions no.s 5 & 6 appropriate veterinary care is provided and cases of serious illness, noticeable disease and death are reported.

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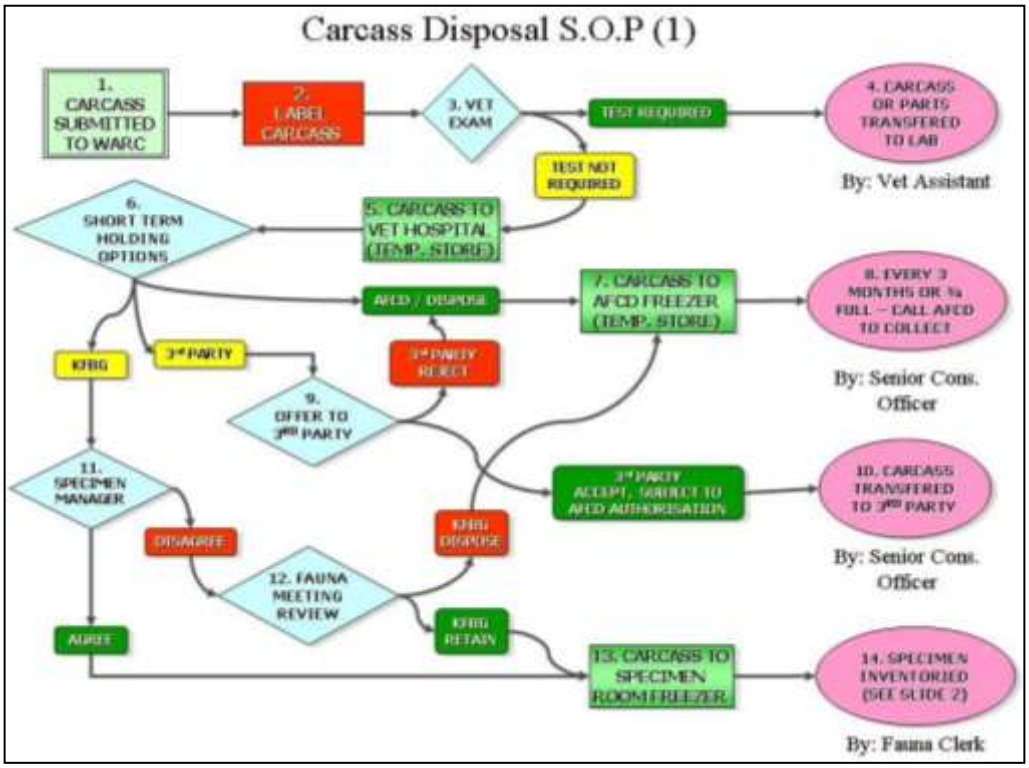
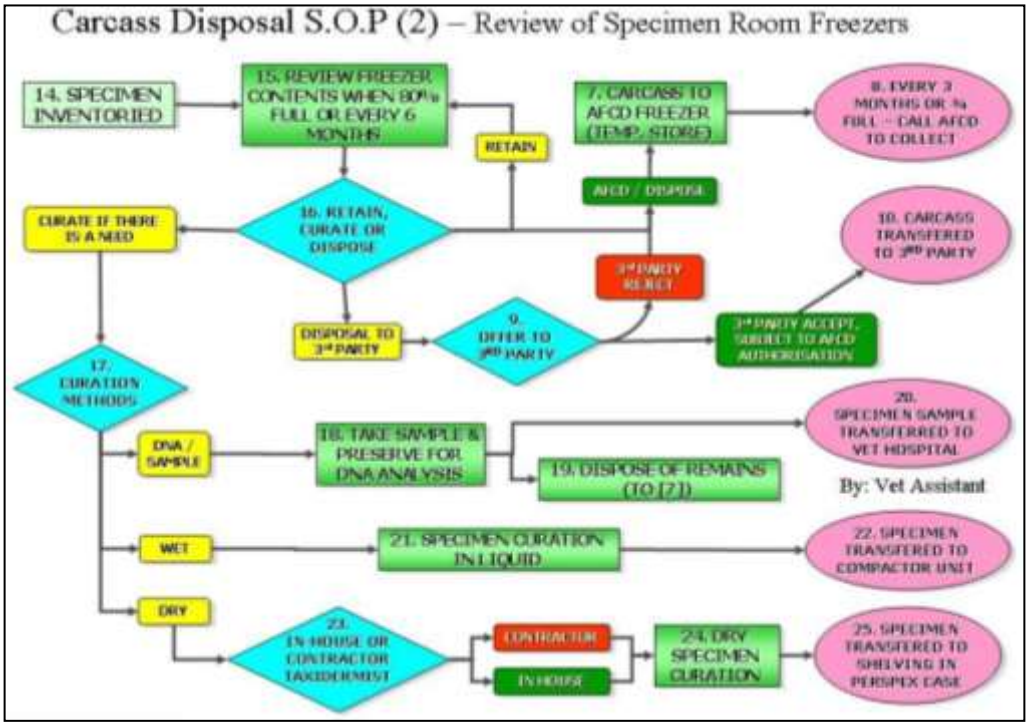
APPENDIX 26

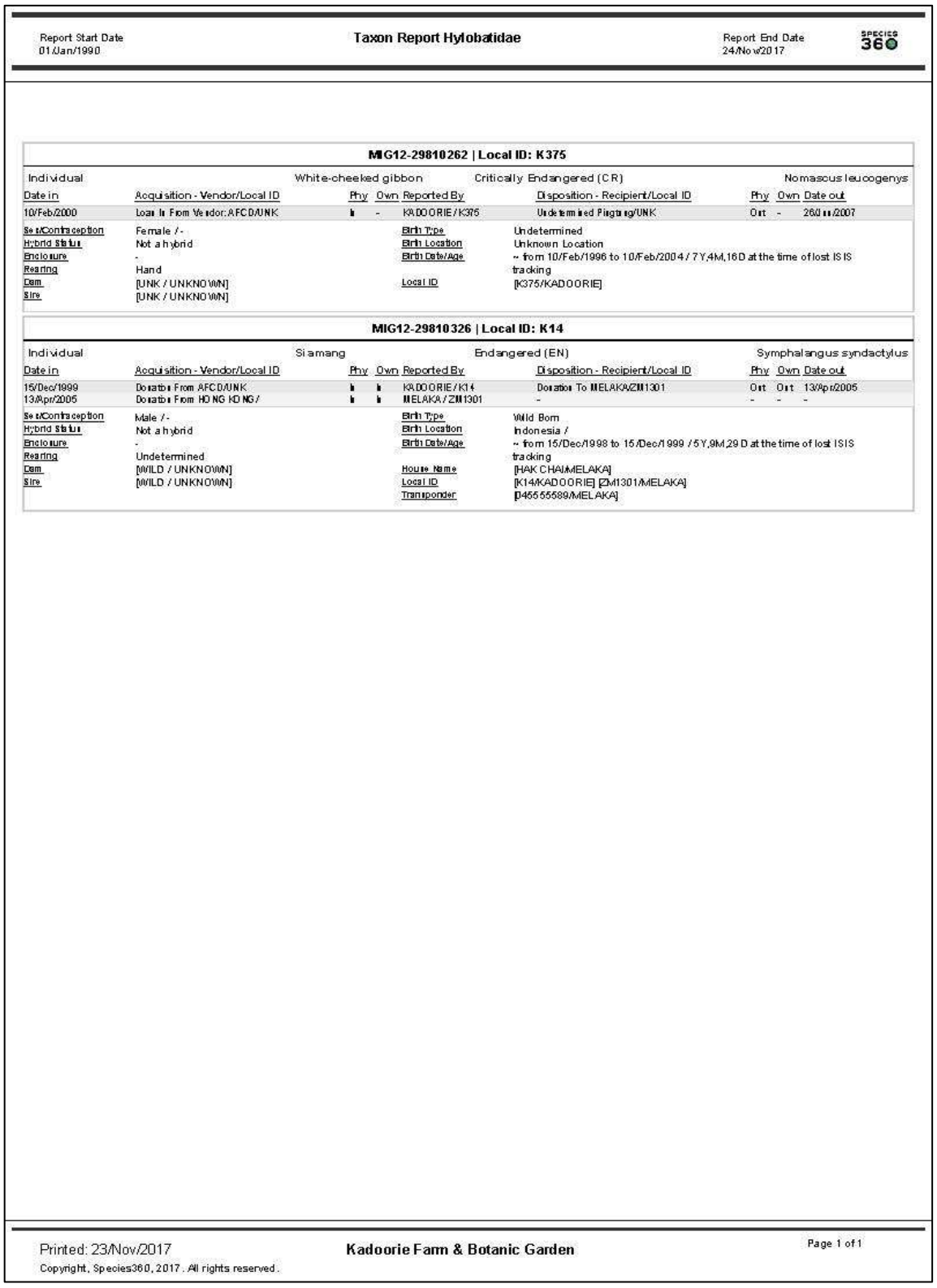
CARCASS DISPOSAL





APPENDIX 27

ZIMS TAXON REPORT (Example)



Report Start Date
01/Jan/1990

Taxon Report Hylobatidae

Report End Date
24/Nov/2017

SPECIES 360

MIG12-29810262 | Local ID: K375

Individual — White-cheeked gibbon — Critically Endangered (CR) — Nomascus leucogenys

Date in	Acquisition - Vendor/Local ID	Phy	Own	Reported By	Disposition - Recipient/Local ID	Phy	Own	Date out
10/Feb/2000	Loan In From Vendor: AFCD/UNK	In	-	KADOORIE/K375	Undetermined Pingtung/UNK	Out	-	26/Jun/2007

Sex/Contraception	Female / -	Birth Type	Undetermined
Hybrid Status	Not a hybrid	Birth Location	Unknown Location
Enclosure	-	Birth Date/Age	~ from 10/Feb/1996 to 10/Feb/2004 / 7Y,4M,16D at the time of lost ISIS tracking
Rearing	Hand		
Dam	[UNK / UNKNOWN]	Local ID	[K375/KADOORIE]
Sire	[UNK / UNKNOWN]		

MIG12-29810326 | Local ID: K14

Individual — Siamang — Endangered (EN) — Symphalangus syndactylus

Date in	Acquisition - Vendor/Local ID	Phy	Own	Reported By	Disposition - Recipient/Local ID	Phy	Own	Date out
15/Dec/1999	Donation From AFCD/UNK	In	In	KADOORIE/K14	Donation To MELAKA/ZM1301	Out	Out	13/Apr/2005
13/Apr/2005	Donation From HONG KONG/	In	In	MELAKA/ZM1301	-	-	-	-

Sex/Contraception	Male / -	Birth Type	Wild Born
Hybrid Status	Not a hybrid	Birth Location	Indonesia /
Enclosure	-	Birth Date/Age	~ from 15/Dec/1998 to 15/Dec/1999 / 5Y,9M,29D at the time of lost ISIS tracking
Rearing	Undetermined		
Dam	[WILD / UNKNOWN]	House Name	[HAK CHAI/MELAKA]
Sire	[WILD / UNKNOWN]	Local ID	[K14/KADOORIE] [ZM1301/MELAKA]
		Transponder	[945555589/MELAKA]

Printed: 23/Nov/2017

Kadoorie Farm & Botanic Garden

Page 1 of 1

APPENDIX 28

ZIMS SPECIMEN REPORT (Example)

Specimen Report

Species360 MIG12-29810262 **Local ID** : KADOORIE / K375
GAN
Nomascus leucogenys White-cheeked gibbon
Studbooks EAZA, ZAA
Order Primates **Family** Hylobatidae
IUCN Critically Endangered (CR) **CITES** I
Start Date 01/Jan/1800 **End Date** 23/Sep/2016

Basic Animal Information — **No Local Data Differences Found**

Sex - Contraception	Female -	**Status**	Undetermined (Lost to follow up)
Birthdate - Age	~From 10/Feb/1996 To 10/Feb/2004 - 7Y,4M,16D +/-4Y at the time of lost ISIS tracking	**Preferred ID**	KADOORIE / K375
Origin	Unknown Location	**Rearing**	Hand
Birth Type	Undetermined	**Hybrid Status**	Not Hybrid
Sire	UNK/UNKNOWN	**Dam**	UNK/UNKNOWN
Current Collection	Main Institution Animal Collection	**Collection Trip**	
Clutch / Litter		**Enclosure**	

Visit History

Date in	Acquisition - Vendor/Local ID	Phy Own	Reported By	Disposition - Recipient/Local ID	Phy Own	Date Out
10/Feb/2000	Loan In From Vendor: AFCD/UNK	In -	KADOORIE / K375	Undetermined Pingtung/UNK	Out -	26/Jun/2007

Identifiers

Reported By	Effective Date	Type	Identifier	Location	Status	Comments
KADOORIE	10/Feb/2000	Transponder	029124778		In-Use	Legacy SLocation: Mid spine Legacy Comment:
KADOORIE	10/Feb/2000	Local ID	K375		Active	

Sex Information

Reported By	Date	Sex	Comments
KADOORIE	10/Feb/2000	Female	

Enclosure History

Enclosure Name	Date Moved In	Date Moved Out	Move In Reason	Comments
WML4OT	21/Feb/2005	26/Jun/2007		
WMR4i	10/Feb/2000	21/Feb/2005		

APPENDIX 29

ZIMS ENCLOSURE REPORT (Example)

Report Start Date
13/May/2020

Report End Date
20/May/2020

Enclosure Occupants Summary

CTPS3 (including sub-enclosures)
Animalia / Animals

	Beginning	Birth	Acquisition	Move In	Death	Disposition	Move Out	Ending
CTPS3								
Eclectus roratus/Eclectus parrot	3 0 0 (3)	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	3 0 0 (3)
Psittacus erithacus/Grey parrot	2 1 0 (3)	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	2 1 0 (3)
Mundiacus vaginalis/Northern red muntjac	0 1 0 (1)	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 0 (1)
Total Count	7	0	0	0	0	0	0	7

Including groups, may not add across due to census count entries
+ Including colonies
~ Multiple enclosures, total count for these entities will display in each enclosure they are assigned to

APPENDIX 30

Birds of Prey Release Techniques – SUPPLEMENTARY NOTES

Bird of Prey Fitness Training and Release Techniques Used at KFBG

When a raptor has completed quarantine and treatment, it is then time to think about fitness training and release techniques. Each species, and even each case, may have slightly different requirements for fitness training and release, and the guidelines below should assist in deciding which technique is appropriate. These guidelines are specific to the species found in Hong Kong and the facilities at KFBG.

Determine the Type of Case

The release technique chosen is dependent on the nature of the case.

Type I : *Immature/adult birds that were admitted at an age greater than two months post-fledging, without apparent injuries that could affect flight and hunting ability.*

Type II : *Juvenile/immature birds that were admitted at an age of less than two months post-fledging, without apparent injuries that could affect flight and hunting ability.*

Type III : *Birds of any age that were admitted with an injury that, although resolved, could affect flight and hunting ability.*

Release Techniques

Methods may vary slightly from species to species as indicated in the species list below, but the three main techniques utilised fall under the categories below:

- Aviary

Fitness Building and Release

The bird should be allowed/encouraged to fly around a spacious aviary for at least one week for fitness training before release. The bird should then simply be released in a suitable location. If the release site is nearby, then the bird should be transported there by hand. If a transportation box is used, then the bird may be best released from the box. At KFBG we have 3 possible facilities to assist with this category, a large flight aviary containing several disabled raptors, a net enclosure for smaller raptors and a long building which can accommodate falcons and owls prior to release.

- Hacking

Two methods-

a) Immediate Hacking

   If the bird has not reached fledging age then immediate hacking is an option. The fledgling should be placed in an artificial nest and food supplied until the bird can fly and hunt.

b) Conditioning to a Release Site/ Feeding Platform

The bird should be allowed to reach fledging age with minimal human contact. Then it should be 'manned' and fed on the fist daily until steady enough to be fed on a release platform. The bird should be fed at the release platform for one week before release. Food should be placed on the release platform daily for up to 2 weeks after release of the bird.

Falconry techniques (presently not undertaken at KFBG but can be useful if in-house expertise is available and any necessary permitting is obtained)

These include high jumping, flying to the fist and flying short distances between two T bars.

Flight ability should be assessed throughout the whole training period and if it is evident that the bird has poor ability and that its condition is unlikely to improve in the short term then the bird should be placed back in a flight aviary and possibly be considered un-releasable.

Crested Goshawk, Besra Sparrow hawk, Japanese Sparrow hawk, Chinese Goshawk, Kestrel, Amur Falcon, Common Buzzard, Hobby, Eagle owl, Brown Fish Owl

Type I : Aviary fitness and release
Type II : Hacking (only if Hong Kong breeding species)
Type III : Aviary fitness and release for birds with minor problems (flight assessment must be undertaken in a large aviary or outside on a line). Falconry Techniques could be used in more serious cases.

All Owls except Eagle Owl and Brown Fish Owl

Type I : Aviary fitness and release
Type II : Aviary fitness and release (only if Hong Kong breeding species)
Type III : Aviary fitness and release

Black Kite

Type I : Aviary fitness and release
Type II : Hacking
Type III : Basic falconry techniques can be considered

Suggestions for black kite falconry techniques (if in-house expertise is available);

- The bird should be manned and fed on the fist daily.
- It should be flown on a line to the glove up to a distance of 5 metres and then flown regularly to separate T posts to improve fitness.
- Once the bird is doing well the distance between the posts can be increased to around 30 metres. When the bird has been doing this well for one week it can be flown without a line and with jesses removed. The bird may still fly as instructed at first but can be taken on the fist and

released away from the training area. A post release feeding platform can be placed near the training area in case the bird returns for food.

Peregrine Falcon, Saker Falcon

Type I : Hacking or falconry techniques

Type II : Hacking or falconry techniques (only if native breeding resident)

Type III : Falconry techniques if in-house expertise is available

White-bellied Sea Eagle, Crested Serpent Eagle, Bonelli's Eagle, Imperial Eagle, Spotted Eagle

Type I : Aviary fitness and release some individuals may receive post-release monitoring

Type II : Hacking (only if native breeding resident)

Type III : Falconry techniques (if expertise is available and permitted by Authorities)