

Guidelines for the safe handling of wildlife and wildlife products during counter-wildlife trafficking enforcement operations in Asia



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1. Introduction

During the course of counter-wildlife trafficking enforcement operations, government officers often come into contact with live wildlife and wildlife products. There is a risk to the enforcement officers through this contact with wildlife, from potential injury through scratches and bites and also from infection with zoonotic pathogens carried by the wildlife. Likewise, humans carry diseases that can infect animals and if those animals are then reintroduced to the wild, such diseases could spread to wider wildlife populations. In addition, wildlife species that have been traded are often in poor health due to lack of care while being traded. Proper handling can prevent further illness or death.

The global COVID-19 crisis has brought attention to the potentially devastating impacts of zoonotic pathogens. Governments are responding in a variety of ways to prevent future transmissions, but there have also been reports of reduced action by enforcement officers due to a fear of contracting COVID-19 or other zoonotic diseases during an operation. These guidelines have been developed for use by law enforcement officials across Asia to provide practical recommendations that minimize the health risks to humans and wildlife during the course of a counter-wildlife trafficking operation.

The ability of enforcement staff to achieve the biosecurity and wildlife handling standards outlined in this document may at the current time be limited by the lack of access to personal protective equipment, wildlife handling equipment or appropriate training. However, this document can act to highlight where additional equipment and training needs lie and provide a starting point for achieving the standards necessary to properly protect the health of enforcement staff.

2. Pre-operation Planning and Preparation

2.1 Assessing health risks

The types of operations where law enforcement officers may come into contact with wildlife vary widely, from simply being in the same room as wildlife during an operation (e.g. during a routine inspection of a wildlife trading facility, market or breeding farm, or at customs); to a search of a suspected wildlife criminal's property, vehicle or business where it is anticipated wildlife products (e.g. skins, meat, bones, organs, claws) or live animals will be detected and immediately seized as evidence.

For each situation the level of health risk varies and precautions that need to be taken change accordingly. The key factors influencing health risk that need to be considered prior to the operation are (i) the type of operation, (ii) the environment in which the wildlife is present and (iii) the species of wildlife present.

- 1. Type of operation:** When an operation involves handling or close contact with live wildlife, then the level of risk is high due to the risk of injury and disease transmission through bites, scratches, splashes to the face with urine, faeces or saliva and aerosols (e.g., exhaled air or coughs/sneezes from animal). When dead wildlife that is fresh (i.e., no color changes of skin or putrid odor is present) is handled during an operation, there is still a disease risk however the risk of injury and disease transmission is lower. With dry wildlife products (i.e., those no longer containing tissues or secretions) such as ivory, rhino horn, tiger bones, pangolin scales etc., the health risk is low.

2. **The environment in which the wildlife is present.** Indoor spaces, especially those with limited air flow (e.g., a trader’s house, restaurant, airports, warehouse) are considered as environments that are high risk for transmission of airborne pathogens. Outdoor environments are usually lower risk for transmission of airborne pathogens if there is good air flow (e.g., border crossings, road check points). If an outdoor area is crowded and staff are likely to frequently come within 2 meters of animals or people, the risk increases (e.g., crowded markets).
3. **The species of wildlife likely present.** Certain species pose a higher risk for either causing injury or carrying serious diseases that can infect humans. Enforcement staff must assess when a situation poses or represents a higher risk by understanding which species are most likely to cause injury or carry serious zoonotic diseases, and how the diseases are transmitted:

- **Risk of injury:** All wild animals have the potential to cause injury to people who handle and/or have close contact with them. Large (weighing more than 15kg) or venomous wildlife species are most likely to cause injury. This includes venomous snakes, medium to large felids and bears. All primates and carnivores over 3kg are considered high risk due to their speed, dexterity or potential aggressive nature. Expert assistance from a rescue center or zoo is a requirement for confiscation of these species, to allow experienced handling and potentially chemical immobilization. If the species of snake cannot be identified, treat it as venomous.
- **Risk of disease:** All mammals and birds pose a risk of carrying serious diseases that can infect humans. Primates, bats, rodents and carnivores are mammals of particular concern. Although reptiles (turtles, lizards, non-venomous snakes) can also carry zoonotic pathogens, human infections can usually be treated and the diseases are rarely fatal.

It is important to understand some key diseases of concern that can be carried by mammals and birds and how they are transmitted. Table 1 outlines some examples of serious zoonotic diseases (not intended to be exhaustive) and further information on these diseases can be found in Appendix A. Numerous emerging infectious diseases originate in wildlife, so there is a real possibility of a new unknown virus or serious pathogen being present.

Table 1: Examples of serious zoonotic diseases that can be found in wildlife species encountered in enforcement operations. These diseases can be fatal in humans and transmitted through bites, scratches, facial splashes, or inhalation of aerosols.

Disease	Common wildlife hosts	Route of transmission
Cercopithecine herpes-1 (B virus)	Macaques or other primates housed with macaques	Bites, scratches, facial splash with saliva, urine or faeces
Rabies	All mammals but particularly bats and carnivores	Bites, scratches, facial splash with saliva or urine
Hantaan virus	Rodents	Inhalation of aerosols, less commonly through rodent bites
Highly Pathogenic Avian Influenza (H5N1)	Birds	Contact with saliva, nasal secretions or blood
Coronaviruses responsible for Severe Acute Respiratory Syndrome SARS-CoV-1 and SARS-CoV-2	Bats*, mustelids, pangolins	Bites, scratches, facial splash with saliva, urine or faeces

* The origins of SARS-CoV-2, the causative agent of COVID19, remain unknown, but its genome indicates a strong likelihood that the reservoir species is a bat (Zhang et al., 2020). Other wildlife species may act as intermediate hosts as civets did with SARS-CoV-1

2.2 Minimizing wildlife contact

Wildlife capture and handling has the potential to result in serious injury to both the handler and the animal. It should only be undertaken if absolutely necessary. In all operations, handling of live wildlife should be minimized by doing the following:

- Confiscate the animal without handling it directly e.g., if it is already in a cage that can be moved, use this rather than moving the animal into another transport cage
- Enlist external expertise to assist e.g., zoo/rescue center personnel or other experienced personnel familiar with handling the species (e.g., pet shop owner, wildlife trader or wildlife farm staff)
- If external expertise is not available on the day of the operation, maintain the animal on site (i.e., at the point of seizure) until assistance is available from experienced personnel
- Avoid physical capture of animals by encouraging an animal to enter a transport crate using patience or food as enticement

2.3 Minimum requirements for handling wildlife during an enforcement operation

STOP! If enforcement personnel feel that there is no option but to handle the wildlife, the following criteria must be met, before the operation begins. The officers who will handle the wildlife should:

- Understand the potential disease risk posed by the environment in which the operation is occurring
- Understand the potential disease and injury risks from and to the wildlife on site
- Have the appropriate training and experience to handle the species of wildlife present, and have access to appropriate wildlife handling equipment
- Have access to, and understand how to use appropriate Personal Protective Equipment (PPE)
- Understand how to manage bites/scratches from wildlife
- Feel confident that the health risks of the operation can be mitigated

If the above criteria are not met, then the operation involving wildlife should not proceed. If enforcement staff are not properly trained, live animal handling should not be attempted.

Under no circumstances should confiscations of any wildlife over 15kg (medium to large felids, bears) be undertaken without expert assistance, to allow for experienced handling and chemical immobilization if needed. If primates or carnivores 3-15kg cannot be confiscated without handling (eg by encouraging an animal to enter a transport crate using patience or food as enticement), expert assistance for handling should be sought. Under no circumstances should confiscations of venomous snakes occur without the assistance of trained, expert snake handlers.

2.4 Contact details of experts for assistance with animal confiscations

As these guidelines are localized, the table below should be populated with names and contact details of personnel who can provide expert assistance:

Table 2: Zoo, rescue center or other expert personnel that can be called to assist with live animal confiscations

Wildlife type	Expert contact details
Venomous snakes	
Large mammals (>15kg) that need chemical immobilization (large primates, large carnivores, bears)	
Other species (primates, small carnivores)	

2.5 Health status of staff carrying out operations

- Staff carrying out live animal confiscations should be vaccinated for a minimum of rabies and tetanus
- Any staff participating in primate confiscations must be free of tuberculosis (TB). Staff participating in primate confiscations should be tested for TB every 6 months, typically by an intradermal tuberculin skin test.
- No persons with any current or recent (within a few days) clinical signs of illness (coughing, sneezing, fever, diarrhea, rash, cold sores, etc.) should participate in a confiscation
- Staff with compromised immune systems will be at higher risk of catching diseases and should not be involved in confiscations.

2.6 Personal Protective Equipment (PPE)

Why use PPE?

If employed correctly, PPE forms a barrier between you and the animal that you are confiscating. Zoonotic viruses or bacteria can be transmitted from animals to humans in the air an animal breathes out, in splashes of saliva, urine or faeces, and via bites or scratches. Therefore, it is important that the air you breathe is filtered, that your skin, eyes and mouth are covered to protect from splashes, that you have a

layer of clothing that can be removed at the operation site once the operation is complete, and shoes that can be washed. Table 3 explains how the different elements of infectious disease PPE work.

PPE such as gloves, steel toe capped shoes and long trouser legs and sleeves can also offer some protection from bites and scratches but should be combined with careful and correct wildlife handling to avoid injury. Further information on gauntlet gloves are given in Section 2.7.

Choosing the correct level of PPE for an operation

In order to assess risks, it is preferable to find out as much information about the species of wildlife, environment and type of activity before an operation begins. However, this will not always be possible. Having **masks, nitrile gloves, washable shoes and 80% + alcohol gel ready for any operation** will allow an operation site to be entered and for further risk assessment to be made. Both surgical masks and respirator masks should be carried.

- ❑ **Surgical masks** should comply with the standards of the region from which they are purchased (European standard EN14683, US standard ASTM, Chinese standard YY 0469).
- ❑ **Respirator masks** are graded according to their filtration performance. The following grades of mask would be suitable for enforcement operations as they all significantly reduce the risk of inhaling an infectious aerosol (by >93%). The masks should comply with the standards of the region from which they are purchased:
 - **N95** (US standard NIOSH 42CFR84)
 - **FFP2** (European standard EN149)
 - **KN95** (Chinese standard GB2626)
 - **Korea 1ST Class** (Korean standard KMOEL-2017-64)
 - **DS2** (Japanese standard JMHLW-2000)
 - **P2** (Australian standard AS/NZS1716)
- For indoor sites (e.g., traders house, restaurant, airports, warehouse), a **respirator mask** must be worn. For crowded outdoor sites where enforcement staff are likely to frequently come within 2 meters of animals or people (e.g., crowded markets), a **respirator mask** must be worn.
- For outdoor sites with good airflow (e.g., border crossings, road check points), a **surgical mask** can be worn.

If any wildlife product needs to be seized (live, fresh dead or dry), the following additional PPE must be used to allow the operation to continue safely.

- For **SEIZURE of mammals or birds (live or fresh dead), full PPE should be worn by the personnel handling the wildlife or personnel coming within 2 meters of the wildlife.** Full PPE includes a respirator mask, face shield or goggles, long sleeved fluid repellent gown or coveralls with hood, nitrile gloves, washable closed toe shoes and shoe covers (see Figure 1).
- For **SEIZURE of reptiles or amphibians (live or fresh dead) or dry wildlife products (those no longer containing tissues or secretions) basic PPE can be worn by the personnel handling the wildlife or personnel coming within 2 meters of the wildlife.** This consists of a surgical mask, nitrile gloves, disposable apron or dedicated clothing (that can be removed at the end of the confiscation) and washable closed toe shoes (see Figure 1).

PPE FOR WILDLIFE SEIZURES

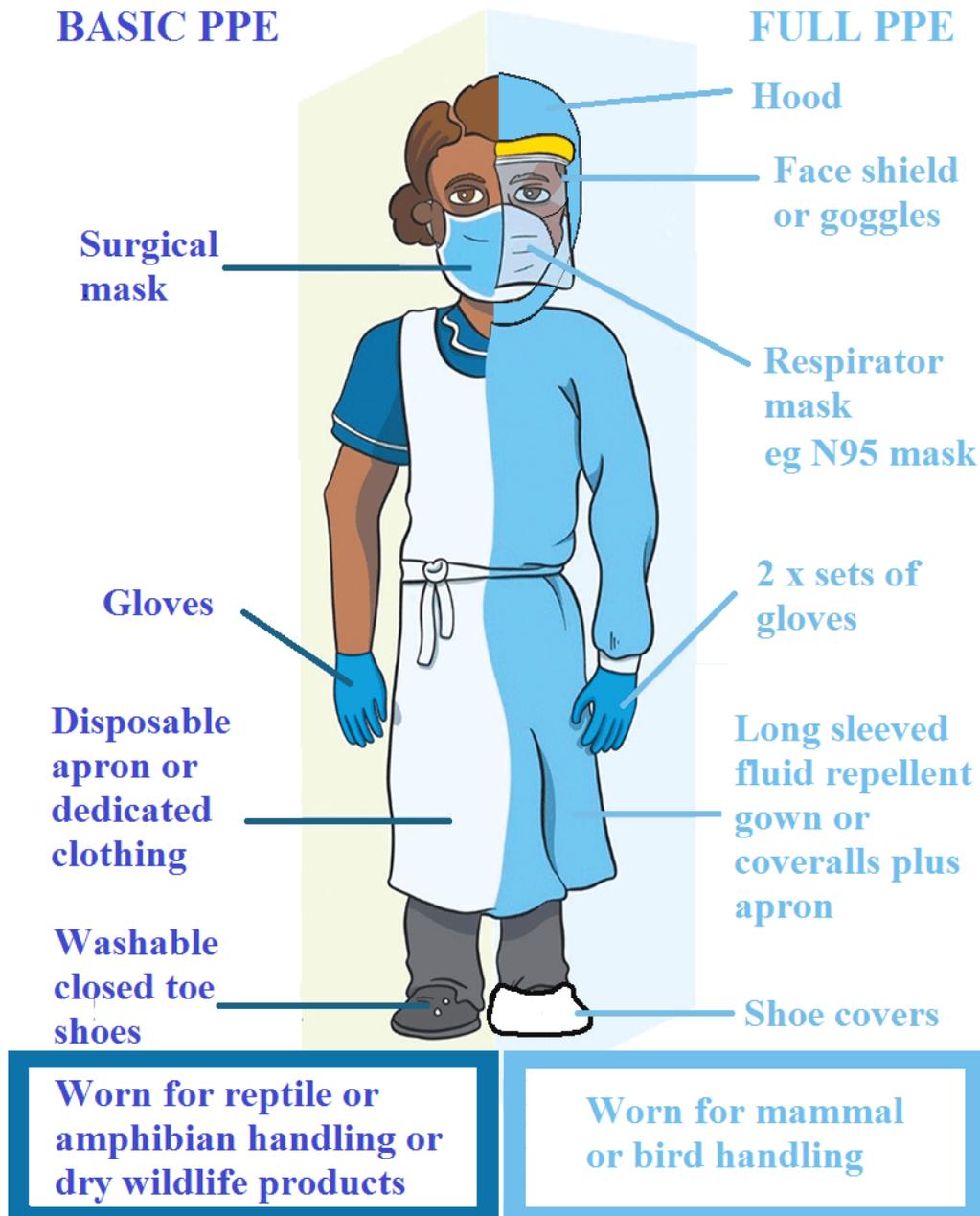


Figure 1. Full and basic PPE to be used in wildlife seizures. Basic PPE is used for live or fresh dead reptile or amphibian handling or dry wildlife products. Full PPE is used for live or fresh dead mammals or birds.

Table 3: Types of infectious disease PPE and how they work

<p>Respirator mask</p>		<p>Types include N95, FFP2, KN95, Korea 1st Class, DS2, P2. These masks filter the air you breathe to reduce the risk by >93% of breathing in a virus. They will only work if properly fitted. There are several different models, styles, and sizes of mask that fit a variety of face shapes and sizes. Each person requiring a respirator mask should be individually fit tested to identify a respirator that appropriately fits her or his face. See Appendix B for more information on fit testing. Single use only – must be disposed of in biohazard bag after confiscation. If there is a severe shortage of PPE in crisis situations, respirator masks can be cleaned and reused as detailed later.</p>
<p>Surgical mask</p>		<p>SURGICAL MASKS WILL NOT STOP YOU BREATHING IN A VIRUS. They will stop any large airborne droplets or splashes of animal saliva/urine/faeces getting into your mouth. They help reduce the risk of passing on diseases to the wildlife by providing a barrier to aerosols coming out of your mouth. Single use only – must be disposed of in biohazard bag after confiscation</p>
<p>Nitrile gloves</p>		<p>Nitrile gloves will stop splashes of animal saliva/urine/faeces getting onto your skin. Gloves should be pulled over the cuffs of coveralls. Single use only – must be disposed of in biohazard bag after confiscation</p>
<p>Goggles or face shield</p>		<p>Goggles or a face shield are used to stop splashes of animal saliva/urine/faeces getting on your face and in your eyes. Can be disinfected and reused</p>
<p>Gown or Coveralls</p>		<p>The gown or coverall acts as a single use barrier that you can throw away at the end of the confiscation so you don't risk taking pathogens back to the office or home. Long sleeves protect arms from being bitten by parasites, such as fleas, that may have come off the animal. Single use only – must be disposed of in biohazard bag after confiscation</p>
<p>Apron</p>		<p>The apron acts as a single use barrier that you can throw away at the end of the confiscation so you don't risk taking pathogens back to the office or home. Single use only – must be disposed of in biohazard bag after confiscation</p>
<p>Dedicated clothing (cotton coveralls)</p>		<p>Dedicated clothing is used so that if you became contaminated during the confiscation, you have a layer that can be removed after the confiscation to remove the risk of carrying pathogens back to the office or home on your clothing Can be washed (at a designated work facility, separate from other laundry) and reused</p>
<p>Washable closed toe shoes</p>		<p>Boots or shoes should be closed toe to avoid bites or scratches to the feet and should be washable so that you don't risk taking pathogens back to the office or home. Can be cleaned, disinfected and reused</p>

It is vital officers put on and remove PPE correctly to ensure they are properly protected. All law enforcement officers working with wildlife should have attended training on the correct use of PPE prior to any operation. The following videos shows how to put on and take off PPE safely, including hand hygiene and is essential viewing. However, this is not a replacement for training:

https://www.cdc.gov/vhf/ebola/hcp/ppe-training/n95Respirator_Coveralls/donning_01.html

Practical PPE solutions:

If law enforcement officers cannot access the PPE outlined above, there are some alternatives:

- Where gowns/coveralls are not available, a plastic rain poncho that covers body, arms, legs and head can be used and disposed of at the end of the operation. Care must be taken not to contaminate the wearer when the poncho is pulled over the head at the end of the operation.
- If dedicated clothing/cotton coveralls are not available, any normal clothing with long trouser legs can be worn. At the end of the operation, the clothes must be removed in the PPE removal area and washed in a work washing machine. Care must be taken not to wear the clothes away from the enforcement operation site.
- If visors are not available, sunglasses can be used to protect eyes from splashes.
- If aprons are not available, plastic bin bags can have a hole cut out for head and arms and worn over dedicated clothing. It must be disposed of at the end of the operation.

Reusing masks:

Reusing respirator masks is possible but should only be done as a last resort in crisis situations where there is a shortage of available PPE. Care should be taken to check that after cleaning the mask still fits the users face well. The following 3 protocols for reusing masks have been trialed for COVID-19 however their effectiveness against novel pathogens is unknown;

- Store the used mask for 3 days at room temperature (21–23°C) and 40% humidity. All SARS-CoV-2 viruses on the mask will be dead in 3 days (Van Doremalan et al, 2020)
- Heat mask for 60 min at 70°C by hanging the mask in an oven using plastic or wooden clips. Masks need to be > 6" from the walls of the heater to prevent mask degradation (Juang and Tsai, 2020)
- Boil masks for 5 minutes and then air-dry. The elastic band should not be immersed in boiling water. Do not stir while boiling to avoid disturbing the physical structure of the mask (Juang and Tsai, 2020)

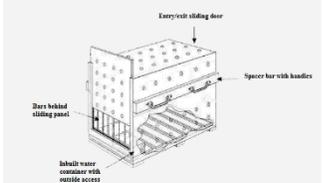
2.7 Wildlife capture/handling equipment

The goal in enforcement operations should always be to minimize contact with wildlife. If handling of wildlife can be avoided, this is always the preferred option. If handling is necessary, getting help from experienced handlers is strongly recommended. However, there may be situations where wildlife handling by enforcement staff cannot be avoided.

To safely use the wildlife handling equipment and perform the handling techniques described in this document, training and experience are needed. Handling of wildlife should not be attempted by inexperienced staff.

Table 4 outlines the minimum equipment that should be available for use in the event of capture/handling of wildlife. A breakdown of which equipment to use for specific wildlife taxa can be found in Table 5. Details of all of the equipment can be found in Appendix C. The equipment recommended here can often be made or bought locally.

Table 4: Minimum wildlife capture/handling equipment

Equipment	Example	Key features
Gauntlet gloves		<ul style="list-style-type: none"> ● Ensure fit is loose enough so finger slips to side inside glove if bitten ● Provide protection from small animal bites/scratches, not necessarily from medium sized carnivore or primate bites
Hoop nets		<ul style="list-style-type: none"> ● Ensure hoop big enough to go over animal without touching animal and net deep enough to be folded over with animal inside ● Ensure holes in net small enough so animal head/legs can't come through ● Ensure soft mesh for small animals, non-knotted mesh for birds, thick mesh for larger animals
Transport crates*		<ul style="list-style-type: none"> ● A sliding door is essential ● Ensure 25% of surface is ventilation holes ● An in-built water container makes overnight care easier ● Mesh or bars at one end allows access to provide water without opening door. Cover with a solid sliding door ● Crates should be large enough for an animal to stand up and turn around
Shield		<ul style="list-style-type: none"> ● Consists of a piece of strong clear plastic with handle ● Use to encourage small animals to move into a transport crate
Cage door barrier		<ul style="list-style-type: none"> ● Any strong solid barrier can be used e.g., strong piece of plywood ● Use to cover cage opening if animal needs to be transferred from a cage with a swing door to a transport crate ● Only works for animals that are not strong enough to push the barrier away
Cage divider		<ul style="list-style-type: none"> ● Consists of a comb made of metal rods ● Insert down through a cage to keep animal at one end of cage and prevent escape if opening door to place in food/water
Self-closing cage		<ul style="list-style-type: none"> ● Good for avoiding direct handling of animal ● Bait trap with food and wait for animal to enter, triggering door to close
Equipment for non-venomous snakes		<ul style="list-style-type: none"> ● Snake hook and clear plastic tubes or hessian bags used to move snakes while minimizing touching snakes' head ● Snake tongs only for holding plastic tubes, removing dishes, feeding, not for grasping snake

*For pangolin and bird transport crates and snake transport box see Appendix C

During operations

3.1 Minimum equipment list for live animal or fresh dead seizures

On ALL operations, **masks (both surgical and respirator e.g., N95), nitrile gloves, washable shoes and alcohol gel** should be carried to allow an operation site to be entered and for further risk to be assessed.

For a live or fresh dead animal seizure/confiscation, additional equipment should be brought to the site:

- PPE. See Table 5 for level of PPE needed by wildlife taxa. Make sure extra PPE is taken in case items become torn or damaged.
- Wildlife handling equipment and transport crates. See Table 5 for equipment by wildlife taxa.
- Container of water for handwashing, and antibacterial soap
- Hand alcohol gel that contains at least 80% alcohol
- Disinfectant for cleaning equipment after use: bleach and Virkon. If Virkon unavailable, information on other disinfectants is available here (p83):
<http://www.who.int/csr/resources/publications/biosafety/en/Biosafety7.pdf>
- Scrubbing brush
- Large waste bags; one for infectious waste disposal (such as disposable PPE) and one for equipment that will be disinfected for re-use (such as plastic goggles, face shields and rubber boots)
- Disinfectant wipes or bottle of disinfectant spray for disinfecting outside of waste bags before they go in the vehicle
- First aid kit including povidone-iodine for washing any scratches or bites, eyewash, dressing to cover any scratches or bites

If performing confiscations of macaques, due to the risk of B virus, you should also carry:

- 1 liter of saline eye wash
- Freshly prepared 1:20 dilution of household bleach for initial wash of skin if it becomes exposed (NOT to be used on mucous membranes)

Table 5. Summary of PPE and wildlife handling equipment to be used by wildlife taxa

Form of wildlife	Class	Sub-group	Sub-group	Example species	PPE to use	Wildlife handling equipment needed if live animals
Live or fresh dead	Mammals	Primates	Large >15kg	Large macaques, orangutan	Full PPE	Seek expert help
			Medium 3-15kg	Some macaque species, gibbons, langurs	Full PPE	If handling necessary, seek expert help
			Small 0-3kg	Lorises, Tarsiers	Full PPE	Soft nets, gauntlet gloves, transport crate
		Carnivores	Large >15kg	Bears, large felids	Full PPE	Seek expert help
			Medium 3-15kg	Leopard cat, civets, otters	Full PPE	If handling necessary, seek expert help
			Small 0-3kg	Martens, weasels, mongoose	Full PPE	Nets, gauntlet gloves, shield, cage door barrier, transport crate
		Rodents		Squirrels, rats	Full PPE	Soft nets, gauntlet gloves, shield, cloth bags, transport crate
		Bats			Full PPE	Gauntlet gloves, towel, fine net, torch, cardboard transport box
		Pangolins			Full PPE	Smooth sided transport box, towel to cover box, gauntlet gloves
		Birds	Poultry/ waterfowl			Full PPE
	Raptors			Owls	Full PPE	Gauntlet gloves, towel, transport crate
	Psittaciformes			Parrots	Full PPE	Soft non-knotted mesh net, towel, transport crate
	Reptiles	Snakes	Venomous	Cobra, viper	Basic PPE	Use snake specialist – seek expert help
			Non-venomous	Python, boa	Basic PPE	Snake hook, clear plastic tubes, plastic shield, snake tongs, hessian bags/pillow cases, transport box
		Turtles/ tortoises			Basic PPE	Gauntlet gloves, transport crate
Lizards			Monitor lizards, water dragons	Basic PPE	Net, gauntlet gloves, transport crate	
Dry dead	All wildlife	All species		Ivory, rhino horn, tiger bones, pangolin scales	Basic PPE	No handling equipment needed

3.2 Putting on PPE

Once the species that is going to be seized/confiscated has been identified and the correct PPE and wildlife handling equipment brought to site, staff need to designate an area for putting on and taking off PPE. This should be at least 10m away from the animals in a well-ventilated area. Before going anywhere near animals, this area should be set up with a first-aid kit, hand alcohol gel, a bucket of disinfectant for washing boots and disinfecting equipment, and waste bags open and ready to receive used PPE.

Spend as little time in PPE as possible as it can get very hot and heat stress can occur. Pre-plan activities before putting on the PPE and drink water beforehand. Minimize the number of personnel who will come into close contact (within 2m) of the wildlife and maintain the same team for the duration of the operation to minimize the number of people contacting the animal.

Remember there is the possibility for disease transmission both ways – from the staff to the animal and from the animal to the staff. So before going near the animal, the following hand hygiene protocol must occur and clean PPE must be worn.

Good hand hygiene technique is vital. Hand hygiene can be done using either antibacterial soap/water or alcohol gel (minimum 80%) and should last around 20 seconds. It is important that whether you are using soap or alcohol gel, all surfaces of your hands and wrists are cleaned (see Figure 2). Once cleaning is complete, if using soap/water, rinse hands and wrists well under running water or have someone pour the water. Air dry your hands. If using alcohol gel, wait until the gel has evaporated and hands are dry.



Figure 2. Hand washing or hand gel application technique

How to put on basic PPE

1. Hand hygiene with soap and water or alcohol gel
2. Apron or dedicated clothing goes on first
3. Surgical mask goes on
4. Put on nitrile gloves

How to put on full PPE (see Figure 3 below)

1. Hand hygiene with soap and water or alcohol gel
2. Shoe covers on
3. Put on inner pairs of nitrile gloves
4. Coveralls go on
5. Respirator mask (e.g., N95 mask) goes on. Form the section of mask over your nose to fit the bridge of your nose and make sure there are no gaps around the edge. Any time you put on a respirator, perform a seal check by inhaling sharply. If there is air leakage around the edges of the mask, readjust to ensure a proper seal.
6. Pull the hood of the coveralls up or put on separate hood
7. Put on apron
8. Put on outer pair of gloves over the first pair and extend the gloves over the coverall cuffs
9. Face shield or goggles on



Figure 3: Putting on Full PPE

Once you are wearing PPE and handling the animal, remember your gloves are contaminated.

- DO NOT touch your face or any other unprotected area of the body with your gloves.
- DO NOT eat, drink or smoke whilst wearing PPE or in the area near the animal.

If the mask gets wet during sampling, it will no longer be effective and should be changed (using the PPE removal procedures described below).

3.3 Taking off PPE, cleaning and disinfection

When taking off PPE it is very important to remember that everything you are wearing could be contaminated on the outside with pathogens. Always think about what you are touching and make sure you perform hand hygiene between removing each piece of PPE. Only take PPE off in the designated area. As soon as you take off a contaminated item, it should be put in the biohazard bag.

How to remove basic PPE

1. Hand hygiene with alcohol gel
2. Remove and dispose of the apron. Put in disposable biohazard bag. Or take off dedicated clothing and put in bag for washing
3. Hand hygiene with alcohol gel
4. Remove gloves. Place in disposable bag
5. Hand hygiene with alcohol gel
6. Remove surgical mask
7. Make sure everything is inside disposable bag
8. Close the disposable biohazard bag
9. Hand hygiene with alcohol gel

How to remove full PPE (see Figure 4 below)

1. Use disinfectant wipe to wipe off any visible contamination of PPE. Place in disposable biohazard bag
2. Remove apron. Place in disposable bag
3. Hand hygiene with alcohol gel
4. Remove outer gloves. Place in disposable bag
5. Hand hygiene with alcohol gel
6. Remove face shield or goggles. Place in bag for disinfecting
7. Hand hygiene with alcohol gel
8. Pull down (if attached) or pull off hood of coverall
9. Remove coverall by rolling down until inside out. Place in disposable bag
10. Hand hygiene with alcohol gel
11. Remove shoe covers. Place in disposable bag or boots in bag for disinfecting
12. Remove inner gloves. Place in disposable bag. Hand hygiene
13. Put on new pair of gloves
14. Remove the respirator (e.g., N95 mask) - first the top, then the bottom strap
15. Hand hygiene with alcohol gel
16. Use disinfectant wipe to clean off shoes
17. Hand hygiene with alcohol gel
18. Remove gloves. Place in disposable bag. Close disposable bag.
19. Hand hygiene with alcohol gel
20. Wash hands with soap and running water



Figure 4: Taking off Full PPE

Once you have completed taking off the PPE, wipe or spray the outside of the disposable bag with disinfectant. DO NOT burn or bury the waste in the field, take it back to the protected area headquarters for burning or burial (the district or provincial vet officer or health officer can advise you on how to handle biohazard waste ie where and how to burn or whether to burn or bury).

Cleaning and disinfection of equipment and boots

Cleaning is critical to remove all organic material from footwear and equipment prior to disinfection, to ensure effectiveness of disinfectants. This should be done in the designated area for removing PPE. A brush should be available for scrubbing surfaces of equipment and footwear. For disinfecting boots and equipment, use Chlorine bleach diluted 1:10 with water or Virkon disinfectant solution. For metal equipment, use Virkon as bleach corrodes metal. Freshly made disinfectant solution can be put in a spray bottle to allow spraying of equipment. Because they are porous, leather gloves cannot easily be disinfected. Spray, wipe, or soak gloves in 10% bleach and allowing to sit or dry for >10 minutes. Once cleaning and disinfection of equipment and boots has been completed, wash hands, lower arms and wrists.

3.4 Wildlife capture/handling techniques

Physical handling of animals can often be avoided by encouraging an animal to enter a transport crate using patience or food as enticement. This is always the preferred option if possible, as it minimizes risk to both handler and animal.

Animals are likely to become stressed and possibly struggle when captured or handled. This raises the risk of the animal overheating, especially for mammals in a hot climate. Conducting confiscations at cooler times of day is advisable, as is having cold water ready to cool the animal if they start to overheat. If mammals cannot be caught quickly, the confiscation may need to be postponed to avoid hyperthermia.

Mammals:

- **Small mammals (<3kg):** e.g., loris, mustelids, squirrels, rats, bats.
 - Gauntlet gloves and a secure neck grip are often sufficient for this group of mammals.
 - If a net is used, fine mesh is needed to ensure claws don't get entangled.
 - Once in the net, grasp the animal securely through the net around the head and neck and carefully remove the net.
 - Small mammals have sharp teeth – handling must be done quickly to prevent the animal from turning its head and biting.
 - Take care, if wearing thick gloves, not to exert too much pressure which can restrict the animal's breathing.
 - Bats:
 - If in small enclosure throw towel over bat to restrict flight then grasp with gauntlet gloved hands.
 - If in a big enclosure where flight is possible, shine a bright light on a perched bat to daze it then grasp with gauntlet gloved hands.
 - If nets are used the hoop must be big enough to allow open wings to pass through easily and the mesh should be fine.
 - Bats can be transported in cardboard boxes.

- **Medium mammals (3-15kg):**
 - Medium sized **primates** eg gibbons, langurs, some macaques
 - Primates should be enticed into a transport cage or self-closing cage using food.
 - Handling with nets and gloves should only be a last resort and must only be attempted by very experienced handlers as the risk of injury to both handler and animal is high. Contact experts for assistance if handling is necessary.
 - Chemical immobilization using a blow pipe or jab stick is preferable to using nets and gloves but should only be attempted by experienced personnel from a rescue center or zoo.

 - Medium sized **carnivores** eg leopard cats, civets, otters
 - Carnivores should be enticed into a transport cage or self-closing cage using food.
 - Handling with nets and gloves should only be a last resort and must only be attempted by very experienced handlers as the risk of injury to both handler and animal is high. Contact experts for assistance if handling is necessary.

- **Pangolins**
 - Pangolins are shy and likely to curl into a defensive ball when handled – don't let the animal curl around your arm as it can be painful.
 - Pangolins can be easily moved when curled up. If they uncurl, hold by the tail with one hand, the other hand supporting under the body.
 - They have sharp claws that can cause cuts and scratches so leather gloves should be used.
 - Pangolins get stressed very easily and stress can lead to fatalities. It is very important to keep stress to a minimum by keeping people away from the animals, keeping quiet, and covering the box with a towel to reduce visualization of handlers.

- **Large mammals (>15kg):** e.g., bears, large primates, large carnivores. Expert help should always be brought in. No human contact during confiscation, chemical immobilization often needed.

Birds

- If in a large cage or aviary, use a soft, non-knotted hoop net to catch bird.
- If in a small cage use gloved hands and a towel.
- Birds are very fragile and a hoop net can easily fracture a bird's leg or wing if not used gently.
- Once in the net, hold birds head or beak while carefully removing the net.
- If raptors are being confiscated, wear gauntlets and make sure the legs and talons are controlled. Grasp legs first and then the head. A towel can be used to cover the bird's head and wrap the wings.
- If handling larger species with long beaks such as egrets, wear eye protection.
- Stress in birds can be severe so keep handling time to a minimum. Birds do not have diaphragms and so if squeezed too tightly they cannot breathe. Take care when using gloves and towels not to restrict breathing. Avoid damage to feathers at all costs as birds use feathers for maintaining body heat as well as flying.
- When transporting birds, line crate with a towel or newspaper to allow the bird to grip during transport.

Reptiles

- **Non-venomous snakes:**
 - Remember, if a species of snake cannot be identified, treat it as venomous and call an expert.
 - A snake hook can be used to pick up a non-venomous snake and place it in front of a clear plastic tube (hold the plastic tube with snake tongs) so the snake chooses to slide into the tube. The tube should be just wider than the head of the snake. As the snake slides into the tube, both the tube and the snake are grabbed quickly with the head and upper part of the body within the tube. Alternatively a hessian sack or pillow case can be used.
 - If the snake will not enter the tube or sack, use the snake hook to gently pin the head of the snake to the ground to allow the handler to grasp the head.
 - The head is held behind the occiput using the thumb and middle finger, while the index finger is placed on top of the head. Care must be taken not to put too much pressure on the joint at the back of the head (atlanto-occipital joint) as it may snap.
 - When holding a snake, the body must be supported. If unsupported, the snake may feel insecure and thrash about.
 - Large snakes should never be handled by one person alone; for every 3 feet of snake, there should be an extra person to assist with handling.
 - If a snake appears to be dead, never pick it up with bare hands as snakes can play dead and then bite.

- **Lizards:**
 - Catch monitor lizards with a net and gauntlet gloves.
 - They should then be grasped through the net over the shoulders, the net removed then hold one hand on the shoulders, one hand over the pelvis and the tail secured under the arm.
 - Monitor lizards have very strong jaws and care should be taken to avoid bites.

- **Turtles/tortoises:**
 - Tortoises tend to be shy and easy to handle.
 - Some turtles, such as snapping turtles and soft-shell turtles, may deliver a serious bite and should be handled using gauntlet gloves.
 - Avoid turning turtles/tortoises on their backs.

3.5 Bite/scratch protocol

If a member of staff gets bitten or scratched, the following should be done:

- Injured person notifies other staff and work stops
- The bite or scratch should be washed for 5 minutes with soap and running water. In the event of a macaque bite or scratch, wash for 15 minutes with povidone-iodine.
- Apply an antiseptic with anti-viral properties to the wound e.g., iodine-based disinfectant such as povidone-iodine
- If mucous membranes become contaminated with a splash of animal urine/faeces/saliva then use eyewash/saline to do a 5 minute continuous flush. If the splash is from a macaque, then do a 15-minute continuous flush of any exposed mucous membranes
- If the injury/bite is from a bat or carnivore then get post-exposure rabies vaccination as soon as possible (within 24 hours)
- Consult a doctor if a bite or scratch has penetrated the skin barrier as antibiotics will likely be prescribed
- 24 hours after the bite/scratch occurs, ensure staff member is examined by doctor to assess for swelling, pain, heat, fever
- If the bite or scratch is from a macaque or from a primate that has been housed with macaques then B Virus emergency protocol must be triggered immediately. See Appendix D for B Virus protocol.

After an enforcement operation involving wildlife, if any enforcement officer or those involved in the confiscation event feel sick they should seek medical attention immediately and inform the doctor that there has been contact with wildlife. If a breach of PPE occurred during the operation and known exposure to wildlife occurred, staff should seek medical advice immediately.

4 Overnight/24 hr. holding of animals

Once confiscated, animals should be taken directly to rescue centers. If this is not possible and they have to be held overnight, animals need to be provided for while minimizing handling and continuing biosecurity precautions. These guidelines do not cover longer term housing of animals and if an animal is being held for more than 24 hours then enforcement officials should contact rescue centers or zoos for advice on feeding and husbandry.

General principles:

- Keep good records for confiscated animals. The minimum information should include date and location of where animal was confiscated and if they were mixed with other species. Ideally each animal should be given a unique ID for record keeping so the animal can be tracked.
- Specific staff should be designated to care for the confiscated animals to minimize exposure risk to other members of the team.
- Keep the animal in a quiet and dark place with minimum disturbance.
- If the transport crate is of sufficient size (large enough for an animal to stand up and turn around) and the animal is only going to be kept for 24hrs before transfer to a rescue center or release site, then keep the animal in the transport crate overnight. This minimizes risk from further handling of the animal.
- Provide water – enough so the animal can drink but not submerge itself as it may be weak and at risk of drowning. If an inbuilt water container is present in the transport crate, water can be provided without having to open the crate. Otherwise, a low, wide, heavy and damage resistant water dish can be used and a cage divider (see Table 4) can be used to keep the animal at the back of the crate while the door is opened and water or food put in, without risk of escape.
- Provide food. The only animals which should not have food provided in the first 24 hrs after confiscation are snakes. Ensure the food provided is appropriate for the species of animal (seek advice from rescue centers if unsure).
- Ensure the animals don't overheat – ensure the animal is in a shaded and cool area.
- Ideally keep animals in a well-ventilated area to reduce the risk of airborne pathogens.
- Ideally keep animals in an isolated area where staff are not walking through.
- Don't mix wildlife species. Aim to keep a minimum of 1m between different species.
- Practice good biosecurity when going near the animals. Remember disease can travel both ways, from humans to animals and from animals to humans. If there is a possibility that the animal will be reintroduced to the wild, it's important to make sure they don't pick up a disease while being held in captivity. Staff need to wash their hands and put on basic PPE before going in to feed/check animals and follow PPE removal protocol described in section 3.3 when leaving the room where the animal is being kept. To make following these protocols easier, it helps to have alcohol gel, boots and respirator masks (e.g., N95 masks) on a table and a trash can set up at the entry to the room.
- Place a tray or plastic sheeting under the cage to catch urine or faeces for easy disposal.
- If large confiscations of multiple animals occur, sick and healthy animals need to be separated if possible.
- Once the animals have been transferred to a rescue center or released, disinfect/mop with 1:10 diluted bleach and ventilate the area for 30 minutes before personnel enter without masks.

Appendices

Appendix A

Examples of serious zoonotic diseases that can be transmitted by wildlife in Asia

The following are a few examples of zoonotic diseases that can be found in wildlife species that may be encountered on enforcement operations. This is not an exhaustive list. Included here are some diseases that can have serious health implications for humans and can be transmitted through either bites, scratches, facial splashes or through inhalation of aerosols:

Cercopithecine herpes-1 (B virus). B virus can be carried by **Macaques**. Other primates housed with macaques may also be infected. *Transmission occurs through bites, scratches or facial splash with saliva, urine or faeces.* B virus can cause serious central nervous system disease in humans and is life-threatening. Macaques, should always be assumed to be infected with B virus, with or without any clinical signs. Macaques with oral lesions (Figure 5) should be handled with extreme caution and only by highly trained staff, if they are handled at all. If a bite, scratch or facial splash occurs, work should stop immediately and the measures detailed in Appendix D should be followed.



Figure 5. Macaque with oral lesions. Photo PREDICT One Health Consortium (2016)

Rabies. Rabies is a potential risk when handling any mammal but in particular **bats and carnivores**. *Transmission is through bites, scratches or facial splash with saliva or urine.* Rabies can cause a life threatening infection of the brain and nerves in humans. Clinical signs of rabies in animals are quite variable and may not be obvious, so when handling bats and carnivores, the potential for rabies should be assumed. Anyone expecting to handle mammals during confiscations should be vaccinated for rabies. If a bite or scratch or contamination of mucous membrane with saliva or urine occurs then work should stop immediately and the bite washing protocol in Section 3.5 followed and post-exposure vaccination obtained as soon as possible (within 24 hours). When handling bats or carnivores, the correct PPE and careful handling technique can reduce risk of infection.

Hantaan virus. Hantaan virus is carried by **rodents**. *Transmission to humans is through inhalation of aerosols of rodent faeces or urine or, less commonly through rodent bites.* It can cause severe hemorrhagic fever with renal syndrome (HFRS) in humans. Symptoms of HFRS initially are fever, progressing to abdominal pain, vomiting, bleeding and kidney failure. In 6-15% of cases, it can cause death. If symptoms of infection occur within 45 days of exposure, a doctor should be notified as early treatment can be life-saving. Aerosolization of rodent faeces or urine is of particular risk in confined spaces, for example in rodent infested buildings or in places where rodents have been confined to cages for long periods. When conducting an operation in a space where rodents are present or if rodents are handled, the correct PPE, in particular a well fitted respirator (eg N95) mask and careful handling technique can reduce risk of infection.

Highly Pathogenic Avian Influenza (H5N1) 'Bird Flu'. **Wild birds** are the natural reservoir of H5N1, in particular waterfowl such as ducks, geese and swans. It can also be found in other birds. *The disease is transmitted to humans through contact with infected saliva, nasal secretions, faeces and blood.* Symptoms

in humans include fever, cough, sore throat, muscle aches and in severe cases breathing problems and pneumonia that can be fatal. When handling waterfowl, the correct PPE can reduce risk of infection.

Coronaviruses. Bats are known to be the reservoir host of at least one serious coronavirus (Severe Acute Respiratory Syndrome coronavirus, SARS-CoV-1). The origins of SARS-CoV-2, or Covid 19, remains unknown but its genome indicates a strong likelihood that the reservoir species is bats (McIver et al., 2020). Mustelids with naturally acquired SARS-CoV-2 infection have also been identified (Opriessnig and Huang 2020). *Although research is ongoing, it should be presumed that transmission could occur through bites, scratches or contamination of mucous membrane with saliva, urine or faeces.* When handling bats and mustelids, the correct PPE and careful handling technique can reduce risk of infection.

Appendix B

Fit testing a respirator mask

Each staff member using a respirator mask must undergo a fit test to identify a model of mask that fits the face well and ensure the mask fits the face without any gaps. This should be done before using the respirator mask in the field. Performing a fit test takes 15-20 minutes. Qualitative fit test kits are available for purchase through 3M. Staff should receive training on how to perform a fit test.

Once a fit test has been completed, the staff member should always use the same model of respirator mask for future work.

Facial hair can make it difficult for the mask to form a proper seal around the face. If staff with facial hair fail the fit test, a loose-fitting (i.e., helmeted or hooded) powered air purifying respirator equipped with high-efficiency filters may need to be used or facial hair removed.

Workers with respiratory problems may experience respiratory distress when wearing a respirator mask. If this is the case, these staff members cannot wear respirator masks and therefore cannot participate in confiscations of mammals and birds.

The following video gives an overview of respirator mask fit testing requirements for any worker who is required to wear one:

https://www.osha.gov/video/respiratory_protection/fittesting.html

The transcript for this video can be viewed at

https://www.osha.gov/video/respiratory_protection/fittesting_transcript.html

The following video provides guidance from the manufacturer of 3M respirator masks on how to perform a fit test:

<https://www.youtube.com/watch?v=PthSES4O9d8>

Appendix C

Wildlife handling equipment specifications

- **Gloves:** Gauntlet gloves provide protection from smaller animal bites and scratches. They will not necessarily protect from medium sized carnivore or primate bites. Hexarmor Hercules 400R6E gloves are good, or leather welders gloves can suffice if custom gloves are not available. Ideally gauntlets should be slightly loose on the hand so if an animal bites, the finger can slip sideways and be missed by the bite. Care is needed not to harm the animal when wearing thick gloves as the ability to feel how tightly the animal is being held is reduced.

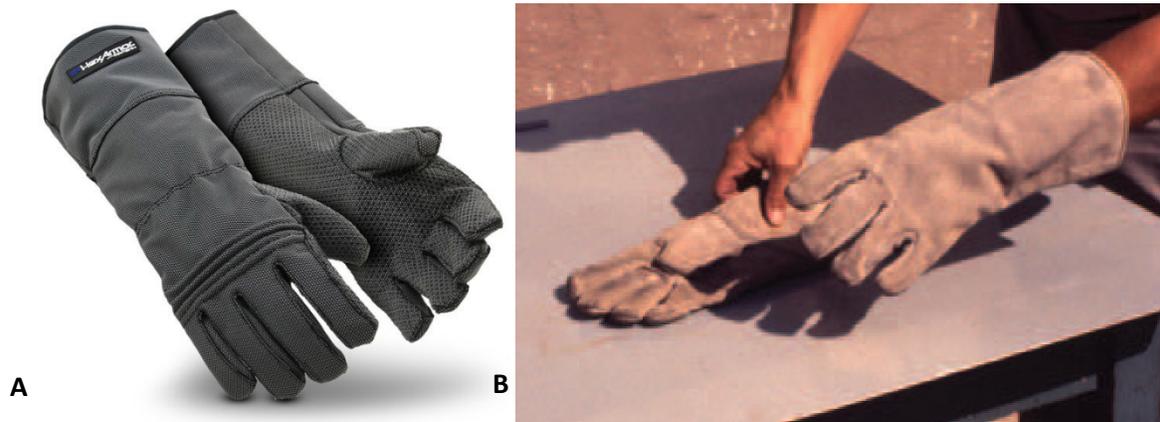


Figure 6. Gauntlet gloves for animal handling. A Hexarmor Hercules 400R6E gloves, B leather welders gloves

- **Nets:** Hoop nets are essential pieces of equipment. They have a long, strong pole fixed to a metal or fiberglass hoop supporting the net, allowing the handler to keep a distance from the animal. The hoop of the net should be large enough that it can be placed over the animal with enough room to avoid the hoop edge injuring the animal. The holes in the net should be small enough so the animal cannot put its head through the holes and risk strangulation and cannot stick arms or legs through the holes. The net should be deep enough to allow the net to be folded over or twisted to trap the animal inside (see Figure 7B). The thickness and type of mesh used will depend on the species. Soft mesh should be used for small animals, non-knotted mesh for birds and strong/thick mesh for larger animals. A variety of sizes and mesh strengths should be purchased to allow capture of a wide range of species.

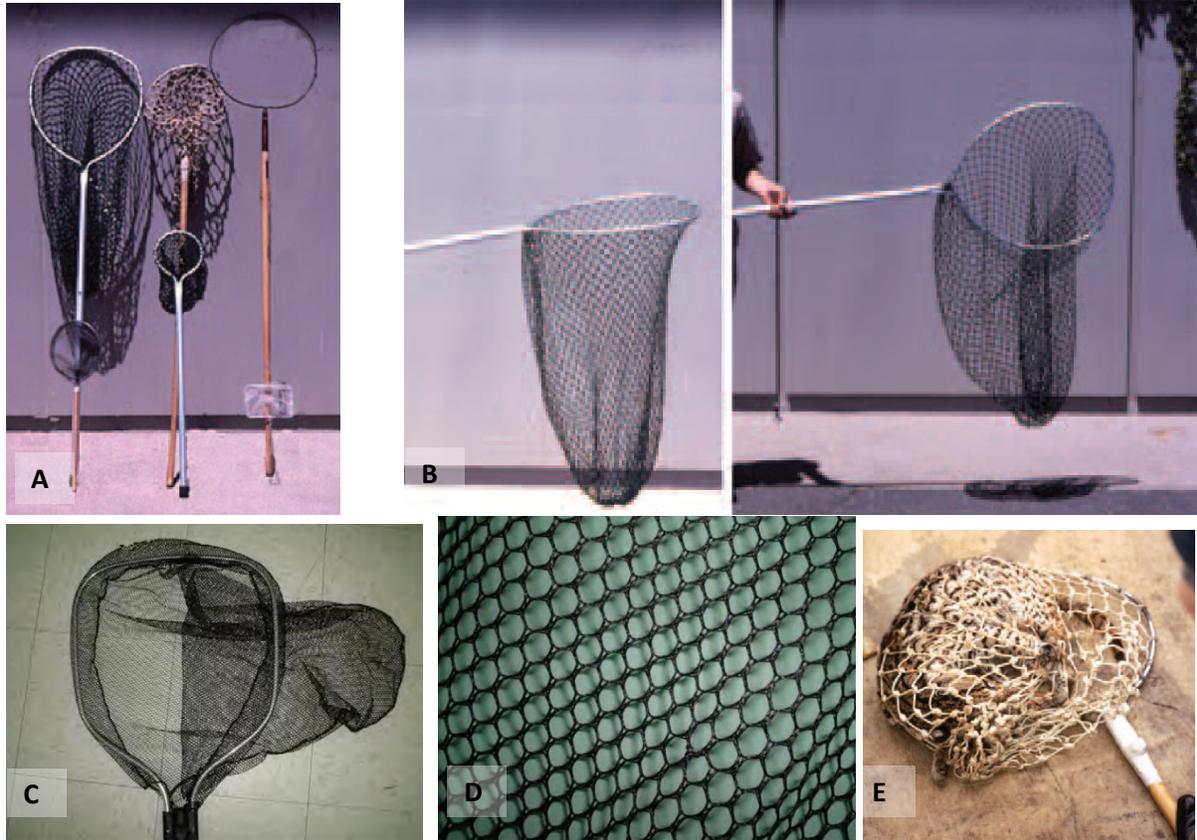


Figure 7. Hoop nets. A Having a range of hoop nets allows capture of different species. **B** Hoop nets must be deep enough to allow folding or twisting to trap animal in bottom of net. **C** Nets for birds must be soft and not-knotted. **D** Close up of non-knotted mesh for birds. **E** Strong rope nets are used for larger animals but the holes are still small enough to stop the animal poking a leg or head through a hole. Photos Fowler 2008 and KFBG 2009

- Transport crates:** Having a selection of strong wooden or metal transport crates of varying sizes is advisable. It is essential to have a sliding door on crates to allow more controlled access to animals while minimizing risk of escape. This also allows the crate to be put directly up against a cage for transfer of animals. Having one end covered in mesh or bars with a sliding metal or wooden panel over the top (Figure 8) allows visualization of the animal and access to inbuilt water containers without having to open doors. Crates should be large enough for an animal to stand up and turn around. 25% of the vertical surfaces of crates should be ventilated with holes. The crate should be easy to disinfect. It is often necessary to hold animals overnight before they are taken to a rescue center or released so having an in-built water container with outside access avoids having to open doors to provide water. The crate should be slightly raised off the floor to allow drainage of urine. If the animal is being held overnight, a tray or plastic sheet can be slid underneath the crate to collect urine and allow safe disposal and minimize urine splashes during onward transport of the animal. Advice on specific requirements of crates for various wildlife taxa can be gained from speaking to in country rescue centers dealing with specific taxa.

Transport crate for specific wildlife taxa:

- Pangolins are very susceptible to self-injury – they can tear off claws on metal cages. They are also very easily stressed so wooden transport crates with solid smooth sides that minimize visual contact and potential for self-injury are best for transport (Figure 9A).

- For birds, the crate should be a minimum size of roughly double the height of the bird in all three dimensions but not be too large or the bird will flap and damage itself. Wire mesh crates should be avoided for birds as they can easily damage feathers
- For non-venomous snakes, a clear plastic box (to allow visualization of the inside of the box) with a lid and ventilation holes is adequate (Figure 9B). If a box with a sliding lid (ideally made of clear plastic) can be made, this is even better, allowing gradual opening of the box and so better control of the snake. Ideally the snake should be inside a sack inside the box.

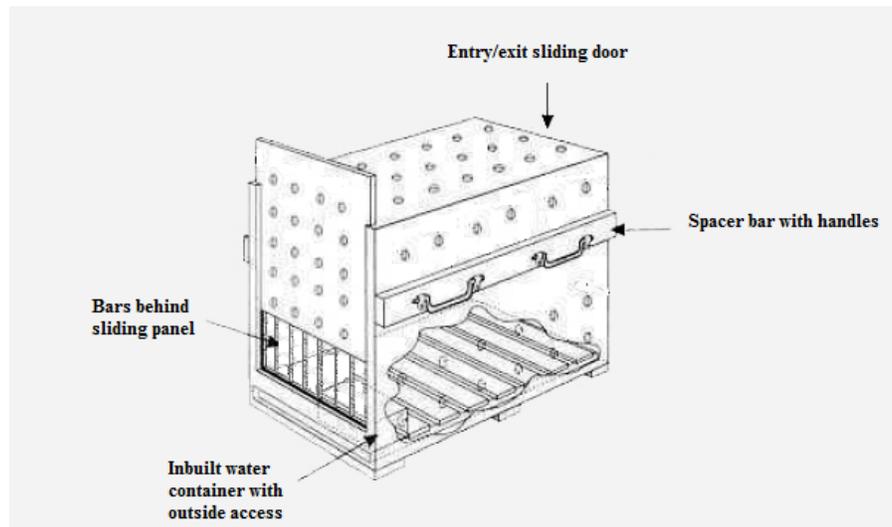


Figure 8. An example transport crate. Advice on specific requirements of crates for various wildlife taxa can be gained from speaking to in country rescue centers dealing with specific taxa.

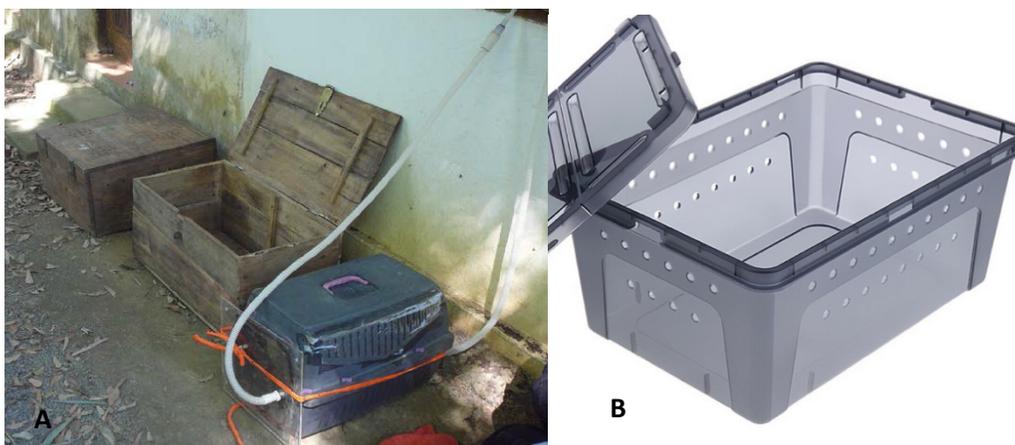
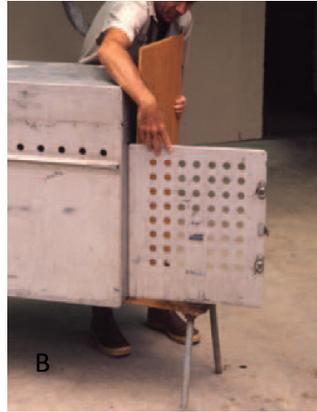


Figure 9. Transport crates for particular wildlife taxa. A Crate for Pangolin: a smooth sided wooden box minimizes the risk of self-trauma. Photo: WCS Vietnam B: Plastic box for non-venomous snakes with holes for ventilation

- **Shields and cage door barriers:** A shield (Figure 10A) can be used to encourage small animals to move into a transport crate. A cage door barrier, such as a strong piece of plywood (Figure 10B) can be used if an animal needs to be transferred from a cage with a swing door to a transport crate. The barrier can be used to cover the opening of the swing door until the transport box can be put flush against the cage. This technique only works for animals that are not strong enough to push the barrier away.



A



B



Figure 10. A: Shield for encouraging animals to move into transport cage; B: a cage door barrier to stop escape of an animal while opening a swing door and putting transport crate against cage. Photos: Fowler 2008

- **A cage divider:** A cage divider has metal rods that can be inserted down through a cage to allow the animal to be kept at the back of the cage. They are useful if an animal needs to be held overnight, to allow the cage to be opened to put in food or water, while preventing the escape of the animal. Cage dividers can be made easily and can be designed to fit specific transport crates.



Figure 11. Cage dividers used to stop an animal escaping when the cage door is opened

- **Self-closing cages**
Self-closing cages, such as Tomahawk traps, can be used if an animal is in a large enclosure and handling is deemed too dangerous. The trap is baited with food and the animal enters the cage to get the food, triggering the door to close. The disadvantage of these traps is that it can be time consuming waiting for the animal to go into the cage of their own accord.

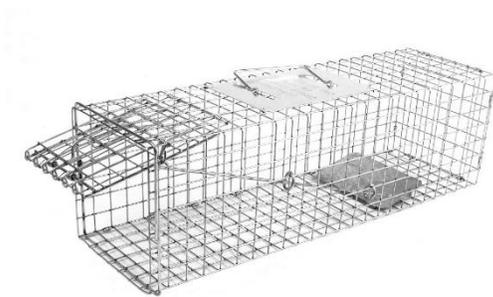


Figure 12. A tomahawk trap can be used for small to medium sized animals. Photo: PREDICT Tanzania Team

- **Equipment for snakes:** Snake hooks (Figure 13A) are very useful for lifting snakes from containers, directing their movement and gently pinning heads to the floor. Clear plastic tubes (Figure 13B) are useful to allow snakes to slide into and allow containment of the head. The tubes can be easily made from any clear plastic pipes (eg used for building/manufacturing) that is then cut down to size and a cap fitted. Plastic shields (Figure 13C) can be used to capture slightly aggressive non-poisonous snakes by trapping the head against the floor with gentle pressure to allow the handler to move in and grasp behind the head. Grasping snake tongs (Figure 13D) are not suitable for direct handling of snakes as they can easily cause injury if not used correctly. However they are useful for removing dishes, feeding or holding plastic tubes. Hessian bags or pillow cases with enough room to tie a knot in the top can be used to transport snakes inside a transport box.



Figure 13. Snake handling equipment. A snake hook, B clear plastic tubes, C plastic shield, D grasping snake tongs. Photos Fowler 2008.

Appendix D

B Virus Exposure Emergency Protocol in the event of a macaque bite, scratch or mucous membrane/eye splash (PREDICT One Health Consortium 2016)

FIRST AID SHOULD BE CARRIED OUT IMMEDIATELY AFTER MACAQUE BITE/SCRATCH/MUCOUS MEMBRANE/EYE SPLASH

Bite or scratch: wash skin for 15 minutes with a solution containing detergent soap (eg povidine iodine or chlorhexidine). If available, wash skin first with freshly prepared 1:20 diluted household bleach followed by the detergent soap. **DON'T USE** bleach on mucous membranes.

Mucous membrane exposure: flush eye or mucous membranes with sterile saline solution or water for 15 min (or 1 liter).

After initial first aid, a health care professional should be consulted as soon as possible, preferably within hours, to decide whether prophylactic treatment with acyclovir should be started. There have not been any controlled studies to show that acyclovir can prevent infection of B virus in humans so it should always be the goal not to be injured by a macaque. The doctor may also take a blood sample to perform paired serum samples and take a swab of the wound for culture.

Prophylactic acyclovir treatment is recommended if:

- The bite/scratch went through the skin or a mucosal splash occurred and the macaque was ill or had oral or genital lesions seen with B virus
- The bite/scratch went through the skin or a mucosal splash occurred and the area was not cleaned properly at the time
- A laceration of the head, neck or torso occurred
- A deep puncture bite occurred
- A needle stick injury associated with tissue or fluid from the nervous system or from lesions suspicious for B virus, eyelids, or mucosa.
- Puncture or laceration by an object that was (a) contaminated either with fluid from monkey oral or genital lesions or with nervous system tissues, or (b) known to contain B virus.
- The doctor takes a post-cleaning swab and the culture is positive for B virus.

Prophylactic acyclovir treatment is considered if:

- The bite/scratch or mucosal splash was adequately cleaned
- A needle stick injury involving blood from an ill or immunocompromised macaque
- Puncture or laceration from an object that was contaminated with body fluid (other than that from a lesion)

Prophylactic acyclovir treatment is not recommended if:

- The bite/scratch did not puncture the skin
- Exposure was from a different species of primate/not a macaque

Appendix E

List of local medical contacts for first aid or emergency services

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References:

Fowler, M.E. (2008) Restraint and handling of wild and domestic animals / Murray E. Fowler. – 3rd edition. ISBN-13: 978-0-8138-1432-2

Juang, P.S.C and Tsai, P. (2020). N95 Respirator Cleaning and Reuse Methods Proposed by the Inventor of the N95 Mask Material. J Emerg Med, 58(5): 817-820

KFBG, Kadoorie Farm and Botanic Gardens (2009) Operational Guidelines for Wild Animal Rehabilitation, https://www.kfbg.org/images/download/KFBG_Fauna_Operational_Guidelines_3rdEd_2009Sept.pdf

Zhang, L. et al. (2020) Origin and evolution of the 2019 novel coronavirus. Clin Infect Dis. (2020) 71:882–3. doi: 10.1093/cid/ciaa112

Mills, J.N. et al. (1995) Methods for Trapping and Sampling Small Mammals for Virologic Testing. U.S. Department Of Health & Human Services, Centers for Disease Control and Prevention.

Opriessnig, T. and Huang Y.W. (2020) Update on possible animal sources for Covid-19 in humans. Xenotransplantation 27(3)

PREDICT One Health Consortium (2016). PREDICT Operating Procedures: Non-Human Primate Sampling. Adapted from Cohen et al., 2002. Recommendations for Prevention of and Therapy for Exposure to B Virus (*Cercopithecine Herpesvirus 1*). Clinical Infectious Diseases, 35: 1191-203.

Tribe, A. and Spielman D. (1996) Restraint and Handling of Captive Wildlife. ANZCCART News Vol 9 No 1 March 1996 Insert.
http://www.ebd.csic.es/documents/240051/0/Restraint_and_handling_of_captive_wildlife.pdf/fae6d2a8-3f1d-4645-be5b-77bda8cfaf0a

Van Doremalan, N. et al (2020). Aerosol and surface stability of sars-cov-2 as compared with SARS-CoV-1. New England Journal of Medicine, 382:1564–1567.



Decision making quick guide for safe handling of wildlife and wildlife products on enforcement operations in Asia

All enforcement operations:
Always carry **masks, nitrile gloves, washable shoes and 80% + alcohol gel**
Use respirator mask (eg N95 mask) for indoors or crowded outdoor operations, surgical mask for other outdoor operations

Wildlife or wildlife products on operation that need to be seized

Check that enforcement staff are:

- vaccinated for a minimum of rabies and tetanus if live animal confiscation
- free of tuberculosis (had negative test in last 6 months) if primate confiscation
- not currently or in last few days ill (coughing, sneezing, fever, diarrhea, rash, cold sores, etc)
- not immunocompromised

Do enforcement staff have access to and understand how to use PPE?

NO → Do not proceed with seizure

YES

Live wildlife:

- Mammals and birds: Full PPE
- Amphibians and reptiles: Basic PPE
- **STOP, before handling wildlife, answer the following**

Fresh dead wildlife:

- Mammals and birds: Full PPE
- Amphibians and reptiles: Basic PPE
- **PROCEED WITH SEIZURE**

Dry wildlife products (eg ivory, rhino horn, tiger bones, pangolin scales):

- Basic PPE
- **PROCEED WITH SEIZURE**

Can live wildlife handling by enforcement staff be avoided by:

- Confiscating without direct handling e.g. move in existing cage
- Enlisting external expertise to assist
- Maintaining animal at point of seizure until expert assistance available
- Encouraging animal to enter transport crate using patience or food as enticement, no handling

YES → **PROCEED WITH SEIZURE** (NOTE: animals >15kg must have expert help even when no handling anticipated)

NO, LIVE WILDLIFE HANDLING BY ENFORCEMENT STAFF IS NECESSARY

Do enforcement staff:

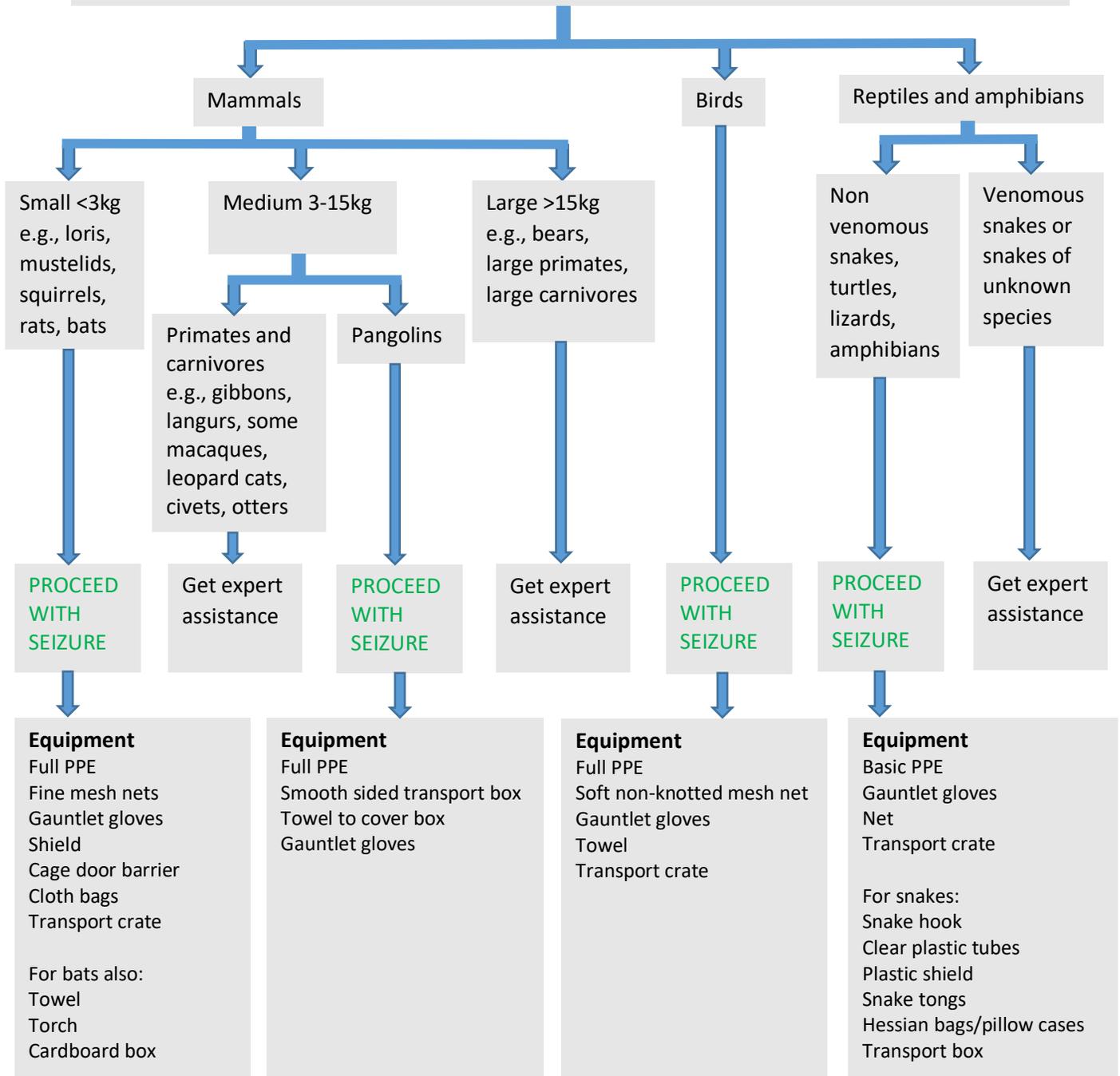
- Understand potential disease and injury risks from and to the wildlife on site
- Have appropriate training/experience to handle the species of wildlife present
- Have access to appropriate wildlife handling equipment
- Understand how to manage bites/scratches from wildlife
- Feel confident that the health risks of the operation can be mitigated

NO → Do not proceed with seizure

YES → Go to next page

Live wildlife seizure where animal handling by enforcement staff is necessary

HANDLING ONLY TO BE DONE BY EXPERIENCED STAFF WHO HAVE HAD APPROPRIATE TRAINING



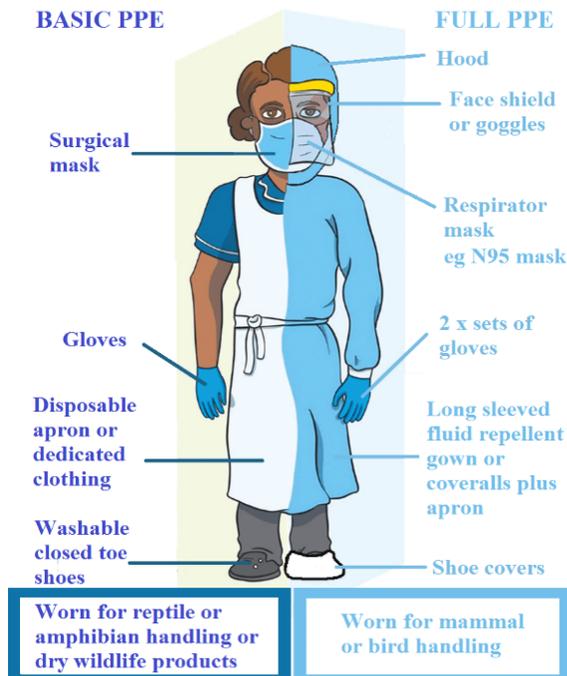
Additional equipment for all seizures:

- Container of water for handwashing, and antibacterial soap
- Hand alcohol gel that contains at least 80% alcohol
- Disinfectant for cleaning equipment after use: bleach or Virkon.
- Scrubbing brush
- Large waste bags for used PPE
- Disinfectant wipes or bottle of disinfectant spray
- First aid kit including povidone-iodine, eyewash, dressing to cover any scratches or bites

Summary sheet of Personnel Protective Equipment (PPE) for handling of wildlife and wildlife products on enforcement operations in Asia

Adapted from NHS illustration by James Fox Creative

PPE FOR WILDLIFE SEIZURES



How to put on FULL PPE

1. Hand hygiene with soap and water or alcohol gel
2. Shoe covers on
3. Put on inner pairs of nitrile gloves
4. Coveralls go on
5. Respirator mask (eg N95 mask) goes on. Form the section of mask over your nose to fit the bridge of your nose and make sure there are no gaps around the edge. Any time you put on a respirator, perform a seal check by inhaling sharply. If there is air leakage around the edges of the mask, readjust to ensure a proper seal.
6. Pull the hood of the coveralls up or put on separate hood
7. Put on apron
8. Put on outer pair of gloves over the first pair and extend the gloves over the coverall cuffs
9. Face shield or goggles on

How to put on BASIC PPE

1. Hand hygiene with soap and water or alcohol gel
2. Apron or dedicated clothing goes on first
3. Surgical mask goes on.
4. Put on nitrile gloves

How to remove BASIC PPE

1. Hand hygiene with soap and water or alcohol gel
2. Remove and dispose of the apron. Put in disposable biohazard bag. Or take off dedicated clothing and put in bag for washing
3. Hand hygiene with alcohol gel
4. Remove gloves. Place in disposable bag
5. Hand hygiene with alcohol gel
6. Remove surgical mask
7. Make sure everything is inside disposable bag
8. Close the disposable biohazard bag
9. Hand hygiene with alcohol gel

How to remove FULL PPE

1. Use disinfectant wipe to wipe off any visible contamination of PPE. Place in disposable biohazard bag
2. Remove apron. Place in disposable bag
3. Hand hygiene with alcohol gel
4. Remove outer gloves. Place in disposable bag
5. Hand hygiene with alcohol gel
6. Remove face shield or goggles. Place in bag for disinfecting
7. Hand hygiene with alcohol gel
8. Pull down (if attached) or pull off hood of coverall
9. Remove coverall by rolling down until inside out. Place in disposable bag
10. Hand hygiene with alcohol gel
11. Remove shoe covers. Place in disposable bag or boots in bag for disinfecting
12. Remove inner gloves. Place in disposable bag. Hand hygiene
13. Put on new pair of gloves
14. Remove the respirator mask (eg N95 mask) - first the top, then the bottom strap
15. Hand hygiene with alcohol gel
16. Use disinfectant wipe to clean off shoes
17. Hand hygiene with alcohol gel
18. Remove gloves. Place in disposable bag. Close disposable bag.
19. Hand hygiene with alcohol gel
20. Wash hands with soap and running water
21. Wipe or spray outside of disposable bag with disinfectant