



Guidelines for Working with Free-Ranging Wild Mammals in the Era of the COVID-19 Pandemic

SUMMARY

The SARS-CoV-2 virus, the cause of COVID-19, emerged as a human pathogen in 2019. While it is thought to have a zoonotic source, the original wildlife reservoir and any potential intermediate hosts have not yet been identified. Phylogenetic analyses suggest the progenitor virus is related to beta-coronaviruses previously identified in bats. At this time, SARS-CoV-2 should be considered a human pathogen with people acting as reservoir and sustaining transmission. There is a possibility that SARS-CoV-2 will become endemic in the human population and thus, presents a risk of a potential reverse zoonosis to wildlife as with infectious diseases such as tuberculosis and influenza.

Currently the risk of human-to-animal transmission to non-captive wildlife species warrants concern. A number of cases have demonstrated natural human-to-animal transmission of SARS-CoV-2 in felids, canids and mustelids, the majority due to close and prolonged contact with infected households or people, and none has involved free-ranging wildlife. The identification of close phylogenetically-related viruses (e.g. in bats and pangolins), the presence of important cell receptor proteins (ACE2 receptors) and infection following natural exposure or experimental inoculation suggest that a wide range of mammalian species may be susceptible to SARS-CoV-2. Knowledge and experience with human-to-animal transmission with other human respiratory pathogens (e.g. metapneumovirus, measles, other human coronaviruses and tuberculosis) indicate that some species taxonomically closely related to humans (e.g. non-human primates) would likely be susceptible to infection and/or clinical disease caused by SARS-CoV-2.

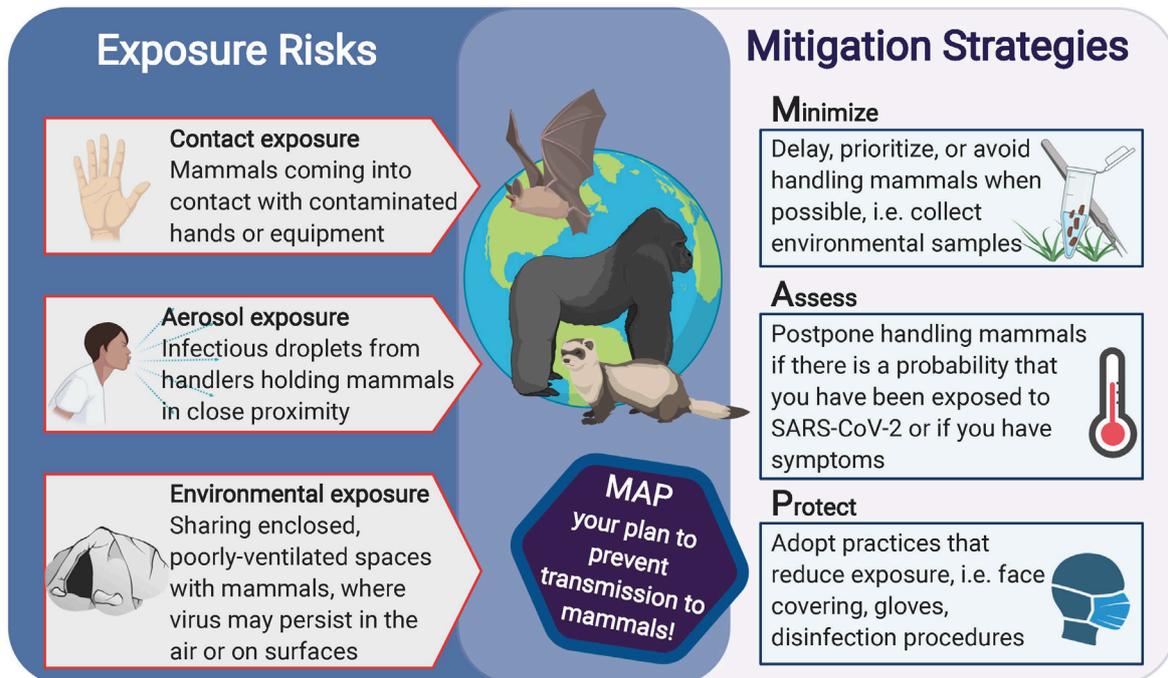
There are valid concerns about the health of individuals or populations if infected with the virus and/or a wildlife population becoming a reservoir for SARS-CoV-2. Any wildlife species/taxa that becomes a reservoir for SARS-CoV-2 could pose a continued public health risk of zoonosis, a risk for the transmission of SARS-CoV-2 to other animal species, and risk negative perceptions resulting in human threats to that species or their populations.

Efforts that require working with free-living wildlife are vital to professional management and conservation as well as the health of wildlife, people and ecosystems. The recommendations below were developed to minimize the risk of SARS-CoV-2 transmission from people to free-ranging, wild mammals. Specifically, these recommendations are for people engaged in **wildlife work*** in the field, either in direct contact (e.g. handling) or indirect contact (e.g. within 2 meters

* These recommendations are provided for trained biologists, conservationists, researchers, veterinarians, etc who work with free-living wildlife in situ. They are not intended for people who interact with wild mammals under different circumstances, such as rehabilitators or ecotourists, etc.

or in a confined space) with free-ranging wild mammals, or working in situations in which free-ranging wild mammals may come in contact with surfaces or materials contaminated by infected personnel.

Preventing transmission of SARS-CoV-2 from humans to wild mammals



This figure was adapted in collaboration with the IUCN Bat Specialist group.
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RECOMMENDATIONS

These recommendations are based on first principles of biosecurity and hygiene, current knowledge of human-to-animal SARS-CoV-2 transmission and the precautionary principle.

Minimize

In line with ethical considerations for working with wildlife, we recommend that the three “R’s” be considered. If postponement is not possible, it is recommended to “**Replace**” work that involves animals with alternatives that do not require handling free-living wildlife (i.e. environmental sampling, remote monitoring); “**Reduce**” the number of animals required to conduct the work and “**Refine**” the methods used to minimize the impact of the handling on the individual animal and on that animal’s population. The recommendations given below are focused on “Refine” however, “Replacing” and “Reducing” work with animals should also be considered at all times.

The primary aim of “Refining” work to be done with wild mammals is to reduce transmission of SARS-CoV-2 from a person to wild mammals. Like tuberculosis and measles, SARS-CoV2 may pose a serious threat of transmission from people to wild mammals. Thus, these additional refinements are recommended for those working indirectly with wild mammals within an enclosed space as well as those working directly with/handling free-living wild mammals.

Assess

The SARS-CoV-2 virus will likely be endemic in many human populations for the foreseeable future, making the potential for transmission of SARS-CoV-2 to wild mammals from people an on-going risk. It is recognised that as the local rate of transmission of SARS-CoV-2 in human populations in different localities fluctuates, the subsequent risk of transmission to wildlife will also vary, requiring continuous and adaptive risk assessment. As the level of community transmission ([as defined by WHO](#)) increases and decreases according to implemented control measures, so too will the level of risk. When community transmission rate increases, the potential that at least one person on the field team will be infected (even if they do not have symptoms) also increases. This is important as currently almost half of human infections are asymptomatic, which increases the risk of unknowingly transmitting the virus to wild mammals. These factors make it impossible to estimate the exact quantitative risk of human-to-animal SARS-CoV-2 transmission that working with wildlife represents. Thus, when assessing whether to proceed or postpone work it is recommended that one:

- 1) Postpone the work, unless it is urgent for the health and wellbeing of the animal, if there is known or suspected COVID-19 community transmission, [as defined by the WHO](#), in the area around the site of the wild mammal work or in an area where the team members have been in the past two weeks. Wildlife work should be postponed at least until the transmission rate of COVID-19 has been limited to clusters of cases instead of community transmission ([WHO](#)).
- 2) Confirm that local authorities currently permit this type of work and always follow local public health guidelines regarding COVID-19 prevention; if the work is permitted,
- 3) Use one's best judgement as to when to work with wild mammals, erring on the side of the precautionary principle (i.e. uncertainty must be resolved in favor of prevention); if one decides to continue,
- 4) Assess the field team or individual:
 - If someone on the team tests positive for SARS-CoV-2 or has COVID-19 symptoms ([WHO](#)), they should follow public health advice on quarantining and avoid working with wild mammals for 2 weeks ([WHO](#)) after symptom onset and if symptoms persist, for at least three days after symptoms have resolved without the use of fever-reducing medications. In the case of an asymptomatic infection, avoid working with wild mammals for 2 weeks after the last positive test date.
 - If someone on the team has had contact with a confirmed or suspected person in the past 2 weeks, they should follow public health advice on quarantining and should not work with wildlife for 2 weeks since the potential/known exposure or until they are cleared by public health authorities.
 - This may mean the whole team needs to be quarantined if they were in contact with the team member that tested positive.
 - No one who is currently showing [symptoms of SARS-CoV-2](#) (fever of 38°C [100.4 °F] or greater, cough etc.) should work with wild mammals.
 - Implement daily temperature checks on the days you will be in contact with wild mammals.

- It is important to avoid taking fever-modifying medicine prior to the temperature check to prevent masking a fever.
- If possible, each person on the field team should be tested for SARS-CoV-2 with negative confirmation at least 24-48 hours prior to fieldwork commencing, understanding that this may not be feasible in all circumstances/locations.

Protect

If, upon assessment of the local situation, it is determined that work with free-ranging wild mammals may proceed, it remains the team's duty to minimize the risk of asymptomatic transmission of SARS-CoV-2 to the wild mammals (and each other) by using the proper protective equipment and biosecurity measures. To do this, it is recommended that one:

- Follow local public health recommendations.
- Limit the number of personnel to the minimum necessary to safely complete the task and minimize the number of personnel who actually handle or come into close contact (within 2 meters [6 feet]) with wild mammals.
 - Maintain the same field team for the duration of the operation to minimize the number of different people contacting one another and animals.
 - To the extent possible, maintain physical distancing between personnel, particularly during transportation and activities in closed spaces.
- Minimize the amount of time people are in close or direct contact with wild mammals.
- Ensure the people on the team that will have direct contact with wild mammals have been properly trained in using personal protective equipment, infection control and animal handling.
- Wear clean, dedicated clothing (e.g. disposable (Tyvek coveralls) or clothing that will be removed and properly cleaned immediately after sampling, at the site).
- If working **indirectly** (e.g. >2m or in a confined space) with wild mammal species that are considered to be particularly susceptible[†] (e.g. bats, felids, mustelids, non-human primates and any species with the same ACE2 receptor):
 - Wear a face mask or covering, preferably a surgical mask or a more protective covering (e.g. fit-tested N95 without an air release valve).
 - Note a mask or other cloth face-covering is used to prevent the spread of respiratory droplets from your nose and mouth. If surgical masks or respirators are not available locally, it is recommended to use a fitted face covering to improve the ability of the mask to catch respiratory droplets.

[†] Note: as new information becomes available any other taxa / species in which SARS-CoV-2 transmission is demonstrated via natural or experimental inoculation should also be considered "potentially susceptible".

- If working with a team, team members should wear face coverings regardless of the susceptibility of the animal species as recommended by local public health officials.
- If **directly** handling wild mammals:
 - Wear a face mask or covering, preferably a surgical mask or a more protective covering (e.g. fit-tested N95 without an air release valve) when handling/transporting wild mammals.
 - When handling potentially susceptible species[‡] (e.g. bats, felids, mustelids, non-human primates and any species with the same ACE2 receptor) wear an N95 respirator (**without an air release valve**) or other equivalent/increased respiratory protection (e.g. Powered Air Purifying Respirators).
 - Wash your hands with soap and water and/or apply hand sanitizer (>60% alcohol applied to clean hands) before and after handling wild mammals.
 - Wear disposable or clean reusable gloves, and change gloves between sampling events or handling individuals of solitary species.
 - Do not blow on mammals to see anatomical features or ectoparasites.
 - Keep captured animals separate from each other to greatest extent possible when capturing and handling.
 - Avoid touching your face or mask, and if contact occurs, change/disinfect your hands/gloves.
 - Clean and disinfect all reusable field gear and equipment that may come into contact with wild mammals prior to starting the work and after each field-work shift or between handling individuals of solitary species.
 - When selecting a disinfectant consider its efficacy against SARS-CoV-2 ([EPA](#)), its effectiveness against other pathogens ([The Center for Food Security and Public Health](#)) that the animal being sampled may carry, and its potential effect on the equipment that will be used and its environmental impact.
 - 70% isopropyl alcohol or a 10% solution of household bleach are recommended for disinfection against COVID-19 ([WHO](#)).
 - For both disinfectants, the surface must be cleaned before they are applied, and your working solution of bleach must be made fresh every day.
 - Properly dispose of used materials and biological and hazardous waste.

[‡] Note: as new information becomes available any other taxa / species in which SARS-CoV-2 transmission is demonstrated via natural or experimental inoculation should also be considered “potentially susceptible”.

- Follow more specific guidelines produced for each specific taxa group when available (see links below).
- In settings where peri-urban work is required, ensure that any onlookers from the public remain at least 10 meters away and are upwind from the work that is ongoing with the wild mammals.

These recommendations are deliberately broad to apply to multiple taxa of wild mammals. Some expert groups have developed their own recommendations (see below), which should be used in addition to these. The situation with the COVID-19 pandemic is continually evolving. As we learn more about the effects of SARS-CoV-2 in more species and transmission risks, these recommendations may change or be superseded by species or taxa-specific recommendations. As the SARS-CoV-2 will likely become endemic in human populations, it is our responsibility to prevent the same thing from occurring in the wild, free-ranging mammal species that are in contact with people.

ADDITIONAL RESOURCES

IUCN Great Apes Specialist Group Statement:

http://www.internationalprimatologicalsociety.org/docs/COVID-19_Advisory_for_conservation_field_teams.pdf

IUCN Bat Specialist Group Statement:

https://www.iucnbsg.org/uploads/6/5/0/9/6509077/map_recommendations_for_researchers_v.1.0_final.pdf

AZA Felid Statement: <https://zahp.aza.org/felid-tag-statement-on-sars-cov-2/>

AZA Small Carnivore Statement: https://zahp.aza.org/wp-content/uploads/2020/04/AZA-Small-Carnivore-TAG-SARS-CoV-Statement_8Apr2020.pdf

AFWA Statement: <https://wildlifedisease.org/Portals/0/Covid-19%20Information/AFWA%20Statement%20on%20COVID-19%20and%20Mustelids%20Felids%20and%20Canids%20June%209%202020.pdf>

European Association of Zoo and Wildlife Veterinarians – Transmissible Disease Handbook, Chapter 4.4 SARS-CoV2 and COVID-19. https://www.eazwv.org/page/inf_handbook

* The infographic was created using [BioRender.com](https://www.biorender.com)