



SARS-CoV-2 & Bats: Assessing the Threat

Pennsylvania Game Commission, Bureau of Wildlife Management &
Penn Vet, Wildlife Futures Program

Revised 13 October 2020



Executive Summary

Although the exact origins for the current pandemic of SARS-CoV-2 is unknown, researchers believe that this virus originating in China has been circulating in the horseshoe bat subgenus, a subgenus that also harbors SARS-like coronaviruses. It is still unknown whether SARS-CoV-2 can cause disease in bat species, if bats are latent carriers, if humans can infect bats with the virus, or if the virus can cause infection in people directly transmitted from bats. The virus has not been detected in any North American bat species, nor have there been reports outside of China of the presence of SARS-CoV-2 in other bat populations.

Bats are a critical non-game resource to North America. They are extremely valuable as insectivores and can consume nearly a million insects per bat per year. Humans pose the greatest threat to bats through highway mortalities, wind farms, introduced disease, and disturbances while hibernating. Bat management and research is critical to save several North American species of bats from extinction as their populations have been threatened by the introduction of an invasive pathogen responsible for a new disease called white-nose syndrome. Given this important yet complicated juxtaposition of bats and humans during this SARS-CoV-2 crises, it is critically important to help manage this wildlife resource through education and research to help prevent false information that leads to inappropriate and malicious activities against bat species in the Commonwealth.

Even though SARS-CoV-2 has not been detected in North American bat species, major objectives of the PGC are to protect both bats and humans from interactions that could lead to a disease outbreak. To protect bats the PGC has outlined guidelines for wildlife rehabilitation permittees to exercise utmost precaution to avoid either bat to human or human to bat transmission of the virus. The PGC has worked with the Wildlife Futures Program to develop and validate an assay specific for diagnosing SARS-CoV-2 in North American bats. This testing is being used to check recovering bats at wildlife rehabilitation facilities for the virus prior to potential release and also the assay can be used to identify the presence of virus in dead bats or bats relocated as a potential nuisance animals. As more information and research becomes available the PGC may pursue additional disease mitigation and surveillance efforts to safeguard wildlife health. Any such response will be deliberate and require close coordination with other local, state, and federal wildlife, agriculture, and public health agencies.

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2001 Elmerton Avenue
Harrisburg, PA 17110-9797

Wildlife Management
(717) 787-5529

Date: Friday, April 10, 2020
From: Bureau of Wildlife Management (Non-Game Mammal Section & Wildlife Health Division)
Re: Directives & Support for PA Bat Rehabilitators During Coronavirus Pandemic

Background: As a response to the uncertain risks the SARS-CoV-2 virus poses to native bats, both in terms of short-term mortality in potentially immuno-compromised animals and in terms of the longer-term dangers to humans, bats, and other wildlife, the Association of Fish and Wildlife Agencies (AFWA) has recently developed a draft *Guidance for Bat-related Activities in Response to COVID-19* document. The document specifically addresses the risks associated with reverse zoonosis or the transfer of the virus from infected humans to bats. While bat-related research recommendations will have to be addressed in the near future, there is a more immediate need for directives and support for PA wildlife rehabilitators who care for bats.

Challenges: Currently, there is no test to confirm that a bat, rehabilitator, or rehabilitation facilities are free of the SAR-CoV-2 virus. This presents challenges in determining if bats should be returned to the wild or if rehabilitators should continue to intake bats during the pandemic.

Recommendations: Most bats presently undergoing rehabilitation in PA are found at PA Bat Rescue in Berks County, a bat-only facility operated by Stephanie Stronsick. This facility already implements rigorous biosecurity measures, has not had any additional staff or volunteers inside the facility since January 2020, and we are confident that they have the physical capacity to support the following objectives:

1. Over the course of the next 2-3 months, accept the transfer of any bats currently held by other PA wildlife rehabilitators (may be up to 500 bats across 8 facilities) and the establishment of separate quarantine areas to group bats by originating facility.
2. The ability to establish an additional quarantine area for any new bat intakes to PA Bat Rescue that, while strongly discouraged, may occur during the pandemic.
3. The ability to house bats and forego any bat releases for an undetermined period of time.

At this time, the Game Commission supports the release of bats currently held by rehabilitators, if the bats are ready to return to the wild, only under very specific criteria:

1. The rehabilitation facility has overwintered the bats, and;
2. The rehabilitation facility cares exclusively for bats, and;
3. The rehabilitation facility is run by the owners under strict biosecurity measures, and;
4. The rehabilitation facility has not granted access to outside volunteers or employees since January 2020.

PA Bat Rescue fulfills all the above criteria and will be releasing all suitable bats from their facility. Afterwards, PA Bat Rescue will decontaminate their entire facility and prepare for incoming transfers from facilities that do not meet the above release criteria. So as not to violate the current stay-at-home order, it is recommended that Game Commission personnel coordinate and execute all transfers. Any transferred bats or intakes from this point forward will not be returned to the wild until additional SARS-CoV-2 testing methods are developed and associated protocols are established. With uncertainty surrounding when such developments will occur, PA Bat Rescue will require financial assistance from the Game Commission to support the aforementioned objectives; funds will be used to purchase personal protective equipment (PPE), food for the bats, materials to establish separate quarantine areas, and other operating expenses.*

While we strongly discourage the public from submitting bats to rehabilitators during the pandemic (“If you care, leave it there.”), if intakes are deemed unavoidable, the Game Commission will allow rabies vector species certified rehabilitation facilities in PA that are following strict biosecurity measures (e.g., isolation of all bats in individual enclosures, restricting personnel, regular cleaning and disinfecting) to continue to accept bats. Once bats are able to eat on their own (e.g., pups) and/or deemed healthy enough for transfer, we recommend they be relocated to PA Bat Rescue for long-term care until testing protocols are established and releases can move forward. As bats are cleared for release in the future, they will be returned to their original rehabilitation facility and released as close as possible to their initial point of contact.

This pandemic has presented the Game Commission with an opportunity to provide immediate support for bat populations that are already in significant decline due to habitat loss and disease. Any financial support provided to PA Bat Rescue is a reflection of these unique circumstances and the Game Commission is not expecting to extend such support to other PA wildlife rehabilitators.



COMMONWEALTH OF PENNSYLVANIA PENNSYLVANIA GAME COMMISSION

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Wildlife Management
(717) 787-5529

PGC Talking Points for Protecting Bats & PA Bat Rehabilitators During Coronavirus Pandemic

Friday, April 21, 2020 – This is an ever-changing situation, and these points replace those issued on 04/17/20

As a response to the uncertain risks the SARS-CoV-2 virus (the virus that causes the COVID-19 disease in humans) poses to native bats, and any related dangers infected bats could pose to other bats, wildlife, and humans, the PA Game Commission is instituting restrictions and numerous protective measures in the interest of everyone's health and safety. If bat rehabilitators or any member of the public should contact the Game Commission and have questions about what actions we are taking, we encourage you to cover the following points:

- Research is ongoing at the state and federal level to see if the virus can infect native bats and what effects it may have on them. The Game Commission is currently supporting research into the development and validation of a diagnostic technique to identify the virus in bat guano. We are committed to reducing the risks of introducing the virus to our already decimated bat populations. While the impacts of such an introduction are currently unknown, they pose significant risk to both bat and human health.
- We encourage all individuals to avoid contact with any bats found on the landscape. This is a continuation of past recommendations by the Game Commission and is in place so humans can avoid exposing themselves to diseases such as rabies.
- If a dead bat is encountered and you want to remove it from the landscape, please wear gloves and place the carcass in a plastic bag in your commercial trash bin. If you do not have gloves, you can pick it up while donning a plastic bag on your hand or use a shovel to place it in a plastic bag prior to disposal in your commercial trash bin.
- Standard procedures will remain in place for any cases of potential human rabies exposure from bats. In such cases, regional Game Commission offices can arrange for the bat will be submitted to the appropriate diagnostic laboratory for immediate rabies testing.
- **PA wildlife rehabilitation facilities that are rabies-vector species certified should neither transfer wildlife to nor accept wildlife from any other PA wildlife rehabilitation facility.** The only exception will be the transfer of most bats that are currently held by PA wildlife rehabilitators to a single facility that has rigorous biosecurity measures in place and the capacity to house hundreds of bats in isolated areas. The Game Commission will be coordinating this transfer and providing support to this facility due to the extremely unique circumstances that the pandemic presents.
- **Intake of new bats to wildlife facilities should be avoided whenever possible.** In the case an intake is unavoidable (e.g., bat species is threatened or endangered), please immediately notify the Game Commission's bat biologist, Greg Turner, at gturner@pa.gov. Such intakes will eventually be transferred as noted above.
- **Release of untested bats to the wild is prohibited as this could lead to SARS-CoV-2 becoming established in our native bat populations.** At the point, a test is developed and validated, bats will likely be tested for SARS-CoV-2 prior to eventual release. More guidance on this issue will be developed and distributed in the coming weeks.
- The Game Commission is halting all field research that involves the handling of bats in the wild until the ongoing federal risk assessment is publicly available and provides further guidance. Additionally, any organizations working underneath permits issued by the Game Commission shall suspend bat field activities until further notice.
- It is the recommendation from the Association of Fish and Wildlife Agencies (AFWA) that any bats recovered from homes by Nuisance Wildlife Control Operators (NWCOS) be euthanized. The Game Commission will follow this guidance.
- While the prohibitions outlined above may not be ideal, euthanize bats, it is a conservative approach that reduces the need to euthanize bats.

Additional inquiries can be directed to:

Greg Turner, Bat Biologist, PA Game Commission
Dr. Andrew Di Salvo, Wildlife Veterinarian, PA Game Commission



Date: Friday, May 1st 2020

From: B. Wildlife Management (Non-Game Mammal Section & Wildlife Health Division)

Re: Dispatcher and Regional staff information on COVID-19 and bat related issues

Background: In early April, we sent guidance on the COVID-19 issue relating to bats and rehabbers, specifically addressing the risks associated with reverse zoonosis or the transfer of the coronavirus from infected humans to North American bat species. As we receive more formal guidance from the anticipated risk assessment being developed by federal partners, our guidance and recommendations may be modified. Following discussions with the Executive Office, we have made some minor updates to our current policies and actions. Updated talking points discussing those strategies for any Game Commission personnel communicating with Pennsylvania citizens dealing with bat-related issues are provided below.

Actions and Updates NOT associated with Rehabilitation:

- Currently, all new requests for permits that involve the capture, handling, and release of bats back into the wild are suspended until the risk assessment is released.
- The Game Commission is suspending all of its live bat handling until the risk assessment is released.
- Nuisance Wildlife Control Operators have amended their national methodology when dealing with bats, and it was the consensus by AFWA and federal agencies that these changes are sufficient to allow their permitted activities to continue.

Actions and Updates Associated with Rehabilitation:

- At this time, the Game Commission supports the release of bats currently held by rehabilitators, if the bats are ready to return to the wild, only under very specific criteria:
 1. The rehabilitation facility has overwintered the bats, and;
 2. The rehabilitation facility cares exclusively for bats, and;
 3. The rehabilitation facility is run by the owners under strict biosecurity measures, and;
 4. The rehabilitation facility has not granted access to outside volunteers or employees since January 2020.
- It has been determined that 3 rehabilitators meet the above release criteria. They will be notified of this approval by the Game Commission.
- The Game Commission continues to develop a plan for what to do with bats not approved for release. It currently involves:
 1. To work with our Wildlife Futures Program at Penn Vet to develop and validate a test for SAR-CoV-2 virus in bats. If future risk assessments recommend the testing of all bats prior to their return to the wild, only bats testing negative may be authorized for release.

2. All bats not meeting the Game Commission's criteria for immediate release will be transferred to a single facility dedicated to housing these bats. Site preparation and transportation of these bats is currently being coordinated. Housing these bats in this manner will provide better oversight, will minimize future exposure risk to the bats, and will provide isolated housing to minimize potential spread within the site.

- While we strongly discourage the public from submitting bats to rehabilitators during the pandemic ("If you care, leave it there"), should a threatened or endangered bats species be transported or if intakes are deemed unavoidable, the Game Commission will allow rabies vector species certified rehabilitation facilities in PA that are following strict biosecurity measures (e.g., isolation of all bats in individual enclosures, restricting personnel, use of personal protective equipment (PPE), regular cleaning and disinfecting) to continue to accept bats. These facilities will be required to notify the Game Commission of such admissions for tracking purposes. Once bats are able to eat on their own (e.g., pups) and/or are deemed healthy enough for transfer, we will work to coordinate the transfer to our dedicated holding facility. As bats are cleared for release in the future, they will be returned to their original rehabilitation facility and released that evening as close as possible to their initial point of contact.

Staff Interaction with Citizens and/or Bat Issues:

- For people dealing with an individual bat in occupied structures, first determine if potential human exposure occurred (e.g., bites, scratches). If so, the bat should be euthanized and tested for rabies. If there was no human contact and the bat is able to fly, open doors and windows, reduce lighting, and give it some time to get out on its own. If it must be removed to avoid human contact, citizens should wear leather gloves and use a large towel to capture the bat when it lands to avoid direct contact. An alternative method is to use a large, empty container to cover it when it lands and slide a thin piece of cardboard over the opening to capture the animal and release it outside.
- If potential human exposure to the bat has occurred, please coordinate with the Game Commission or your local veterinarian or Health Department to facilitate sample submission for rabies testing. Any additional questions regarding suspected human exposure to rabies should be directed to the PA Department of Health at 1-877-PAHEALTH (1-877-724-3258).
- If a bat is within an occupied structure and unable to fly, or if any domestic animals have contacted the bat, the bat should be tested for rabies. Please coordinate with the Game Commission or your local veterinarian to coordinate sample submission. Any additional questions regarding domestic animal exposure should be directed to the PA Department of Agriculture at 1-717-787-8808.
- For people dealing with a colony of bats in an occupied structure, they may call a nuisance wildlife control operator who is permitted to use specific techniques that will evict the bats and prevent their return.
- For people finding a baby bat (pup) on the ground in summer, they may try to get the bat off the ground and away from pets and predators so that the mother can retrieve it that

evening. Human exposure should be avoided as always, so using leather gloves or a shovel to pick the animal up and place it in a safer location.

- We do not encourage the general public at this time to take bats to rehabilitators; the bat may not be able to be released if it survives due to COVID-19. However, if the bat is a state or federally listed species, rehabilitators that are permitted to handle rabies vector species are authorized to accept the bat. As always, emphasize extreme caution to avoid any contact.



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Wildlife Management
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Date: Wednesday, May 6th 2020
From: Pennsylvania Game Commission
Re: Release of over-wintered bats

In early April, our agency received guidance regarding the COVID-19 issue relating to bats and rehabilitation, specifically addressing the risks associated with reverse zoonosis or the transfer of the coronavirus from infected humans to North American bat species. Specifically, it was recommended that bats currently in the possession of rehabilitation facilities not be released unless stringent measures were in place that greatly reduced the risk that such spillover occurred.

In following this guidance, the Game Commission developed specific criteria that if met, would authorize the release of bats currently held by rehabilitators:

1. The rehabilitation facility has overwintered the bats, and;
2. The rehabilitation facility cares exclusively for bats, and;
3. The rehabilitation facility (or its sub-permittees) housing the bats is run by the owners under strict biosecurity measures, and;
4. The rehabilitation facility has not granted access to outside volunteers or employees since January 2020.

It has been determined that the facilities that meet these criteria and are hereby approved to release bats currently in their possession are:

Deb Welter: Diamond Rock Wildlife Rehabilitation Clinic

Stephanie Stronsick: PA Bat Rescue

Rosemarie Curcio: Raven Ridge



FAQ re: SARS-CoV-2 PCR Testing of Bat Guano

Since the announcement of the SARS-CoV-2 PCR testing of bat guano at the Penn Vet PADLS New Bolton Center Molecular Diagnostics Laboratory, we have received a few diagnostic, protocol, and husbandry inquiries:

Why are we pursuing this testing? While there is no evidence to date that the SARS-CoV-2 virus can be transmitted from humans to bats, testing is being pursued out of an abundance of caution. In making this decision, we reviewed the Centers for Disease Control and Prevention's Interim Guidance for SARS-CoV-2 Testing in North American Wildlife document, along with recently published research findings. At this time, we are focusing our testing on bats currently held by wildlife rehabilitators.

Under what criteria will guano samples be tested? To submit samples for testing, the following steps must be completed:

1. *Approval from Your State:* Secure testing approval from your State Agriculture Veterinarian and State Public Health Veterinarian. We strongly encourage you to also notify your State Wildlife Veterinarian or state wildlife agency.
2. *Approval from PA:* Provide proof of testing approval from your state and submit your testing request to Dr. Anis's lab (eanis@vet.upenn.edu). Dr. Anis will forward your request to the State Veterinarians in PA for their approval.
3. *Sample Collection, Forms, & Shipping:* Following PA testing approval, you will be provided with a sampling and shipping protocol document, along with all necessary submission paperwork.

What does the test cost? States that are members of the Northeast Wildlife Disease Cooperative (NWDC) will be charged in-state pricing of \$50 per bat. All other states will be charged \$65 per bat. Tests will only be run on guano collected from individual bats. We are not offering testing of pooled samples at this time.

Has this SARS-CoV-2 qPCR/RT-PCR bat guano test been validated by NVSL? No.

What is the sensitivity and specificity of the test? The panel is highly specific with analytical sensitivity of approximately 0.1-1 TCID₅₀/100 uL of titrated SARS-CoV-2 stock. The virus stock was 10⁷ TCID₅₀/1 mL (equivalent to 10⁶ TCID₅₀/100 uL) which means that an inoculum of 100 uL of 1:1,000,000 dilution of virus stock will infect 50% of the inoculated cell.

What do you mean by "paired guano sample testing"? The qPCR panel targets two different regions of the SARS-CoV-2 genome, so two results are returned for each individual guano sample submitted for testing.

Are bats tested over several periods of time? We recommend that bats admitted to rehabilitation facilities be tested at intake and then again immediately prior to release. If there are financial

constraints, a single test immediately prior to release could be pursued. In PA, the bats were not tested at intake but instead following test validation in July; the test series interval was 2-4 weeks for each bat. Many of the bats have been overwintered and therefore had a maximum potential period of exposure to SARS-CoV-2 from human sources of 5-6 months.

Will any *Detected* results be submitted to NVSL for confirmatory testing? Yes. To date, we have only tested PA bats and all have come back *Not Detected*.

What is the fate of the bat if SARS-CoV-2 is detected in its guano? Following confirmation at NVSL, we would euthanize the bat and submit for necropsy. We are still discussing options for specific additional diagnostics and the destination laboratory.

What bat species guano can this test be used on? We are currently testing guano from a variety of bat species. The test was validated on guano from little brown bats (*Myotis lucifugus*), big brown bats (*Eptesicus fuscus*), Eastern red bats (*Lasiurus borealis*), hoary bats (*Lasiurus cinereus*), Northern long-eared bats (*Myotis septentrionalis*), and silver-haired bats (*Lasionycteris noctivagans*).

Are all over-wintered bats currently consolidated in one rehabilitation facility in PA? Yes. In April, all remaining over-wintered bats were transferred to a single facility and split up into quarantined areas corresponding to the originating facility. Each bat is housed in a separate enclosure within this quarantine unit with the exception of mothers and their pups. Bats are individually identified by signage on their enclosures and medical records have been maintained for each bat from their initial intake through the quarantine period. New admissions have been discouraged but in cases where they were unavoidable (e.g., threatened or endangered species), rehabilitators followed similar husbandry and biosecurity measures.

Have any of the bats exhibited clinical signs suggestive of SARS-CoV-2 infection? No. A few over-wintered bats have died during this quarantine period; those bats were suffering from joints issues, were unable to fly, and were euthanized. Guano was collected from those bats and tested for SARS-CoV-2; all results were *Not Detected*. Pathological findings for these euthanized bats included the isolation of a *Mycoplasma* sp. from one of the bat's hands and peritonitis of unknown etiology in another bat. The findings for the others were either unremarkable/unrewarding or are still pending.

Have any of the bats been exposed to a confirmed COVID-19-positive human? No.

Have wildlife rehabilitators caring for the bats in quarantine been regularly tested for SARS-CoV-2? No. Rehabilitators have been extremely careful, have limited access to their facilities, and we are confident that they have not been infected with the virus. They have instituted strict biosecurity measures and change PPE between each bat. However, we would still like to pursue confirmatory human testing. Due to prolonged contact with potentially susceptible wildlife species, we are working with the PA Department of Health and the PA Department of Agriculture in drafting a letter justifying the testing of asymptomatic wildlife rehabilitators or those working closely with captive wildlife species (e.g., workers at farmed mink facilities).



Date: Wednesday, May 14th 2020
To: Permitted rehabilitation facilities
Re: Guidance regarding COVID-19 and bat rehabilitation

Dear Wildlife Rehabilitation Permittee:

During these challenging and difficult times, the Pennsylvania Game Commission (PGC) would like thank you for your efforts to follow our previous guidance, for your understanding of the gravity of this difficult situation, and for your cooperation in protecting the current and future health of our bats and many other species. We would like to take this opportunity to update you on what we know, what we are doing, and to provide some adjustments to our previous directive.

The PGC consults with and receives guidance from a number of experts as well as other state and federal agencies similarly focused on the issue of preventing our native bat species from acquiring the SARS-CoV-2 virus, the coronavirus that is responsible for the COVID-19 pandemic. Guidance received in early April strongly encouraged that all bat-handling activities be restricted or eliminated. Specifically regarding bat rehabilitation, it was recommended that bats currently in care be held indefinitely and to prohibit or greatly reduce the admission of new bats.

The potential for reverse disease transmission is a risk we must take seriously. As we all know, bats are suspected as a source for the initial spillover into humans because they are known to harbor hundreds of varieties or strains of coronaviruses. While bats' immune systems are rather unique and allow them to live seemingly unhindered by some virulent diseases, there could be a cascading negative impact if this particular virus were to become established in our native bats. In such circumstances, the coronavirus could potentially become activated and introduce an additional mortality factor to bats that are hibernating and already immunologically challenged by white-nose syndrome. Bat populations are already decimated and need to be protected. If the coronavirus become established in wild bats, it could forever change our ability to study, protect, and rehabilitate bats in the future.

To minimize these risks the PGC, along with many other wildlife management agencies, halted the release of the majority of bats in care, have discouraged the admission of new bats, have denied new permits and suspended active surveys and research, and cancelled all scheduled agency work involving direct contact and release of wild bats.

Actions and Updates Associated with Rehabilitation:

The PGC developed stringent and specific criteria to determine if any bats currently being cared for could be released, if ready, to the wild this spring. Those criteria are listed below and the facilities that qualified were recently notified.

1. The rehabilitation facility has overwintered the bats, and;

2. The rehabilitation facility cares exclusively for bats, and;
3. The rehabilitation facility is run by the owners under strict biosecurity measures, and;
4. The rehabilitation facility has not granted access to outside volunteers or employees since January 2020.

The PGC recognizes the indefinite holding of bats not permitted to be released presents many challenges, including but not limited to the financial burden of holding these bats, the commitment of limited space and resources, the difficulty in acquiring PPE, and the bad optics of taking PPE away from human health professionals risking their lives during this pandemic. As such, we are working on two fronts to address this issue:

1. We are funding and working with experts at the University of Pennsylvania to develop a validated technique using bat guano to identify if bats have the SAR-CoV-2 virus. When completed, this will allow us to test bats currently being held and approve their release if they are shown to not have the virus. We anticipate this test will take several months to be validated. Additionally, the PGC will cover the costs associated with this testing.
2. To address the challenges mentioned above, the PGC has collaborated with the wildlife rehabilitation community to create a secure and sterile location to assist with the indefinite housing of bats as a service to assist you. To make this happen, we reached out to the largest PA bat-only facility, Pennsylvania Bat Rescue operated by Ms. Stronsick, and we were fortunate that she agreed to assist. The PGC will provide funding assistance to properly care for any bats held whose release is delayed and to prepare the facility to properly isolate bats, as well as provide PGC staff to assist with the transportation of the bats to the facility when ready. We are hoping to be prepared to transfer any bats from your facility to Pennsylvania Bat Rescue in the next 2-3 weeks. At the point when all the bats are tested and found free of the SARS-CoV-2 virus, or if advances in ongoing research suggest such testing is no longer recommended, we will transport the bats back to you and assist with their immediate release. In addition to ensuring strict biosecurity measures are followed, having the bats in one location will assist us in the development of the guano test. We strongly urge you to consider allowing us to provide you this service to address the many challenges that are faced during this difficult time. There is no requirement for the bats in your care to be transferred to Pennsylvania Bat Rescue but the limited funding we secured to pay for the care and testing of bats will be prioritized for bats held at that location.

With time and new information, the PGC has also slightly adjusted its stance on the admission of new bats to facilities that are approved for rabies vector species (RVS):

While we strongly discourage the public from submitting bats to rehabilitators during the pandemic ("If you care, leave it there"), and discourage rehabilitation facilities from accepting bats that may require expensive testing and lengthy stays, the PGC recognizes that a complete ban puts rehabilitators in a difficult spot. Effective immediately, RVS

approved facilities may choose to accept and admit any bat species that is state or federally listed or if intake is deemed unavoidable (e.g., dropped off with no prior communication). However, these facilities must follow strict biosecurity measures (e.g., isolation of all bats in individual enclosures, restricting personnel, regular cleaning and disinfecting) and are required to notify the PGC of that admission for tracking purposes. In addition, these bats will also be required to be tested and demonstrated to be negative for the SAR-CoV-2 virus. Transfer to Pennsylvania Bat Rescue for self-feeding bats may be approved if funding and space are available. Transfer of bats between facilities, excluding the aforementioned PGC-assisted transfer to Pennsylvania Bat Rescue, is not permitted. Lastly, if any person that has entered a facility holding bats tests positive for SARS-CoV-2/COVID-19, the owner/manager of that facility is to notify the PGC immediately.



Date: Tuesday, September 22, 2020
From: Bureau of Wildlife Management (Non-Game Mammal Section & Wildlife Health Division)
Re: SARS-CoV-2 impact on wild North American bats and communication strategies

Have bats played a role in the emergence of SARS-CoV-2, the virus that causes COVID-19? This question is currently unknown. Initially the source for SARS-CoV-2 was thought to be from a small mammal known as a scaly anteater, the pangolin, but genetic sequencing showed some inconsistencies with this theory. Currently, the exact origin of the virus is speculated to have come from *Rhinolophus affinis*, a horseshoe bat that can be found in China, based on genetic similarities to previous bat coronaviruses discovered in 2013. However, no direct transmission links have been identified in this pandemic. This specific bat species is not found in North America and these types of coronaviruses have also not been associated with North American bats.

Are North American bats susceptible to SARS-CoV-2? This question is also unknown based on the current science. Coronaviruses are very common, and although some types of coronaviruses have been found in North American bats, to date the SARS bat coronaviruses have not been identified in any native bat species in North America.

Can infected North American bats transmit the virus to humans or can humans transmit the virus to bats? North American bat to human transmission is plausible by unknown. It has been well documented that southeast Asian bat species infected with other SARS bat coronaviruses are able to transmit the virus to humans, but this has not been seen in the United States with our native species. Based on the large number of human cases of SARS-CoV-2, there is also a great concern for potential reverse zoonosis to bats, that is, infected humans working with North American bats for research, as wildlife rehabilitators, and for nuisance control or relocation transmitting the virus to bats. It is currently unknown if North American bats, especially those infected with white-nose syndrome, can become infected with the virus, exhibit clinical signs if infected, or simply become latent carriers. The primary and nearly exclusive transmission route globally remains human-to-human. Ongoing research is studying the effects the SARS-CoV-2 virus has on animals and the role they may play in the spread of the virus.

What can North American bat researchers, wildlife rehabilitators, and Nuisance Wildlife Control Operators do to ensure their health and safety and that of their animals? Facilities, whether in a laboratory or at a wildlife rehabilitation center, that practice proper biosecurity offer the best protection for their staff and their animals. This includes such measures as:

- Restricting access to the premises and building where animals are kept.
- Informing all employees who are sick to stay home.
- Testing all employees with direct contact of bats.
- Instituting daily temperature checks of employees working with bats.
- Increasing distance between workers.
- Encouraging or requiring employees to wear cloth face coverings and PPE as needed, especially in unclean areas such as attics, lofts, and chimneys of abandoned building.

- Limiting the duration of contact among coworkers.
- Encouraging proper hand hygiene and providing employees hand-washing stations.
- Frequently and consistently cleaning and disinfecting touched surfaces, all utensils, objects, and equipment that encounters bats.
- Reporting any unexpected mortalities to PGC.
- Following any State and Federal guidelines that may be available.
- Following recommendations and protocols that have been provided by various research and wildlife rehabilitation experts such as USGS recommendations on risk assessment, and the NWRA guidelines, as examples.
- Asking questions to appropriate experts with specific concerns regarding North American bats and SARS-CoV-2.

What kind of impact could SARS-CoV-2 have on wild North American bat populations? Too little information is known to quantify the risks to wild populations of North American bat species. Based on our understanding of the life-history and ecology, we estimate the risk to wild populations to vary based on a variety of factors including proximity to humans, health status of the bats, species characteristics, colony size, colony location, etc. Some concerns regarding an infection of native bat populations with SARS-CoV-2 include having a naïve population of bats infected with a new virus. Often this can lead to high morbidity and mortality. Another factor is the health status of North American populations affected by white-nosed syndrome, as already vulnerable and immunocompromised bats could allow even weaker viruses to have more lethal effects.

Rehabilitation Resources

- Association of Fish and Wildlife Agencies' (AFWA) Fish and Wildlife Health Committee and Bat Working Group have collaborated on voluntary interim guidance. <https://wildlifehealth.org/1478/>
- Bat Conservation International <https://www.batcon.org/bats-covid-19-updates/>; Information on the global status of bats during COVID-19
- Bat Conservation Trust <https://www.bats.org.uk/about-bats/bats-and-disease/covid-19-and-bats>; Information from the United Kingdom on bat status during the COVID-19 pandemic
- Canadian Wildlife Health Cooperative guidelines on wild bat rehabilitation. [http://cwhc-rcsf.ca/docs/miscellaneous/CWHC%20Bat%20health%20and%20Covid-19%20\(Versions%201.0%20April%2023%202020\).pdf](http://cwhc-rcsf.ca/docs/miscellaneous/CWHC%20Bat%20health%20and%20Covid-19%20(Versions%201.0%20April%2023%202020).pdf)
- North Carolina Wildlife Resources Commission compiled information to address frequently asked questions. <https://www.ncwildlife.org/Portals/0/WildlifeProblems/documents/COVID-Wildlife-Rehab-FINAL.pdf>
- North Carolina Wildlife Organization guidelines for activities with bats during COVID-19. <https://www.ncwildlife.org/Portals/0/Learning/documents/Profiles/Mammals/COVID-Bats-FINAL.pdf>
- NWRA guidelines for bat rehabilitation during COVID-19. https://cdn.ymaws.com/www.nrawildlife.org/resource/resmgr/homepagephotos/Position_Statement-Covid19_a.pdf
- Pennsylvania Game Commission and Wildlife Futures diagnostic testing of bats for COVID 19. <https://www.vet.upenn.edu/about/press-room/press-releases/article/bats-and-covid>

Information and resources for communicating about bats related to COVID-19

What are additional challenges being faced by bat species across the globe during this pandemic?

There is great concern among wildlife managers and scientists across the globe that misinformation and misunderstanding about the relationship between bats and COVID-19 is increasing fear and negative attitudes toward bats. That has led to direct harm to bats in several countries and can erode public support for bat conservation. The following are recent examples from Arkansas, Australia, Canada, and China.

- Sasse and Gramza. 2020. Influence of the COVID-19 pandemic on public attitudes toward bats in Arkansas and implications for bat management.
<https://www.tandfonline.com/doi/full/10.1080/10871209.2020.1799267>
- MacFarlane and Rocha. 2020. Guidelines for communicating about bats to prevent persecution in the time of COVID-19.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7266771/>
- Fenton, M. Brock et al. COVID-19 and threats to bats.
<https://www.nrcresearchpress.com/doi/pdf/10.1139/facets-2020-0028%40cfac.issue1>
- Zhao, Huabin et al. COVID-19 drives new threat to bats in China.
<https://science.sciencemag.org/content/367/6485/1436.1/tab-pdf>

How can this communication problem be addressed? One way is to identify and to address potential misconceptions and negative attitudes toward bats by providing clear concise information with consistent and positive messages about bats specific to topics regarding bats and the COVID pandemic. One of the objectives of Bat Week 2020 will be communicating the importance of bats through the lens of COVID-19 (see below for more information).

Resources for communicating about bats and key messages related to bats and COVID-19

This list was curated with input from natural resource managers, scientists, and communication specialists involved in bat conservation. While not comprehensive, this list contains key resources that serve as a starting point when developing messaging and communication plans related to bats during the COVID-19 pandemic:

- Bat Conservation International – Bats and COVID-19 <https://www.batcon.org/bats-covid-19-updates/>; Includes a video describing the connection between bats and COVID-19 and a list of FAQs
- CDC FAQ on Bats and COVID-19 <https://www.cdc.gov/coronavirus/2019-ncov/faq.html#Pets-and-Animals>

- Convention on the Conservation of Migratory Species of Wild Animals <https://www.cms.int/en/news/opinion-far-being-our-enemies-bats-need-protection-now-more-ever>
- GBatNet - Global Union of Bat Diversity Networks <https://gbatnet.blogspot.com/>; A collection of short articles addressing bats, zoonotic diseases, and COVID-19
 - “Bats in the Media Panel” Seminar hosted by GBatNet https://www.youtube.com/watch?v=-4jIEJA5ijk&feature=youtu.be&fbclid=IwAR3D-yOk4WiVsxoOvb9j_G8Ak0SUzgHqLjQfPJFGvV_HOHF1O3yrK065fDj; Tips for working with the media to ensure high-quality reporting on complicated and nuanced topics surrounding bats
- Hoffmaster et al. 2016. Education to action: improving public perception of bats <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4730123/>
- IUCN: FAQs on COVID-19 and Nature Conservation <https://www.iucn.org/covid-19-resources/questions-and-answers-covid-19-and-nature-conservation>

Lubee Bat Conservancy <https://www.lubee.org/>; General bat educational material for adults and children, including handouts on the benefits of bats (see Education tab)

Bat Week 2020 <https://batweek.org/>; October 24 - 31

Overview

Bat Week is an annual celebration of bats and the many roles they play in our ecosystems. The international event is organized by a team of representatives from across North America from conservation organizations and government departments. Bat Week strives to show the critical importance of bats and raise greater awareness of conservation efforts worldwide.

Goals & Objectives

Goal: Raise awareness and encourage the public to protect bats around the globe.

Objectives:

1. Communicate the importance of bat conservation, especially through the lens of COVID-19.
 - a. Key Messages:
 - i. Protection of wildlife and their habitats creates a safer world for all
 - ii. Bat conservation is of global importance as they play a vital role in our ecosystems and support our economies
 - iii. Research into bats can hold the key to the next vaccine or treatment

2. Make the connection with people and the bats in their own backyard.
3. Promote the various virtual events across North America celebrating the importance of bats.
4. Highlight our partners and encourage the public to support the various organizations involved in Bat Week.

Connecting educators with online opportunities as well as resources to conduct safe, virtual outreach.



October 6, 2020

To: All Bat Rehabilitators

From: Betsy Schroeder, DVM, PhD, MPH

Date: September 22, 2020

Re: SARS-CoV-2 Testing

The COVID-19 pandemic continues to affect humans across the globe but its impact on animal species remains uncertain. Early indications suggest that the SARS-CoV-2 virus is highly species specific. However, it has been detected in a few domestic and farmed animals (dog, cat, mink), as well as captive wildlife (lion, tiger). While infections in these animals does not appear to significantly impact their health, their susceptibility to the virus has raised concerns. Reverse zoonosis, or the spillover of the virus from humans to animals, could potentially lead to the establishment of a viral reservoir in an animal species and future reinfection of humans.

The Pennsylvania Game Commission (PGC) and other wildlife agencies have issued directives to individuals who work with wildlife to mitigate the risks of such viral spillover. Of particular focus have been those who handle or rehabilitate bats. Recently, the PGC partnered with Penn Vet in the development and validation of PCR diagnostics to detect the virus in bat guano. Bats that are currently held by Pennsylvania wildlife rehabilitators will be tested to determine if they are shedding the virus. Additionally, ascertaining the true SARS-CoV-2 status of rehabilitators who currently are caring for these bats would provide valuable information in determining which bats can be returned to the wild.

It is recommended that any people who handle or rehabilitate bats be tested for SARS-CoV-2 two to four days prior to releasing bats into the wild. If a wildlife rehabilitator develops symptoms consistent with SARS-CoV-2, those people should be tested immediately, regardless of whether a bat release is upcoming. If you require assistance with obtaining testing, please contact Dr. Betsy Schroeder at the Pennsylvania Department of Health at beschroede@pa.gov and Dr. Andrew Di Salvo at the Pennsylvania Game Commission at andisalvo@pa.gov.

Regards,

A handwritten signature in blue ink, appearing to read 'Betsy Schroeder'.

Betsy Schroeder DVM, PhD, MPH
State Public Health Veterinarian
Pennsylvania Department of Health

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.

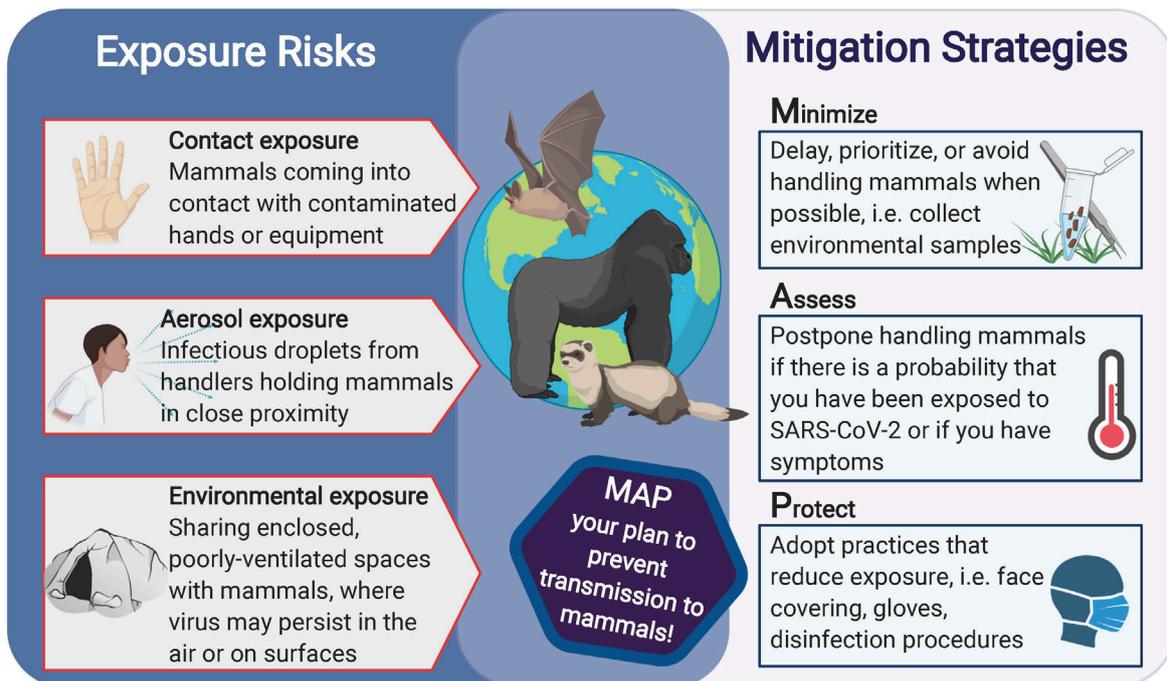
Currently the risk of human-to-animal transmission to non-captive wildlife species warrants concern. A number of cases have demonstrated natural human-to-animal transmission of SARS-CoV-2 in felids, canids and mustelids, the majority due to close and prolonged contact with infected households or people, 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 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.

* 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.

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



This figure was adapted in collaboration with the IUCN Bat Specialist group.
This work by [IUCN SSC Bat Specialist Group](#) is licensed under [CC BY-NC-ND 4.0](#).

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.
 - 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.
 - Follow more specific guidelines produced for each specific taxa group when available (see links below).

[‡] 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”.

- 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