

## **Risk of Humans Infecting Other Species**

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Analysis of 410 species of birds, fish, amphibians, reptiles and mammals found that about 40% of those that are thought to be highly susceptible to SARS-CoV-2 based on the composition of their angiotensin converting enzyme-2 receptors are considered threatened or endangered. These include the Western lowland gorilla, Sumatran orangutan and Northern white-cheeked gibbon, are predicted to be at very high risk of infection by SARS-CoV-2 via their ACE2 receptor.

Gray whales, bottlenose dolphins, white-tailed deer and Chinese hamsters are at high risk; cats, cows and sheep are at medium risk; dogs, pigs and horses are at low risk. [University of California, Davis](#) (8/21/2020). This report states: "In documented cases of SARS-COV-2 infection in [mink](#), [cats](#), [dogs](#), [hamsters](#), [lions and tigers](#), the virus may be using ACE2 receptors, or they may use receptors other than ACE2 to gain access to host cells. Lower propensity for binding could translate to lower propensity for infection, or lower ability for the infection to spread in an animal or between animals once established. Because of the potential for animals to contract the novel coronavirus from humans, and vice versa, institutions including the [National Zoo](#) and the [San Diego Zoo](#), which both contributed genomic material to the study, have strengthened programs to protect both animals and humans.

<https://www.ucdavis.edu/news/genomic-analysis-reveals-many-animal-species-may-be-vulnerable-sars-cov-2-infection/>

This valuable contribution to our understanding of the potential threat of this virus to species other than human is one level of determination. Some species and individuals may have cross-immunity from other virus infections they survived or greater susceptibility because of environmental factors impairing their immune systems which can range from air pollution to malnutrition.

Marine mammals are assailed by microplastics in the oceans that bond with toxic chemicals such as the dioxins that are carcinogenic, mutagenic and endocrine disruptors, and dwindling sea foods due to human overfishing and mismanagement of natural resources. White-tailed deer currently overpopulating and spreading Chronic Wasting Disease across North America (see my review in the *Journal of the American Holistic Veterinary Medical Association* vol.59:p 16-18,. 2020) may be at higher risk especially on and from deer farms where employees infected with the SARS-CoV-2 virus could infect the deer. Such human-to non-human animal infection as happened in the U.S., (Utah), Denmark and the Netherlands where infected workers infected the mink and also cats around one of these fur ranches.

Hamsters are very popular cage pets and special precautions are called for with all families avoiding any physical contact and keeping the hamsters in a separate room with only one adult tending the animals and washing hands before and after cleaning, feeding and watering. (Jasper Fuk-Woo Chan, Anna Jinxia Zhang, Shuofeng Yuan, et al Simulation of the clinical and pathological manifestations of Coronavirus Disease 2019 (COVID-19) in golden Syrian hamster

model: implications for disease pathogenesis and transmissibility, *Clinical Infectious Diseases*, ciaa325, <https://doi.org/10.1093/cid/ciaa325> ).

Ferrets are also susceptible and similar precautions are called for. High vigilance is called for with all highly and moderately susceptible species since, as the Dutch government has shown, mink infected with SARS-CoV-2 contracted from workers subsequently passed the infection on to other workers.

Cats must be kept indoors otherwise an infective pool of cats carrying the coronavirus could become established in our communities where humans with the coronavirus are a constant source of infection and re-infection into the surrounding cat community. Some cats could bring the coronavirus into their homes since cat-to-cat transfer has been documented, but as yet no case of cat-to-human transfer of infection has been reported.

Infected cats could put other wildlife at risk, most likely the indigenous predators like foxes, weasels and mink in Minnesota's forests and elsewhere, from suburb to country estate. Zoos, circuses that still have wild animal performances not yet outlawed, wildlife parks, marine aquariums, and conservation areas around the world need to take immediate steps to limit human-animal proximity and routinely test all staff, wildlife officers and anti-poaching forces and screen all visitors.

Precautions are called for with workers around cattle and sheep that are considered at medium risk of coronavirus infection. Even though pigs are at low risk, workers also need to be screened, especially considering hog confinement units generally have poor air quality and can be the source of influenza and other zoonotic infections.

Since crows are not considered immune but categorized as very low risk the possibility of human to bird transfer of SARSCoV-2 to poultry should not be ruled out. This needs to be considered by the egg and poultry meat industries that are epicenters for influenza pandemics spread in part by international travelers and migratory birds.

Especially through trans-species passage, infecting one species then mutating and infecting another, developing a SARS-CoV-2 vaccine that is effective as well as safe will be a challenge. Similar difficulties with constantly evolving strains of the influenza virus with its avian, -porcine - human variant recombinants mean some vaccines, developed in anticipation of the next pandemic, do not give effective protection because it is an unexpected new variant strain. Arjan Stegeman, a professor of veterinary medicine at Utrecht University has proposed that since humans could become part of two-species reservoirs with either wild or domestic cats or with mink or ferrets, passing the virus between and among one another, researchers need to develop models to quantify the risk. [The Conversation](https://theconversation.com/pets-livestock-and-wildlife-can-all-catch-coronavirus-does-that-make-them-dangerous-144440/) ( <https://theconversation.com/pets-livestock-and-wildlife-can-all-catch-coronavirus-does-that-make-them-dangerous-144440/>).

Surely the way for any sane and civil society is to practice effective preventive medicine is from a One Health perspective ( <https://www.onehealthinitiative.com> ) which first calls for a total revisioning of our relationships with animals and answers why we need to protect many species now endangered and stop eating so many as a primary source of nutrition.

The killing of competing predators, like the recently approved slaughter of hundreds of California and Stellar sea lions in the Columbia River basin to “protect” salmon and steel-head trout in Oregon, Idaho and Washington states, is illustrative of what we chose to put into our mouths has more significance than what comes out of them. Wild carnivores have no choice. But we do.

