October 8, 2021

Animal and Plant Health Inspection Service
U.S. Department of Agriculture

Submitted via regulations.gov

Re: APHIS' American Rescue Plan Surveillance Program: Strategic Framework (Docket ID APHIS-2021-0061)

Dear Animal and Plant Health Inspection Service:

The Animal Welfare Institute, Center for Biological Diversity, Humane Society Legislative Fund, Humane Society of the United States, Animal Defenders International, Animal Legal Defense Fund, and Born Free USA thank you for this opportunity to comment on the U.S. Department of Agriculture ("USDA") Animal and Plant Health Inspection Service's ("APHIS") American Rescue Plan Surveillance Program: Strategic Framework ("Surveillance Program" or "Strategic Framework").

In March, President Biden signed the American Rescue Plan Act of 2021.[1] The Act allocated $300 million for use by the Secretary of Agriculture to "conduct monitoring and surveillance of susceptible animals for incidence of SARS-CoV-2."[2] APHIS developed its Strategic Framework to "outline[] how the Agency will focus its efforts to prevent, detect, investigate and respond to SARS-CoV-2, the virus that causes COVID-19, as well as other emerging and zoonotic diseases that could pose a threat to both people and animals."[3]

We appreciate the thought the agency has put into developing its Strategic Framework and Surveillance Program and strongly support its goals to prevent, detect, monitor and investigate,

---

[1] *See* American Rescue Plan Act of 2021, Pub. L. No. 117-2, 135 Stat. 4.
[2] *Id.* § 1001(c).
[3] USDA Press, *USDA Announces Proposed Framework for Advancing Surveillance for SARS-CoV-2 and Other Emerging Zoonotic Diseases through the American Rescue Plan* (Aug. 24, 2021), https://www.usda.gov/media/press-releases/2021/08/24/usda-announces-proposed-framework-advancing-surveillance-sars-cov-2.

and communicate about SARS-CoV-2 and other emerging zoonoses. However, it is unclear from the documents, webinars, and other materials provided by APHIS thus far whether, or to what extent, it intends to direct its surveillance efforts toward a critically significant industry sector: the intensive farming of American mink (*Neovison vison*) ("mink") and other species for their fur. While all concentrated animal feeding operations are vulnerable to disease transmission, industrial mink farms have proven especially susceptible to the SARS-CoV-2 virus, and operations that raise other species for their fur may be as well. [4]

As further described below, APHIS should concentrate substantial surveillance efforts on mink and other fur operations and the numerous pathways by which the SARS-CoV-2 virus could be transmitted to, from, and within such farms. In particular, as part of its surveillance of these operations, the agency should emphasize prevention, use only humane interventions, collect and disseminate significantly more information about fur operations, and develop an early warning system specific to fur farms. Finally, because of the threat posed by SARS-CoV-2 to both humans and wildlife, we urge APHIS to exercise its authority under the Animal Health Protection Act to prohibit the import and interstate transport of mink and materials containing mink fur.

I. Intensive Confinement Systems, Mink Farms, and SARS-CoV-2

As recently explained in a report from the United Nations Environment Programme ("UNEP") on preventing the next pandemic, about 60 percent of all human infections are estimated to have an animal origin, and in "high income" countries, such as in the United States, the spread of zoonotic diseases generally occurs indirectly, such as "through insect vectors or, more frequently, via the food [or agriculture] system." [5] The vulnerability of the current food system to the spread of zoonotic disease is a result of a number of factors, but one of the most important factors is the significant shift in this country (and internationally) away from relying on many smaller, diversified family farming operations to raise meat and dairy animals to relying instead on only a few highly concentrated and industrialized corporate facilities to raise those same animals.

In such concentrated animal feeding operations, farmed animals are usually maintained in extremely close proximity (sometimes including cages or crates), which can exacerbate the spread of disease among the animals in the operation. The risk of development and spread of disease, is further amplified by the fact that the animals in these operations are often living under poorly regulated, dirty (i.e., with poor biosecurity, animal waste, and carcass management practices), and stressful conditions, all of which intensify the shedding of zoonotic pathogens and spread of disease.[6] In addition, through selective breeding and other methods, the animals raised in these operations are often genetically homogenous, making them "more vulnerable to infection than

[4] While these comments focus on the threat stemming from mink and other fur operations, we do not discount the importance of also monitoring free-ranging wildlife. With more than 70 percent of emerging infectious disease events of zoonotic origin stemming from wild animals, to address the threat of such diseases a major focus must also be placed on animals in the wild. *See* Kate E. Jones et al., Global trends in emerging infectious diseases, NATURE 451, 990-993 (2008).

[5] United Nations Environment Programme and International Livestock Research Institute, Preventing the Next Pandemic: Zoonotic diseases and how to break the chain of transmission, at 11 (2020), https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and.

[6] Jeanette I Webster Marketon & Ronald Glaser, *Stress hormones and immune function*, 252 CELLULAR IMMUNOLOGY 16 (2008); Ming-Yue Zhang et al., *Effects of confinement duration and parity on stereotypic behavioral and physiological responses of pregnant sows*, 179 PHYSIOLOGY & BEHAV. 369 (2017).

genetically diverse populations, because the latter are more likely to include some individuals that better resist disease."[7]

Taken together, according to the UNEP, the "unsustainable agricultural intensification" of farm animal production is considered one of seven major anthropogenic drivers of zoonotic disease emergence.[8] But these findings are not unique to that one report. Indeed, according to a 2013 publication in the *Proceedings of the National Academy of Sciences,* "strong evidence [links] modern farming practices and intensified systems . . . to disease emergence and amplification."[9] Even further, a 2021 report from the Food and Agriculture Organization of the United Nations ("FAO") identified these types of concentrated animal feeding operations as having "historically been associated with the spread of zoonoses," and that "[f]rom a biological security perspective, individuals associated with highly mechanized/intensive livestock production face an increased risk of catching zoonotic diseases."[10] These are just a handful of the many reports that have identified concentrated animal feeding operations as causing a significant risk for the development and spread of zoonotic diseases, including diseases with pandemic potential.

All of the factors that led UNEP to identify the intensification of farm animal agriculture as a major driver of zoonotic disease emergence (including concentration, stress-induced immune system suppression, genetic homogeneity, and poorly regulated, dirty environments) are also present in mink and other fur farming operations. In addition, mink are known for being uniquely vulnerable to sharing diseases with humans, and are even understood to experience a "flu season" along with the workers in mink operations.[11] The risk of spreading zoonotic disease in mink operations and between farmed mink, workers, and even wild mink most recently played out with the significant spread of "severe acute respiratory syndrome coronavirus 2" ("SARS-CoV-2")—the animal virus linked to COVID-19—within mink farms in the United States and Europe.[12]

Since its emergence in late 2019, SARS-CoV-2 has caused a pandemic of respiratory disease known as "coronavirus disease 2019" ("COVID-19").[13] According to the U.S. Centers for Disease Control and Prevention ("CDC"), to date there have been more than 43 million reported cases of COVID-19 in the United States, and the disease has killed over 700,000 people,[14] more than were

[7] United Nations Environment Programme and International Livestock Research Institute, Preventing the Next Pandemic: Zoonotic diseases and how to break the chain of transmission, at 15 (2020), https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and; *see also id*. at 25.

[8] *Id*.

[9] Bryony A. Jones et al., *Zoonosis emergence linked to agricultural intensification and environmental change*, 110 PNAS 8399 (2013).

[10] FAO, UNDP & UNEP, A MULTI-BILLION-DOLLAR OPPORTUNITY: REPURPOSING AGRICULTURAL SUPPORT TO TRANSFORM FOOD SYSTEMS 7, 71 (2021), http://www.fao.org/3/cb6562en/cb6562en.pdf.

[11] *See e.g.*, Kate Golden, *Wisconsin's No. 1 mink farming industry now seen as a COVID-19 risk,* https://wisconsinwatch.org/2021/01/wisconsins-no-1-mink-farming-industry-now-seen-as-a-covid-19-risk/; Honglei Sun et al., *Mink is a highly susceptible host species to circulating human and avian influenza viruses*, 10 EMERGING MICROBES & INFECTIONS 473 (2021).

[12] *See* Ben Hu et al., *Characteristics of SARS-CoV-2 and COVID-19*, 19 NAT. REV. MICROBIOLOGY 141, 141-154 (2021).

[13] *See id.*

[14] *COVID-19*, CDC, https://www.cdc.gov/coronavirus/2019-ncov/index.html.

lost from the 1918 flu.[15] With the emergence of the Delta variant, the seven-day average of daily cases, hospitalizations, and deaths in the United States recently reached their highest levels in more than six months.[16] Though the numbers are currently declining, daily rates remain alarmingly high. In addition, tens of millions of eligible Americans remain unvaccinated.[17] Further, "some people who are fully vaccinated against COVID-19 will still get sick because no vaccine is 100% effective."[18] Indeed, as of October 4, 2021, the CDC had received reports of 30,117 patients from 50 U.S. states and territories with COVID-19 vaccination breakthrough infections who had been hospitalized or died.[19] Consequently, the disease continues to pose a serious, ongoing threat to human health and safety with no clear end in sight.

It has also proven deadly for mink. Millions of mink are raised in captivity and killed for their fur each year in industrial farms across North America, Europe, and Asia. According to the latest data from the USDA's National Agricultural Statistics Service ("NASS"), in 2017 there were 236 mink farms in eighteen states, with about two-thirds of those farms in Wisconsin, Utah, Idaho, and Oregon.[20] In total, these farms housed somewhere between one and five million mink and produced 3.31 million pelts. By comparison, in 2018 there were approximately 60 mink farms in Canada that produced 1.76 million pelts, 2,750 mink farms in Europe that produced 34.7 million pelts, and 8,000 mink farms in China that produced 20.7 million pelts.[21]

Captive mink raised for their fur are among the most vulnerable non-human animals susceptible to catching and spreading the virus, both because of the confined, stressful conditions in which they are raised, which compromises their immune systems and facilitates viral transmission,[22] and because of the human-like structure of their angiotensin-converting enzyme 2 ("ACE2") receptors, which allows the SARS-CoV-2 spike protein to effectively bind to and enter (i.e., infect) their cells.[23] Since the beginning of the pandemic, more than 20,000 captive mink on at least 17 U.S. mink farms have died from the disease,[24] while millions more have either died from the disease or been killed to prevent its spread in more than 400 fur farms across Europe.[25]

---

[15] Elizabeth Gamillo, *Covid-19 Surpasses 1918 Flu to Become Deadliest Pandemic in American History*, Smithsonian Magazine (Sept. 24, 2021), https://www.smithsonianmag.com/smart-news/the-covid-19-pandemic-is-considered-the-deadliest-in-american-history-as-death-toll-surpasses-1918-estimates-180978748/.

[16] *Coronavirus in the U.S.: Latest Map and Case Count*, N.Y. TIMES (Oct. 7, 2021), https://www.nytimes.com/interactive/2021/us/covid-cases.html.

[17] Adeel Hassan, *'We're not out of danger': A threat lingers even as new U.S. cases and deaths decline*, N.Y. TIMES (Oct. 6, 2021), https://www.nytimes.com/2021/07/31/us/virus-unvaccinated-americans.html.

[18] *COVID-19: Effectiveness*, CDC (May 10, 2021), https://www.cdc.gov/coronavirus/2019-ncov/vaccines/effectiveness.html.

[19] *Vaccines & Immunizations: COVID-19 Breakthrough Case Investigations and Reporting*, CDC (Sept. 29, 2021), https://www.cdc.gov/vaccines/covid-19/health-departments/breakthrough-cases.html.

[20] NAT'L AGRIC. STAT. SERV., USDA, 2017 CENSUS OF AGRICULTURE 28 (2019).

[21] Florence Fenollar et al., *Mink, SARS-CoV-2, and the Human-Animal Interference*, FRONTIERS IN MICROBIOLOGY, Apr. 2021, at 2.

[22] *See, e.g.*, Jonathan Anomaly, *What's Wrong with Factory Farming*?, 8 PUB. HEALTH ETHICS 246 (2015); Jeanette I. Webster Marketon, *Stress hormones and immune function*, 252 CELLULAR IMMUNOLOGY 16 (2008).

[23] *See, e.g.*, Yulong Wei et al., *Predicting mammalian species at risk of being infected by SARS-CoV-2 from an ACE2 perspective*, SCI. REPORTS., Jan. 2021.

[24] Florence Fenollar et al., *Mink, SARS-CoV-2, and the Human-Animal Interference*, FRONTIERS IN MICROBIOLOGY, Apr. 2021, at 7; USDA APHIS, *Confirmed Cases of SARS-CoV-2 in Animals in the United States*, https://www.aphis.usda.gov/aphis/dashboards/tableau/sars-dashboard (last updated Sept. 13).

[25] *Id.* at 2, 6.

These losses have further damaged an industry already in decline. In 2017, mink farms in the United States produced 3.31 million pelts valued at $120 million, and bred 731,000 female mink to produce kits. By 2020, the number of mink pelts produced in the United States declined to 1.41 million, valued at $47 million; and the number of female mink bred to produce kits dropped to less than 324,000. It is unclear whether, or to what extent, the total number of mink farms also declined during that time, because the USDA has not made that information publicly available.

While the outbreaks of SARS-CoV-2 on mink farms have been devastating, they have not been surprising. Operating guidelines developed by the Fur Commission USA ("Fur Commission"), an association that represents U.S. mink farmers, warn that disease transmission is a risk inherent to mink farming:

> Due to industry characteristics, mink farms have been expanding in size and in many cases there are multiple farms in close proximity to each other. This high density of animals increases the chance of disease transmission. Small farms are at just as much risk for disease as large farms; biosecurity concerns are everyone's concerns.[26]

Farmed mink are unique not only in their susceptibility to the virus, but also in their ability to transmit it. To date, captive mink are the only animals verified to have transmitted the virus directly to humans.[27] It is also possible that captive or escaped mink have or could spread the virus to wild mink or other animals that may live on or near mink fur operations, such as cats,[28] bats,[29] and deer mice.[30] In addition, as discussed in more detail below, live mink are not the only potential transmission vector found on mink farms; the virus could also be transmitted through feces, carcasses and fur, wastewater and surface water runoff, and secondarily through other animals originally infected by mink.

II. During Its First Year, APHIS' Surveillance Program Should Place a Greater Emphasis on Prevention—Especially with Respect to Fur Farms

Prevention should play a greater role during the first year of APHIS's Surveillance Program than it currently does—particularly in the context of SARS-CoV-2 and fur farms. The agency's Strategic Framework identifies four main focal areas: "Prevent;" "Detect;" "Investigate and Control Spread;" and "Communication and Outreach."[31] It generally describes what activities the agency will undertake within each focal area over the next several years in carrying out the agency's proposed Surveillance Program. The document explains that, during the first year of the

[26] JOHN S. EASLEY D.M.V., FUR COMM'N USA, STANDARD GUIDELINES FOR THE OPERATION OF MINK FARMS IN THE UNITED STATES BOOK 3: BIOSECURITY PROTOCOLS FOR MINK FARMS IN THE UNITED STATES 1 (2019).
[27] *COVID-19: Animals and COVID-19*, CDC (Aug. 5, 2021), https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/animals.html.
[28] Jianzhong Shi et al., *Susceptibility of Ferrets, Cats, Dogs, and Other Domesticated Animals to SARS-Coronavirus 2*, 368 SCI. 1016, 1019 (2020).
[29] Arinjay Banerjee et al., *Zooanthroponotic Potential of SARS-CoV-2 and Implications of Reintroduction into Human Populations*, 29 CELL HOST & MICROBE 160, 163 (2021).
[30] Anna Fagre et al., *SARS-CoV-2 Infection, Neuropathogenesis and Transmission Among Deer Mice: Implications for Spillback to New World Rodents*, PLOS PATHOGENS, May 2021, at 2.
[31] Strategic Framework at 2.

program, the agency will address the immediate threat presented by SARS-CoV-2, and during the second year and beyond, it will focus on both SARS-CoV-2 and other emerging diseases.[32]

We agree that the four identified focal areas provide a sufficient framework within which APHIS can develop and pursue activities essential to combat both the current SARS-CoV-2 pandemic and future emerging diseases. We are concerned, however, that during the first year of the Surveillance Program, the agency does not place as much focus on prevention as on the other three focal areas. For example, during the first year of the program, the framework describes activities that will be taken under the "Detect," "Investigate and Control Spread," and "Communication/Education" focal areas. But it does not include specific activities the agency intends to take under the "Prevent" focal area. APHIS does not discuss specific activities within the "Prevent" focal area until the second and subsequent years of the program.

Additionally, during the agency's September 1, 2021 webinar, APHIS Acting Science Advisor Dr. Tracey Dutcher noted that, of the four focal areas, "really the focus of our efforts" is on the "Detect" and "Investigate and Control Spread."[33] Dr. Dutcher's comments, taken together with the lack of specific prevention activities proposed in the Strategic Framework during year one of the Surveillance Program, suggest that with respect to SARS-CoV-2, prevention is a secondary consideration. This idea may stem from the notion that because SARS-CoV-2 has already established itself in the human population, focusing on prevention is less necessary or important. However, preventing further spread of the virus remains a vital concern.

Prevention is particularly important in the context of the mink fur farming industry—one that, as noted above, has proven highly susceptible to the current pandemic. A focus on prevention during the first year of the Surveillance Program could prove vital to avoiding the spread of SARS-CoV-2 to additional mink farms, mink farm workers and their communities, other animals found on mink farms such as cats and mice, and susceptible wildlife populations (such as wild mink) surrounding mink fur operations.

If aggressive prevention activities are not pursued in the near future, fur farms have the potential to become virus reservoirs that could initiate a recurring cycle of transmission between farmed mink, humans, and other species. APHIS should therefore work now to ensure and make clear that the Strategic Framework at least equally emphasizes prevention during the first year of the Surveillance Program, particularly due to the risk that mink farms pose of perpetuating spread of the virus.

III. APHIS' Surveillance Program Should Involve Collecting and Disseminating More Information about Mink and Other Fur Farms

One component of APHIS's Surveillance Program should involve gathering and sharing more information about mink and other fur producing operations, including the steps they are taking to avoid transmission of SARS-CoV-2 between farmed animals, humans, and other species. The Strategic Framework recognizes the need to improve surveillance and data collection systems,

---

[32] *Id.* at 3-6.

[33] USDA APHIS Webinar, *American Rescue Plan – Overview of APHIS' Strategic Framework* (Sept. 1, 2020) at 14:00.

particularly with regard to "species at highest risk of transmission" of zoonotic disease.[34] Mink and other fur farms are particularly susceptible to zoonotic disease transmission, yet USDA's lack of meaningful data collection from this sector makes it impossible for the federal government, or the public, to sufficiently monitor the incubation and spread of infectious zoonotic diseases at these farms. Swiftly and significantly improving federal data collection regarding U.S. fur farms is an essential precondition to understanding the magnitude of the zoonotic disease risk they pose and necessary to enable an understanding of the effectiveness of prevention measures being undertaken. It is vital that the USDA heed the recommendations of the World Health Organization, the Food and Agriculture Organization of the United Nations, and other global health and food safety organizations that recommend monitoring mink farms—and fur operations in general—more closely.[35]

Implementing these recommendations will require the agency to collect more data than it currently does. At present, the federal government's principal fur farm data collection tool is NASS's annual mink survey questionnaire. That survey requests information only about the number of females bred on each farm, the number and color of pelts produced, the name and address of any new owners of the operation, and any persons nearby who may have recently started or returned to raising mink.[36] It fails to request a wide range of other information relevant to public safety and health, such as what specific measures fur operations have taken to mitigate transmission of COVID-19 or other diseases, making it impossible to easily monitor the potential infectious diseases incubated or spread at these farms. This annual mink survey should be made more robust in order to capture data vital to understanding, monitoring, and responding to zoonotic disease risks. As numerous organizations recommended in a June 21, 2021 public comment letter regarding the survey,[37] NASS should at a minimum collect the following information about mink operations in its annual questionnaire:

- To the extent not already collected, the full contact information for all of the mink farm's owners and operators;
- The address of each place of business at which the mink farm conducted business;
- The legal descriptions of any lands upon which the mink farm conducted business;
- All trade names under which the mink farm conducted business;
- The number of individuals who worked on the farm;
- The number and sex of individual mink raised;
- The source of each individual mink and a detailed description of how the animals were transported, and the route taken, if applicable;

[34] Strategic Framework at 2-3.
[35] *See* FAO ET AL., GLEWS+ RISK ASSESSMENT vii, 1 (2021); EFSA et al. Monitoring of SARS-CoV-2 Infection in Mustelids 3 (2021).
[36] *See* NAT'L AGRIC. STAT. SERV., USDA, MINK SURVEY, (2012), https://www.nass.usda.gov/Publications/Methodology_and_Data_Quality/Mink/07_2012/Mink_2012_questionnaire.pdf. Although the most recent questionnaire available is from 2012, it does not appear to have changed since then, because the mink survey has been "approved without change" by the Office of Management and Budget since 2012. *See OMB Control Number History*, OFF. OF MGMT. AND BUDGET, OFF. OF INFO. AND REG. AFF., https://www.reginfo.gov/public/do/PRAOMBHistory?ombControlNumber=0535-0212.
[37] *See* Notice of Intent to Request Revision and Extension of a Currently Approved Information Collection, 86 Fed. Reg. 20,481 (April 20, 2021).

- The number of individual mink purchased, transferred, or sold and the name of each person or entity to whom or from whom such animals were purchased, transferred, or sold;
- A description of the size, number, and type of the mink farm's pens, cages, or other such enclosures;
- A description of the barrier(s) that were used to contain the mink on the farm and prevent other animals from gaining access to the farm;
- A description of the procedures the mink farm used to dispose of manure, and carcasses and any parts thereof, to ensure the health and safety of farm workers, the public, and the captive and wild animals;
- The number of mink that died or were killed, the cause of death, and, if killed by humans, the reason each was killed and the method used;
- A description of the measures the mink farm adhered to in compliance with the current American Veterinary Medical Association guidelines relevant to fur farm operations, including euthanasia and depopulation; and
- A description of the measures the mink farm adhered to in compliance with the latest guidelines and recommendations developed by the USDA, the CDC, and any other federal agencies, in order to prevent the transmission of COVID-19 or other diseases to mink or other captive furbearing animals or to wildlife, fur farm workers, and the public.

Obtaining this additional information would benefit public health and safety in several ways. First, collecting more information about farm owners, operators, business names, and locations (including farms that may have multiple locations) would enhance the USDA's ability to locate, monitor, inspect, and communicate with the farms in the event of a disease outbreak or other public health emergency.

Second, more detailed information about the number of workers on each farm, the number of mink on each farm, the method of conveyance and routes of any mink that were transported, the type of enclosures the mink are kept in, and the cause of individual mink mortality would be useful for assessing the scale, origin, and potential transmissibility of any zoonotic disease.

Third, information about barriers used to enclose the farms (to keep the mink contained and prevent other animals from gaining access) and how the farms dispose of manure and carcasses would help determine the likelihood of unintentional spread of disease to wild animal populations or into the environment.

And fourth, information about animal treatment and welfare conditions would help determine the minks' susceptibility to disease, because chronically stressed animals can be more immunocompromised and are more likely to shed pathogens.[38] Such information would help government officials and the general public gain a better understanding of the mink production industry's public health threats and impacts.

Currently, NASS appears only to gather data about mink and rabbit farms. Because they pose similar zoonotic disease risks, APHIS's Surveillance Program should collect the above

---

[38] *See, e.g.*, Lynn B. Martin et al., *Stress and Animal Health: Physiological Mechanisms and Ecological Consequences*, NATURE EDUC. KNOWLEDGE (2011), https://www.nature.com/scitable/knowledge/library/stress-and-animal-health-physiological-mechanisms-and-23672697/.

information not only about mink and rabbit farms, but also about other types of fur producing operations. For example, foxes—another species that appears to be raised on fur farms in the United States—may also be susceptible to SARS-CoV-2 and could transmit it to humans.[39] Other species raised for their fur could be vulnerable to, and potentially serve as dangerous reservoirs for, future zoonoses.[40]

Gathering this information through APHIS's Surveillance Program could provide all One Health partners and the general public with vital information that troublingly does not appear to be currently collected at all. Indeed, dissemination of this information to the public is *vital*: the collected data must be made available to the public to allow for an understanding of the potential risk that mink and other fur farms pose to public health, and to help inform health decisions by policy makers.

IV. APHIS' Surveillance Should Involve Developing Early Warning Systems for Mink and other Fur Farms

As part of its Surveillance Program, APHIS should develop an early warning system for mink and other fur operations that is designed to prevent transmission of the virus and immediately notify the public of any detected infections. Many species raised for their fur—like mink and foxes—are carnivores. Carnivore species carry a relatively high number of diseases, because they "lack key genes needed to detect and protect against pathogens."[41] While this does not necessarily predispose carnivores to infection, it does allow pathogens to reside in their body undetected.[42] Researchers have found that approximately 49 percent of carnivore species—"the highest proportion of any mammal order including bats,"—carry one or more unique zoonotic pathogens.[43] When large numbers of carnivores are kept close together, these animals "could create a 'disease reservoir'" where pathogens accumulate, mutate, and spread to humans.[44] Intensive fur operations, which house a high density of carnivores, provide ideal conditions for the replication and transmission of viruses such as SARS-CoV-2.[45] Therefore, it is critical for APHIS to develop an early warning system specific to mink and other fur farms to prevent zoonotic disease transmission. Such a system should include, at a minimum, the following measures:

---

[39] *See* Yinghui Liu et al., *Functional and Genetic Analysis of Viral Receptor ACE2 Orthologs Reveals a Broad Potential Host Range of SARS-CoV-2*, 118 PROC. OF THE NAT'L ACAD. OF SCI. 1, 4 (2021); Ilya R. Fischhoff et al., *Predicting the zoonotic capacity of mammals to transmit SARS-CoV-2* 19, BIORXIV, June 2021, at 21; Jane Dalton, *It's not just mink: Foxes and raccoon dogs on fur farms 'may infect humans with coronaviruses,' scientists warn*, INDEP. (Nov. 26, 2020), https://www.independent.co.uk/climate-change/news/mink-fur-farm-covid-foxes-raccoon-dogs-b1759223.html.

[40] Hilde Kruse, Anne-Mette Kirkemo & Kjell Handeland, *Wildlife as Source of Zoonotic Infections*, 10 EMERGING INFECTIOUS DISEASES 2067 (2004); Zsofia Digby, *Evolutionary loss of inflammasomes in the Carnivora and implications for the carriage of zoonotic infections*, CELL REPS., Aug. 2021.

[41] Annie Lennon, *Farming carnivores may encourage 'disease reservoirs'*, MED. NEWS TODAY (Aug. 27, 2021), https://www.medicalnewstoday.com/articles/farming-carnivores-may-encourage-disease-reservoirs.

[42] Zsofia Digby et al., *Evolutionary Loss of Inflammasomes in the Carnivora and Implications for the Carriage of Zoonotic Infections*, CELL REPS., Aug. 2021, at 9.

[43] *Id.* at 1.

[44] Annie Lennon, *Farming carnivores may encourage 'disease reservoirs'*, MED. NEWS TODAY (Aug. 27, 2021), https://www.medicalnewstoday.com/articles/farming-carnivores-may-encourage-disease-reservoirs.

[45] Anette Boklund et al., *Monitoring of SARS-CoV-2 Infection in Mustelids*, EFSA J., Jan. 2021, at 3.

- Immediate reporting to APHIS and CDC of any animal raised for its fur showing signs of possible SARS-CoV-2 infection, including "increased mortality, respiratory or gastrointestinal signs or reduction in feed intake;"[46]
- Immediate testing of any fur farm workers who show, or whose household members show, signs of possible SARS-CoV-2 infection, including "fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea;"[47]
- At least weekly testing of a large enough sample size of the animals being raised on a given fur farm to determine with at least 95 percent confidence that no animals in the population are infected (prioritizing the testing of animals that appear sick or have already died);[48]
- At least weekly testing of all fur farm workers;
- Immediate reporting to APHIS and CDC of any fur farm workers or animals that test positive for SARS-CoV-2 infection;
- If any fur farm workers or animals test positive, immediate:
    - quarantine of the farm workers and/or the farm;
    - reporting of the positive test results and any other relevant information to local health authorities, wildlife management agencies, and the public;
    - investigations by APHIS and CDC to determine whether or to what extent other farm workers and the mink population on the farm are infected;
    - investigations by APHIS, CDC, and wildlife management officials to determine whether or to what extent the virus is present in any domestic animals, escaped mink, wild mink, or other potentially susceptible wildlife on or near (within, for example, a 40-kilometer radius of[49]) the infected farm;
    - recommendation to relevant state and federal wildlife officials that the recreational trapping of mink and other potentially susceptible wildlife—particularly mustelids[50]—be closed in the area surrounding the infected farm; and
    - genetic analysis of the virus "to characterize the virus, to detect possible virus mutations and to identify the origin and the source of the virus (e.g. spread between different populations)."[51]

In addition, APHIS should establish increased reporting obligations to minimize escapes of farmed mink into the wild. Such obligations should include written confirmation that:

---

[46] *Id.* at 41.

[47] CDC, *COVID-19: Symptoms of COVID-19*, https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html.

[48] Anette Boklund et al., *Monitoring of SARS-CoV-2 Infection in Mustelids*, EFSA J., Jan. 2021, at 42.

[49] A.G. Kidd et al., *Hybridization Between Escaped Domestic and Wild American Mink (*Neovison vison*)*, 18 MOLECULAR ECOLOGY 1175 (2009).

[50] Numerous researchers have cautioned that members of the family Mustelidae may be particularly susceptible to the SARS-CoV-2 virus, and efforts to monitor them should be prioritized. *See, e.g.*, Tessa Prince et al., *SARS-CoV-2 Infections in Animals: Reservoirs for Reverse Zoonosis and Models for Study*, VIRUSES, 13, 494 (2021) at 4; Costanza Manes et al., *Could Mustelids spur COVID-19 into a panzootic?*, 56 VETERINARIA ITALIANA 65 (2020); Khan Sharun et al., *SARS-CoV-2 in Animals: Potential for Unknown Reservoir Hosts and Public Health Implications*, 41 VETERINARY QUARTERLY 181, 191 (2021).

[51] Anette Boklund et al., *Monitoring of SARS-CoV-2 Infection in Mustelids*, EFSA J., Jan. 2021, at 43.

- The facility is constructed (or that additional protections are put in place should construction be subpar) to minimize escapes;
- There are adequate security and safety programs and procedures which minimize the possibility of escape;
- There is adequate record keeping to aid in tracking of confined animals or recovery of escaped animals;
- There are adequate procedures, equipment and trained staff to maximize capture of escaped animals;
- Adequate veterinary care is provided to identify and minimize the spread of diseases; and
- The applicant has a good reputation for care of animals and compliance with the wildlife laws.

Importantly, all information gathered by APHIS while conducting and regulating such activities should be promptly shared with the scientific community and the public. Collectively, these measures would provide a substantial foundation for an early warning system specific to mink and other fur operations. The undersigned organizations would welcome the opportunity to work with APHIS to develop additional measures that could also be taken to minimize the risk of transmission to farmed animals, humans, and other species.

V. APHIS Should Monitor All Potential Virus Vectors

In its surveillance of SARS-CoV-2 on and around mink operations, APHIS and its partner agencies should monitor all potential transmission pathways, including live mink (captive, escaped, and wild) and other animals that could become infected with and transmit the virus, mink carcasses and fur, mink feces, and wastewater and surface water runoff. The Strategic Framework indicates that APHIS intends to strengthen surveillance tools at the "human-animal-environmental interface;"[52] however, it is unclear whether or the extent to which that includes monitoring these potential vectors.

A. Live mink and other animals

Both farmed mink (captive and escaped) and wild mink could transmit the virus to humans and other animals. Thus, it is important for APHIS's SARS-CoV-2 surveillance efforts to involve monitoring all live mink and other susceptible animals on and near mink farms.

It is clear that intensively farmed mink can become infected with SARS-CoV-2 and that the virus can spread rapidly among them. As mentioned above, there have been outbreaks of SARS-CoV-2 on more than 400 mink farms in North America and Europe,[53] including at least 17 in the United States.[54] More than 20,000 farmed mink have died from the disease in the United States alone; millions more have died from the disease or been culled in Europe in an attempt to prevent the spread of the disease. In August 2020, state and federal officials captured 11 escaped mink near mink farms in Utah; all 11 tested positive for SARS-CoV-2 antibodies, suggesting recent

[52] Surveillance Framework at 3.
[53] Florence Fenollar et al., *Mink, SARS-CoV-2, and the Human-Animal Interference*, FRONTIERS IN MICROBIOLOGY, Apr. 2021, at 5-6; OIE, SARS-COV-2 IN ANIMALS – SITUATION REPORT 1-2 (2021).
[54] *Id.*

infection.[55] In December, three escaped mink were captured outside of a quarantined mink farm in Oregon; two of the three tested positive for SARS-CoV-2.[56]

It is also clear that infected farmed mink can transmit the virus to humans. Mink-to-human spread of SARS-CoV-2 has been reported in the Netherlands,[57] Denmark,[58] and Poland.[59] It has also likely occurred in the United States. According to the CDC, "Investigations found that mink from a Michigan farm and a small number of people were infected with SARS-CoV-2 that contained unique mink-related mutations (changes in the virus's genetic material). This suggests mink-to-human spread might have occurred."[60]

In addition, because of the proximity of many mink farms to wild mink habitat, it is clear that escaped mink could transmit the virus to wild mink. As identified above, in both Utah and Oregon, mink captured in the wild have tested positive for SARS-CoV-2. In Utah, one of the trapped infected mink is believed to have been a wild mink that caught the virus.[61] Scientists concluded through genome sequencing that the wild Utah mink likely caught the virus from an outbreak at a nearby commercial mink.[62]

Even more troubling, while information about the specific locations of industrial fur operations is generally unavailable to the public, the states in which mink farms are located all fall within the range of native mink.[63] Mink farms are also often located in rural areas,[64] increasing the likelihood that escaped mink could come into contact with wild mink. These farms are further often located near "good mink habitat."[65] In Utah, for example, "mink farms often overlap with designated critical mink habitats."[66] This means that escaped mink in those areas may not have to travel far to encounter wild mink.

---

[55] Susan A. Shriner et al., *SARS-CoV-2 Exposure in Escaped Mink, Utah, USA*, 27 EMERGING INFECTIOUS DISEASES 988, 988 (Mar. 2021).

[56] Danny Peterson, *3 mink caught outside quarantined farm; 2 test SARS-CoV-2 positive*, KOIN (Jan. 13, 2021), https://www.koin.com/news/health/coronavirus/3-mink-caught-outside-quarantined-farm-2-test-sars-cov-2-positive/.

[57] Bas B. Oude Munnink et al., *Jumping Back and Forth: Anthropozoonotic and Zoonotic Transmission of SARS-CoV-2 on Mink Farms*, BIORXIV, Sept. 2020, at 21.

[58] Anne Sofie Hammer et al., *SARS-CoV-2 Transmission Between Mink (Neovision vision) and Humans, Denmark*, 27 EMERGING INFECTIOUS DISEASES 547, 550 (2021).

[59] Lukasz Rabalski et al., *Zoonotic Spillover of SARS-CoV-2: Mink-Adapted Virus in Humans*, BIORXIV, Mar. 2021, at 7.

[60] *COVID-19: Animals and COVID-19*, CDC (Aug. 5, 2021), https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/animals.html.

[61] Wufei Yu, *Why Utah's Wild Mink COVID-19 Case Matters*, HIGH COUNTRY NEWS (Jan. 20, 2021), https://www.hcn.org/issues/53.3/south-wildlife-why-utahs-wild-mink-covid-19-case-matters.

[62] James Gorman, *One Wild Mink Near Utah Fur Farms Tests Positive for Virus*, N.Y. TIMES (Dec. 15, 2020), https://www.nytimes.com/2020/12/15/science/covid-wild-mink-utah.html.

[63] Lauren A. Harrington et al., *Wild American Mink (Neovision vison) May Pose a COVID-19 Threat*, 19 FRONTIERS IN ECOLOGY & THE ENV'T 266, 266 (2021).

[64] *See e.g.*, Kate Golden, *Wisconsin's No. 1 mink farming industry now seen as a COVID-19 risk*, WIS. WATCH (Jan. 30, 2021), https://wisconsinwatch.org/2021/01/wisconsins-no-1-mink-farming-industry-now-seen-as-a-covid-19-risk/; Lauren A. Harrington et al., *Wild American Mink (Neovision vison) May Pose a COVID-19 Threat*, 19 FRONTIERS IN ECOLOGY & THE ENV'T 266, 266 (2021).

[65] Jeff Bowman et al., *Assessing the Potential for Impacts by Feral Mink on Wild Mink in Canada*, 139 BIOLOGICAL CONSERVATION 12, 16 (2007).

[66] Susan A. Shriner et al., *SARS-CoV-2 Exposure in Escaped Mink, Utah, USA*, 27 EMERGING INFECTIOUS DISEASES 988, 989 (2021).

Studies further indicate that escaped farmed mink can survive in the wild, breed and otherwise interact with wild mink, and potentially out-compete native wild populations. For example, a survey of free-ranging mink in two locations near mink farms in southern Ontario in Canada by Kidd et al. (2009) determined that, on average, 36 percent were escaped mink.[67] Numerous studies have further determined that native populations can be negatively impacted by escaped farmed mink through predation, resource competition, genetic disruption, and disease introduction, with "[t]he overwhelming presence of domestic animals and their hybridization with mink in natural populations [being] of great concern for the future sustainability of wild mink populations."[68] Indeed, a 2009 study determined there to be at least "two avenues by which population declines of wild mink may be induced by the mink escaping from mink farms:" 1) introgressive hybridization with domestic mink leading to the introduction of maladaptive genes (or disruption of locally adapted gene complexes) into wild mink populations, and 2) through the introduction of highly infectious, fatal diseases.[69]

Indeed, when mink escape, they can interact with wild mink in a variety of ways that would facilitate spread of the virus:

> [L]ike other mustelids [mink] deposit feces at prominent marking spots that are investigated by neighbors (Hutchings and White 2000); such behaviors could facilitate viral transmission. In addition, during the mating season males will visit multiple females (Macdonald *et al*. 2015), and there is widespread and sometimes extensive movement of both males and females during the autumn when the young-of-the-year disperse from their natal territory (e.g. Oliver *et al*. 2016); both of these behaviors would also potentially facilitate viral spread if movements involve infected individuals.[70]

That escaped mink readily mate with wild mink creates concerning and high-risk conditions for disease transmission. For example, in the same study area discussed above, Kidd et al. (2009) determined that, on average, 28 percent were escaped-wild mink hybrids.[71] In light of these factors, it is not surprising that in December, the USDA confirmed the first case of SARS-CoV-2 in a free-ranging, wild mink near a mink farm in Utah.[72] This is concerning due both to the impact that the virus could have on native mink populations, and because wild mink could in turn spread

---

[67] A.G. Kidd et al., *Hybridization Between Escaped Domestic and Wild American Mink (Neovison vison)*, 18 MOLECULAR ECOLOGY 1175, 1183 (2009).

[68] *Id.* at 1175 (2009); *see also* Morris, et al., *Functional Genetic Diversity of Domestic and Wild American Mink (Neovison Vison)*, 13 EVOLUTIONARY APPLICATIONS 2610, 2610 (2020) ("We found evidence to suggest domestic release events are affecting the functional genetic diversity of wild mink."); Bowman, et al., *Assessing the Potential for Impacts by Feral Mink on Wild Mink in Canada*, 139 BIOLOGICAL CONSERVATION 12, 12 (2007) ("Our analysis suggests that the conditions exist for feral mink to contribute to wild mink declines through outbreeding depression or the introduction of disease."); Bowman, et al., *Testing for Bias in a Sentinel Species: Contaminants in Free-Ranging Domestic, Wild, and Hybrid Mink*, 112 ENV'T RSCH. 77 (2012); Wilkins, et al., *The "Domestication Syndrome" in Mammals: A Unified Explanation Based on Neural Crest Cell Behavior and Genetics*, 197 GENETICS 795 (2014).

[69] Kidd, et al., *Hybridization Between Escaped Domestic and Wild American Mink (Neovison vison)*, 18 MOLECULAR ECOLOGY 1175 (2009).

[70] Lauren A. Harrington et al., *Wild American Mink (Neovision vison) May Pose a COVID-19 Threat*, 19 FRONTIERS IN ECOLOGY & THE ENV'T 266, 266 (2021) (italics in original).

[71] A.G. Kidd et al., *Hybridization Between Escaped Domestic and Wild American Mink (Neovison vison)*, 18 MOLECULAR ECOLOGY 1175, 1183 (2009).

[72] Thomas DeLiberto, *Coronavirus Disease 2019 Update (536): Animal, USA (Utah) Wild Mink, First Case*, PROMED (Dec. 13, 2020), https://promedmail.org/promed-post/?id=8015608.

the virus to humans: wild mink are commonly caught, killed, and handled by recreational trappers. For instance, in Wisconsin alone in 2019, where there are more than 50 mink farms, 1,100 trappers captured 4,634 mink.[73]

Farmed mink may also transmit the virus to other wild animals. As the Fur Commission operating guidelines warn, "Many disease outbreaks have been shown to have been transmitted by wildlife (raccoons, skunks, rodents, birds, feral cats, etc.)" that have accessed mink farms.[74] If these species are capable of accessing mink farms and transmitting diseases to mink, they may also be capable of accessing mink farms and becoming infected by diseased mink. Once infected, they could in turn transmit the virus to conspecifics or other species. In addition, some species not known to be susceptible to infection, such as birds, may serve as mechanical vectors. For example, Boklund et al. (2020) detected low levels of SARS-CoV-2 on the foot of a seagull that had foraged beneath the cages of a mink farm in Denmark.[75] This raised the possibility that the seagull could transmit the virus to another location and potentially transmit the virus to another animal. Species of native wildlife in the United States that are or may be susceptible to SARS-CoV-2 infection include mink and other mustelids,[76] white-tailed deer,[77] mountain lions,[78] raccoons,[79] rabbits,[80] red foxes,[81] skunks,[82] bats,[83] bushy-tailed woodrats,[84] thirteen-lined ground squirrels,[85] ermines,[86] and deer mice.[87]

---

[73] BRIAN DHUEY & SHAWN ROSSLER, FUR TRAPPER SURVEY 4-5 (2019-2020).

[74] JOHN S. EASLEY D.M.V., FUR COMM'N USA, STANDARD GUIDELINES FOR THE OPERATION OF MINK FARMS IN THE UNITED STATES BOOK 3: BIOSECURITY PROTOCOLS FOR MINK FARMS IN THE UNITED STATES 3 (2019).

[75] Anette Boklund et al., *SARS-CoV-2 in Danish Mink Farms: Course of the Epidemic and a Descriptive Analysis of the Outbreaks in 2020*, 11 ANIMALS 164 (2021).

[76] Florence Fenollar et al., *Mink, SARS-CoV-2, and the Human-Animal Interference*, FRONTIERS IN MICROBIOLOGY, Apr. 2021; Khan Sharun et al., *SARS-CoV-2 in Animals: Potential for Unknown Reservoir Hosts and Public Health Implications*, 41 VETERINARY QUARTERLY 181 (2021).

[77] Jeffrey C. Chandler et al., *SARS-CoV-2 Exposure in Wild White-Tailed Deer (Odocoileus virginianus)*, BIORXIV, July 2021, at 1.

[78] *OIE Members have been keeping the OIE updated on any investigations or outcomes of investigations in animals:*, OIE, https://www.oie.int/en/what-we-offer/emergency-and-resilience/covid-19/#ui-id-3 (last updated Sept. 6, 2021).

[79] Raquel Francisco et al., *Experimental Susceptibility of North American Racoons (Procyon lotor) and Striped Skunks (Mephitis mephitis) to SARS-CoV-2*, BIORXIV, Mar. 2021, at 1.

[80] Anna Z. Mykytyn et al., *Susceptibility of Rabbits to SARS-CoV-2*, EMERGING MICROBES & INFECTIONS, Jan. 2021, at 1.

[81] Junwen Luan et al., *Spike Protein Recognition of Mammalian ACE2 Predicts the Host Range and an Optimized ACE2 for SARS-CoV-2 Infection*, 526 BIOCHEMICAL & BIOPHYSICAL RSCH. COMMC'N 165, 166 (2020).

[82] Angela M. Bosco-Lauth et al., *Survey of Peridomestic Mammal Susceptibility to SARS-CoV-2 Infection*, BIORXIV, Jan. 2021, at 2.

[83] Markus Hoffman et al., *SARS-CoV-2 Mutations Acquired in Mink Reduce Antibody-Mediated Neutralization*, CELL REPORTS, Apr. 2021, at 5.

[84] Angela M. Bosco-Lauth et al., *Survey of Peridomestic Mammal Susceptibility to SARS-CoV-2 Infection*, BIORXIV, Jan. 2021, at 2.

[85] Junwen Luan et al., *Spike Protein Recognition of Mammalian ACE2 Predicts the Host Range and an Optimized ACE2 for SARS-CoV-2 Infection*, 526 BIOCHEMICAL & BIOPHYSICAL RSCH. COMMC'N 165, 166 (2020).

[86] *Id.*

[87] Angela M. Bosco-Lauth et al., *Survey of Peridomestic Mammal Susceptibility to SARS-CoV-2 Infection*, BIORXIV, Jan. 2021, at 2.; Anna Fagre et al., *SARS-CoV-2 Infection, Neuropathogenesis and Transmission Among Deer Mice: Implications for Spillback to New World Rodents*, PLOS PATHOGENS, May 2021, at 1.

The susceptibility of deer mice is particularly concerning. They are "abundant in regions where American mink (*Neovison vison*) are farmed, raising the possibility of contact with infected American mink or fomites (e.g., mink food) that may be contaminated with SARS-CoV-2."[88] This is worrisome because researchers have demonstrated that deer mice are not only susceptible to experimental infection of SARS-CoV-2, but can also spread the virus to other deer mice.[89] They may also be able to spread it to any of the dozens of other members of the *Peromyscus* genus.[90] Further, they may be able to transmit it to people: "Deer mice (*P. maniculatus*) are the most studied and abundant mammals in North America and are frequently contacted by mammalogists during field studies."[91]

While experimentally infected deer mice appear asymptomatic or experience only mild disease, "[t]he extent to which these observations may translate to wild deer mouse populations remains unclear."[92] That is, deer mice in the wild could experience more or less severe forms of the disease. If it is more severe, it could have a greater impact on deer mouse populations; if it is relatively mild, it could make infected populations more difficult to detect and monitor. In either case, Griffin et al. (2021) warned that there is a real risk that deer mice or other *Peromyscus* mice could become reservoirs of SARS-CoV-2, as they have for several other diseases: "The findings reported here are concerning in light of the fact that *Peromyscus* species rodents tolerate persistent infection with and serve as the primary reservoirs for several emerging zoonotic pathogens that spillover into humans, including *Borrelia burgdorferi* [the causative agent of Lyme disease], DTV [deer tick virus], and SNV [Sin Nombre orthohantavirus]."[93]

Also concerning is the potential for animal populations to become new reservoirs for SARS-CoV-2. As discussed above, this is particularly likely to occur in carnivore species such as mink, because carnivorous mammals are "immunologically challenged,"[94] in that they "have either missing or mutated immune genes that make them less able to identify and fend off pathogens."[95] This lack of functioning genes can enable pathogens to hide and spread undetected (i.e., the host animals appear asymptomatic), which in turn increases the risk of carnivores becoming new reservoirs for disease.

---

88 Anna Fagre et al., *SARS-CoV-2 Infection, Neuropathogenesis and Transmission Among Deer Mice: Implications for Spillback to New World Rodents*, PLOS PATHOGENS, May 2021, at 2.
89 *Id.*
90 Bryan D. Griffin et al., *SARS-CoV-2 Infection and Transmission in the North American Deer Mouse*, NATURE COMMC'NS, June 2021, at 1; Jasper Fuk-Woo Chan et al., *Simulation of the Clinical and Pathological Manifestations of Coronavirus Disease 2019 (COVID-19) in a Golden Syrian Hamster Model: Implications for Disease Pathogenesis and Transmissibility*, 71 CLINICAL INFECTIOUS DISEASES 2428, 2428 (2020); Sin Fun Sia et al., *Pathogenesis and Transmission of SARS-CoV-2 in Golden Hamsters*, 583 NATURE 834, 834 (2020).
91 Anna Fagre et al., *SARS-CoV-2 Infection, Neuropathogenesis and Transmission Among Deer Mice: Implications for Spillback to New World Rodents*, PLOS PATHOGENS, May 2021, at 2.
92 Bryan D. Griffin et al., *SARS-CoV-2 Infection and Transmission in the North American Deer Mouse*, NATURE COMMC'NS, June 2021, at 1.
93 *Id.* at 6.
94 Zsofia Digby, *Evolutionary loss of inflammasomes in the Carnivora and implications for the carriage of zoonotic infections*, CELL REPORTS, Aug. 2021, at 3.
95 Annie Lennon, *Farming carnivores may encourage 'disease reservoirs'*, MED. NEWS TODAY (Aug. 27, 2021), https://www.medicalnewstoday.com/articles/farming-carnivores-may-encourage-disease-reservoirs.

The risk of reservoir establishment is especially high in environments like industrial mink farms, where the crowded conditions facilitate viral transmission.[96] Indeed, while thousands of farmed mink have become visibly sick and died from the virus, many others appear to have experienced asymptomatic infections. For example, after testing farmed mink in Denmark, Hammer et al. (2021) reported that many infections "occurred with little clinical disease or increase in death, making it difficult to detect the spread of infection; thus, mink farms could represent a serious, unrecognized animal reservoir for SARS-CoV-2."[97]

The potential for mink or other species to become permanent reservoirs for the virus is a major concern for several reasons. First, it could cause ongoing illness and death within the infected animal population itself. Second, the virus could evolve and mutate into variants that are more transmissible or dangerous to humans. For example, Munnink et al. (2021) estimated that the virus mutates approximately once every two weeks in farmed mink populations.[98] These mutations can result in variants that are more harmful and less susceptible to vaccines than the original strain. As Banerjee et al. (2021) warn, "The presence of additional SARS-CoV-2 variants with the ability to reinfect vaccinated or immune populations has the potential for devastating consequences for human health."[99]

Most concerning may be mutations that occur within the virus' spike proteins—the protrusions on the surface of the virus particle that help the virus attach to and enter host cells. Changes in the spike protein are particularly important because such mutations could create "virus populations that would no longer be susceptible to neutralization by antibodies present in vaccinated or naturally infected individuals."[100] Fenollar et al. (2021) reported that, as of early 2021, about 170 mutations had been identified in mink SARS-CoV-2 samples from 40 mink farms, "and mink-specific mutations of SARS-CoV-2 (including a . . . mutation in the viral spike) have been found in humans."[101]

Third, if it infects animals that already host other species of coronaviruses, such as many types of bats, the SARS-CoV-2 virus could "recombine" with those coronaviruses. That is, the viruses could "interact during replication to generate virus progeny that have some genes from both parents."[102] The process of recombination "can lead to the selection or generation of strains capable of switching hosts, posing a threat to human and animal health."[103] Indeed, as Banerjee et al. (2021) noted, "[t]he presence of bats or bat colonies on farms that house SARS-CoV-2-

---

[96] *Id.*; Zsofia Digby, *Evolutionary loss of inflammasomes in the Carnivora and implications for the carriage of zoonotic infections*, CELL REPORTS, Aug. 2021.
[97] Anne Sofie Hammer et al., *SARS-CoV-2 Transmission between Mink (*Neovison vison*) and Humans, Denmark*, 27 EMERGING INFECTIOUS DISEASES 547 (2021); *see also* M. Pomorska-Mól et al., *Review: SARS-CoV-2 Infection in Farmed Minks – an Overview of Current Knowledge on Occurrence, Disease and Epidemiology*, ANIMAL, June 2021, at 1.
[98] Bas B. Oude Munnink et al., *Jumping Back and Forth: Anthropozoonotic and Zoonotic Transmission of SARS-CoV-2 on Mink Farms*, BIORXIV, Sept. 2020, at 21.
[99] Arinjay Banerjee et al., *Zooanthroponotic Potential of SARS-CoV-2 and Implications of Reintroduction into Human Populations*, 29 CELL HOST & MICROBE 160, 163 (2021).
[100] *Id.*
[101] Florence Fenollar et al., *Mink, SARS-CoV-2, and the Human-Animal Interference*, FRONTIERS IN MICROBIOLOGY, Apr. 2021, at 8.
[102] W. Robert Fleischmann, Jr., *Viral Genetics, in* MEDICAL MICROBIOLOGY (Baron S. ed., 4th ed. 1996).
[103] Arinjay Banerjee et al., *Zooanthroponotic Potential of SARS-CoV-2 and Implications of Reintroduction into Human Populations*, 29 CELL HOST & MICROBE 160, 162 (2021).

susceptible animals, such as minks . . . should be assessed and a contingency plan developed to restrict contact."[104] This is because "[t]he highly mobile nature and diversity of bats combined with their ability to host viruses in the absence of clinical disease makes them a particular concern for virus persistence and ongoing transmission to other susceptible hosts."[105]

When the virus spreads to other species, it "is likely to acquire adaptive mutations that ensure efficient viral spread in these species."[106] Once the virus has spread widely within a population, and the species has become a new reservoir, it is difficult to predict how the virus will evolve within that population, or whether it will re-emerge and infect humans, even those who have been previously exposed to SARS-CoV-2 or vaccinated. However, that is a distinct risk. Indeed, "the risk of reservoir establishment with unforeseeable consequences [was] the basis for the decisions to cull [millions of mink on] farms in the Netherlands and Denmark."[107]

Further, infected mink or infected individuals of other species, like many humans, may be asymptomatic.[108] In other words, they may experience "subclinical" infections with no signs or symptoms of disease. That could make it more difficult to determine whether a species could serve as—or has already become—a permanent reservoir for the virus.[109] As Pomorska et al. (2021) explain, "[I]n minks, clinical and subclinical forms of infection with SARS-CoV-2 can occur, making it potentially problematic to detect. Therefore, mink farms could represent a possibly dangerous, not always recognized, animal reservoir for SARS-CoV-2.[110]

Importantly, variants that develop and emerge in other species can be transmitted not only from the infected animal to humans, but also from the infected humans to other humans. For example, in 2020, researchers in Denmark observed the emergence of a mink variant that spread first to humans connected to mink farms and then to the community more broadly.[111] Between June and November of that year, the researchers estimated that 27 percent of the 5,159 confirmed human COVID-19 cases in northern Denmark were caused by mink variant strains, and that "at the peak of the epidemic more than half of the strains sequenced from human samples . . . were mink-associated."[112] While the study authors acknowledged that "[t]he Danish experiences are unique because of the magnitude of the Danish mink production," they nonetheless cautioned that "other countries with farmed mink may well experience similar risks."[113]

---

[104] *Id.* at 163.
[105] *Id.*
[106] Markus Hoffman et al., *SARS-CoV-2 Mutations Acquired in Mink Reduce Antibody-Mediated Neutralization*, CELL REPORTS, Apr. 2021, at 5.
[107] Marion Koopmans, *SARS-CoV-2 and the Human-Animal Interface: Outbreaks on Mink Farms*, 21 LANCET 18, 19 (2021).
[108] Florence Fenollar et al., *Mink, SARS-CoV-2, and the Human-Animal Interference*, FRONTIERS IN MICROBIOLOGY, Apr. 2021, at 5.
[109] Khan Sharun et al., *SARS-CoV-2 in Animals: Potential for Unknown Reservoir Hosts and Public Health Implications*, 41 VETERINARY QUARTERLY 181, 181 (2021).
[110] M. Pomorska-Mól et al., *Review: SARS-CoV-2 Infection in Farmed Minks – an Overview of Current Knowledge on Occurrence, Disease and Epidemiology*, ANIMAL, June 2021, at 1.
[111] Helle Daugaard Larsen et al., *Preliminary Report of an Outbreak of SARS-CoV-2 in Mink and Mink Farmers Associated with Community Spread, Denmark, June to November 2020*, RAPID COMMC'N, Feb. 2021, at 1.
[112] *Id.* at 5.
[113] *Id.*

Because of the risk that captive, escaped, or wild mink could become SARS-CoV-2 reservoirs and transmit the virus to humans, wild mink, or other animals, APHIS should monitor all live mink and other potentially susceptible animals on and near fur farms. Such an approach would align with the conclusions of researchers such as Koopmans et al. (2021), who advised other countries to learn from the experiences of Denmark and the Netherlands and institute mandatory and "urgently needed" surveillance programs for their fur sectors.[114]

B. Manure

In addition to the mink themselves, waste materials produced on mink farms could serve as vectors for the virus. For example, SARS-CoV-2 can be found in infected mink feces.[115] In an interview with Wisconsin Public Radio, Wisconsin state veterinarian Dr. Darlene Konkle acknowledged that "manure and other properties . . . could potentially be a source of the virus."[116] Feces produced by farmed mink typically fall through the wire floors of their cages to the ground below, where they pile up unless or until they are eventually removed and disposed of. Some mink operations dispose of the manure by composting or stockpiling it.[117] If rodents or other wildlife access infected manure while it is in raw piles, or while it is being composted or stored, they could become infected. This is particularly the case if the manure is not properly composted or stored.

Some operations apply manure to fertilize surface land areas on the farm.[118] For example, earlier this year a mink farm in Oregon was authorized to spread manure that had been infected with the virus on the land surrounding the farm.[119] The Oregon farm first composted the manure "per USDA guidance;"[120] however, it is not clear if it was tested for presence of the virus afterward. Nor is it known whether other farms that spread manure on their land first compost it, compost it correctly, or test it afterward. Fur Commission operating guidelines encourage mink farm operators to "consider composting disease-contaminated manure until safe" because "[t]he spreading of contaminated manure can infect wildlife and greatly increase you [sic] and your neighbor's chances of exposure."[121] Once again, however, those guidelines are not binding; nor do they provide specific instructions on how to correctly compost. Thus, it is important for APHIS's surveillance efforts to include monitoring manure—whether in piles, in compost, or spread on the land—on and around mink farms.

---

[114] Marion Koopmans, *SARS-CoV-2 and the Human-Animal Interface: Outbreaks on Mink Farms*, 21 LANCET 18, 19 (2021).

[115] Hai Nguyen Tran et al., *SARS-CoV-2 Coronavirus in Water and Wastewater: A Critical Review About Presence and Concern*, ENV'T RSCH., Oct. 2020; Kuldeep Dhama et al., *SARS-CoV-2 Existence in Sewage and Wastewater: A Global Public Health Concern?*, J. ENV'T MGMT., Dec. 2020.

[116] Hope Kirwan, *Wisconsin Farms Working To Vaccinate Mink Against Coronavirus*, WIS. PUB. RADIO (July 8, 2021), https://www.wpr.org/wisconsin-farms-working-vaccinate-mink-against-coronavirus.

[117] FUR COMM'N USA, STANDARD GUIDELINES FOR THE OPERATION OF MINK FARMS IN THE UNITED STATES BOOK 4: RECORDS AND PROTOCOLS 55 (2019).

[118] *Pollution Prevention, Water Quality & Mink Farming*, FUR COMM'N USA, https://furcommission.com/pollution-prevention-water-quality-mink-farming/.

[119] E-mail from Ryan P. Scholz, State Veterinarian, Oregon Department of Agriculture – Animal Health Program to Emilio DeBess, State Public Health Veterinarian, Acute and Communicable Disease Program, Oregon State Public Health and Colin Gillin, State Wildlife Veterinarian, Wildlife Health and Population Lab, Oregon Department of Fish and Wildlife (Feb. 8, 2021, 11:11 PST).

[120] *Id.*

[121] JOHN S. EASLEY D.M.V., FUR COMM'N USA, STANDARD GUIDELINES FOR THE OPERATION OF MINK FARMS IN THE UNITED STATES BOOK 3: BIOSECURITY PROTOCOLS FOR MINK FARMS IN THE UNITED STATES 4 (2019).

C. Carcasses and Fur

Another form of waste generated each year by mink farms are the hundreds or thousands of carcasses from animals that are killed for their fur or that die of disease or injury. According to the Fur Commission, carcasses are "potentially highly contaminated and infectious to other mink and people."[122] These "casualties" must be "handled correctly" because operators "have a duty to protect your neighbors and keep any diseases from being introduced into the wildlife."[123] Yet, incongruously, the Fur Commission's guidelines encourage operators to store carcasses in "5-gallon plastic pails with lids" until they can be burned, composted, or buried.[124] It is not clear how secure carcasses in compost piles or buried in the ground—much less in plastic buckets—are from wildlife. Nor is it clear how many operators adhere to Fur Commission guidelines. As with manure, if wildlife or other animals on the farm (such as cats or mice) access infected carcasses or waste fur (attached or unattached to the carcasses), they could become infected. Also similar to manure, this is especially the case if carcasses are not composted or disposed of properly. For instance, according to Utah state veterinarian Dr. David Taylor, "[h]ot composting can kill pathogens, but it has to be done right. . . . After we went onto these [mink] farms and saw what they considered to be composting, which really were just piled-up mink, we made the decision here in Utah to just have these [carcasses] buried at landfills."[125] It is not clear whether, or to what extent, landfills are more secure than mink farms from scavenging wildlife.

In an analogous context, Nituch et al. (2011) warned that "improper disposal of pelted mink carcasses, dead-stock, manure and other waste" on mink farms in Canada were potential contributing factors to the spread of Aleutian disease, a highly pathogenic parvovirus affecting mink and other mustelids.[126] Similarly, Bowman et al. (2014) suggested that the "major point of spillover of [the Aleutian disease virus] between mink farms [in Canada] and wildlife is manure and composting carcasses on mink farms," because wildlife sometimes visit manure or carcass compost piles.[127]

Moreover, one study found that, while the virus only remained viable for up to a few days on most surfaces, it remained infectious for ten days or more on mink fur.[128] In fact, SARS-CoV-2 survived so much longer on mink pelts than other surfaces that the study authors raised the question of whether "this stability contributes to the efficient spread of the virus within mink farms."[129] Similarly, Boklund et al. (2020) tested multiple samples of fur that had been removed from mink on two different mink farms in Denmark for the presence of SARS-CoV-2; all were positive.[130] Further, the World Organisation for Animal Health ("OIE") recently determined that

---

[122] *Id.*
[123] *Id.*
[124] *Id.*
[125] Kate Golden, *The Wild World of Mink and Coronavirus*, SIERRA (Jan. 7, 2021), https://www.sierraclub.org/sierra/wild-world-mink-and-coronavirus.
[126] Larissa A. Nituch et al., *Mink Farms Predict Aleutian Disease Exposure in Wild American Mink*, PLoS ONE, July 2011, at 2.
[127] Jeff Bowman et al., *Testing for Aleutian Mink Disease Virus in the River Otter (Lontra canadensis) in Sympatry with Infected American Mink (Neovison vison)*, 50 J. WILDLIFE DISEASES 689, 689 (2014).
[128] Jenni Virtanen et al., *Survival of SARS-CoV-2 on Clothing Materials*, ADVANCES IN VIROLOGY, Apr. 2021, at 1.
[129] *Id.* at 4.
[130] Anette Boklund et al., *SARS-CoV-2 in Danish Mink Farms: Course of the Epidemic and a Descriptive Analysis of the Outbreaks in 2020*, 11 ANIMALS 164 (2021).

"there is insufficient evidence to consider raw mink furskins as safe for international trade, and further research is needed to better understand any risk to human or animal health potentially posed by international trade in contaminated pelts or fur."[131]

This suggests that infected mink fur—whether on carcasses, pelts, live animals, or finished products—and whether in fur farms, compost piles, landfills, or commercial trade[132]—could contribute to the infection of humans and wildlife. Accordingly, it is important for APHIS's Surveillance Program to monitor for the presence of the virus anywhere that mink carcasses or fur may be discarded or in commercial use.

D. Wastewater and Runoff

Yet another way mink farms could spread the virus into the environment is through the discharge of contaminated wastewater or surface water runoff. Indeed, the Fur Commission guidelines describe "[e]xposure to pathogens via . . . water" as "common."[133] For example, they explain that "[a] major concern with [re-circulating water systems] is that they can become contaminated and expose all the mink to disease."[134] Samples of water dripping from the roof and in gutters tested by Boklund et al. (2020) on a mink farm in Denmark tested positive for the virus.[135]

One way SARS-CoV-2 can enter water is by shedding from feces.[136] For example, Dhama et al. (2021) explained that the SARS-CoV-2 virus present in wastewater and sewage can accumulate in "groundwater, surface water, and other natural water compartments."[137] And, once in water, it may remain infectious for many days, depending on factors such as the temperature of the water and the concentration of suspended solids.[138] Mink farms may have liquid waste management systems involving manure storage facilities that could overflow.[139] There is also a risk of "[d]irect runoff from feedlots/mink pen areas or stored manure" into nearby waters.[140] Some farm operators may discharge waste directly into streams. For instance, in 2013, the owner of two mink

---

[131] OIE, GUIDANCE ON WORKING WITH FARMED ANIMALS OF SPECIES SUSCEPTIBLE TO INFECTION WITH SARS-COV-2 5 (2021).

[132] For example, according to the latest publicly available data from the USFWS's Law Enforcement Management Information System, in 2015, the United States imported 12,500 live mink and millions of mink-derived products, including about 41,000 pieces of trim, more than 91,000 garments, and about three million mink skins and skin pieces.

[133] JOHN S. EASLEY D.M.V., FUR COMM'N USA, STANDARD GUIDELINES FOR THE OPERATION OF MINK FARMS IN THE UNITED STATES BOOK 3: BIOSECURITY PROTOCOLS FOR MINK FARMS IN THE UNITED STATES 4 (2019).

[134] *Id.*

[135] Anette Boklund et al., *SARS-CoV-2 in Danish Mink Farms: Course of the Epidemic and a Descriptive Analysis of the Outbreaks in 2020*, 11 ANIMALS 164 (2021).

[136] Jordi Aguilo-Gisbert et al., *First Description of SARS-CoV-2 Infection in Two Feral American Mink (Neovison vison) Caught in the Wild*, ANIMALS, May 2021, at 9; Hai Nguyen Tran et al., *SARS-CoV-2 Coronavirus in Water and Wastewater: A Critical Review About Presence and Concern*, ENV'T RSCH., Oct. 2020, at 1; Kuldeep Dhama et al., *SARS-CoV-2 Existence in Sewage and Wastewater: A Global Public Health Concern?*, J. ENV'T MGMT, Dec. 2020, at 1.

[137] Kuldeep Dhama et al., *SARS-CoV-2 Existence in Sewage and Wastewater: A Global Public Health Concern?*, J. ENV'T MGMT., Dec. 2020, at 3.

[138] Hai Nguyen Tran et al., *SARS-CoV-2 Coronavirus in Water and Wastewater: A Critical Review About Presence and Concern*, ENV'T RSCH., Oct. 2020, at 1.

[139] *Pollution Prevention, Water Quality & Mink Farming*, FUR COMM'N USA, https://furcommission.com/pollution-prevention-water-quality-mink-farming/.

[140] *Id.*

farms in northwestern Washington was fined $48,000 by the Washington Department of Ecology for discharging water contaminated with manure into nearby creeks.[141]

These possibilities are made more concerning by the research of Aguilo-Gisbert et al. (2021). They reported that two out of 13 wild mink captured in Spain tested positive for SARS-CoV-2.[142] They reasoned that it was unlikely that the mink became infected through contact with other infected mink—escaped or wild—for several reasons. First, the nearest mink farms were several miles away, had "approved anti-escape measures," had not reported any positive cases of SARS-CoV-2, had not reported any escapes during the COVID-19 pandemic, and had mostly white-furred animals (the captured mink were brown). Second, the two positive animals lived in different river valleys separated by a mountain range, suggesting the mink populations in both valleys were not in frequent contact, and none of the other mink captured in the two populations tested positive. Instead, the study authors theorized that the two positive mink became infected through contact with contaminated wastewaters:

> As American mink very much depend on aquatic environments, a conceivable possibility for explaining the infection with SARS-CoV-2 of our two animals would be that these animals were the subject of sporadic infection by virus present in wastewaters. SARS-CoV-2 is found in the feces of infected humans and is shed into wastewaters. . . . Inappropriate management or leaks from sewage facilities can lead to wastewater being released to surface water bodies, which would convert this type of event into a potential source of infection. . . . The possibility of intermittent spill outs and of contagion at untreated sewage discharge points rather than in the open river waters, where the virus would be much diluted, together with local and temporal changes in the viral levels in wastewaters, could explain why only 2 of the 13 mink were infected.[143]

Because the virus could enter streams and other water bodies near mink farms, wild mink and a multitude of other species that live in or use such areas are at risk of becoming infected. Consequently, it is important that APHIS's surveillance efforts include monitoring any liquid manure, wastewater, ground water, surface runoff, and natural water bodies on and near mink farms for presence of the virus. Indeed, Dhama et al. (2021) called surveillance of wastewater and sewage potentially contaminated by SARS-CoV-2 "the need of the hour."[144]

VI. Interventions Must Be as Humane as Possible

APHIS's Strategic Framework relies on a combination of interventions, investigations, and options for controlling the spread of SARS-CoV-2 in susceptible animals, as well as other emerging and zoonotic diseases that could pose a threat to both people and animals. As explained in more detail below, any interventions or control measures used to prevent the spread of the

---

[141] *WA mink farm fined for manure discharge*, MANURE MANAGER (Apr. 2, 2013), https://www.manuremanager.com/wa-mink-farm-fined-for-manure-discharge-13209/.
[142] Jordi Aguilo-Gisbert et al., *First Description of SARS-CoV-2 Infection in Two Feral American Mink (Neovison vison) Caught in the Wild*, ANIMALS, May 2021, at 1.
[143] *Id.* at 9-10.
[144] Kuldeep Dhama et al., *SARS-CoV-2 Existence in Sewage and Wastewater: A Global Public Health Concern?*, J. ENV'T MGMT, Dec. 2020, at 3.

virus—whether on farms or in the wild—must be as humane as possible, and certain measures and devices should be avoided entirely.

A. Interventions on farms

As discussed above, over the past year facilities that breed and raise mink for their fur have established themselves as hotspots for the spread of the disease. As a result, the possibility that a facility may wish to—or even be advised by APHIS or another governmental entity to—fully euthanize or depopulate the animals in their operation to prevent the spread of disease outside of the operation and/or to workers is not only likely, it is predictable. Because of this, in further developing this Strategic Framework, it is essential that APHIS establish consistent metrics, guidelines, and limitations regarding the manner and type of depopulations allowed to be implemented in the event of disease risk or spread.

"Depopulation" is a euphemism for mass animal killing. APHIS defines it as "a method by which large numbers of animals must be destroyed quickly and efficiently with as much consideration given to the welfare of the animals as practicable."[145] Likewise, the AVMA Depopulation Guidelines define it as "the rapid destruction of a population of animals in response to urgent circumstances with as much consideration given to the welfare of the animals as practicable."[146] Currently, the AVMA Depopulation Guidelines allow for the following methods for animal depopulation:

- Carbon dioxide (gassing);
- Cervical dislocation;
- Compressed air foam (suffocation);
- Decapitation;
- Electrocution;
- Exsanguination (bleeding out);
- Manual blunt force trauma (e.g., slamming small animals' heads on a hard surface);
- Mechanically assisted cervical dislocation; and
- Sodium nitrite (poison).[147]

The AVMA Depopulation Guidelines organize these methods into categories of "preferred," "permitted in constrained circumstances," and "not recommended."[148] "[Preferred] methods are given highest priority and should be utilized preferentially when emergency response plans are developed and when circumstances allow reasonable implementation during emergencies[.]"[149]

---

[145] APHIS, FOREIGN ANIMAL DISEASE PREPAREDNESS AND RESPONSE PLAN (FAD PREP)/NATIONAL ANIMAL HEALTH EMERGENCY MANAGEMENT SYSTEM (NAHEMS) GUIDELINES 1 (2015), https://www.aphis.usda.gov/animal_health/emergency_management/downloads/nahems_guidelines/mass_depop_euthan.pdf.
[146] AM. VETERINARY MED. ASS'N, AVMA GUIDELINES FOR THE DEPOPULATION OF ANIMALS: 2019 EDITION, AT 4 (2019) [AVMA Depopulation Guidelines], https://www.avma.org/sites/default/files/resources/AVMA-Guidelines-for-the-Depopulation-of-Animals.pdf.
[147] *Id.* at 87–88.
[148] *Id.*
[149] *Id.* at 86.

They "often correspond to techniques outlined in the [AVMA Euthanasia Guidelines], with adjustments as necessary for *constrained time periods* and large populations of animals."[150]

Methods that are "permitted in constrained circumstances" "are permitted only when the circumstances of the emergency are deemed to constrain the ability to reasonably implement a preferred method."[151] Examples of "potential constraints include . . . disease risk, human safety, depopulation efficiency, deployable resources, equipment, animal access, disruption of infrastructure, and disease transmission risk."[152]

Methods that are "not recommended" should only be considered as a last resort when neither preferred methods nor methods permitted in constrained circumstances are available, "and when the risk of doing nothing is deemed likely to result in more animal suffering than that associated with the proposed depopulation method."[153] Examples of such extreme circumstances include "structural collapse or compromise of buildings housing animals, largescale radiologic events, complete inability to safely access animals for a prolonged period of time, or any circumstance that poses a severe threat to human life or animal populations."[154] Economic considerations and protecting corporate profit are not among the situations in which the AVMA allows for methods of last resort.

Given the wide latitude of depopulation options currently allowed through the AVMA guidelines, we request that APHIS severely restrict any uses of the most inhumane depopulation methods, particularly ventilation shutdown and water-based foam,[155] and direct that only the most humane methods shall be used in any depopulation episode on a mink or other fur farm.

In addition, because transparency is key to ensuring that any depopulation activities are conducted with the utmost of animal care and in a way designed to appropriately limit the spread of diseases, APHIS should require any producer, be it mink or other farm animal, that engages in any depopulation efforts to report those efforts to APHIS and for that information to be made publicly available on APHIS's website. At a minimum, APHIS should require in these reports the number and type of animals affected, depopulation method, location of the depopulation, and any compensation provided by the federal or any state government for depopulated animals.

In addition, since, as discussed above, disposal of animal carcasses and infected wastes (including fecal matter) are key vectors for potential disease spread, APHIS should limit the methods of disposal allowable for these waste products, whether they result from depopulation or normal

[150] *Id.* (emphasis added).
[151] *Id.*
[152] *Id.*
[153] *Id.*
[154] *Id.*
[155] For more details on the harm of these depopulation methods, *see* Animal Legal Defense Fund, et al., Petition for Emergency Rulemaking (Aug. 26, 2020), https://www.biologicaldiversity.org/programs/environmental_health/pdfs/2020-08-25--Emergency-Rulemaking-Petition-to-USDA_Factory-Farm-Depopulation.pdf.

operations. In particular, APHIS should prohibit the use of on-site animal carcass burial, on-site carcass or waste incineration, or the application of waste onto any field or crop.[156]

Further, for any mink or other fur operation that initiates any depopulation activities, to prevent the further spread of disease in or from that operation, APHIS should establish standards that must be implemented and followed before the operation can re-open. The standards should include:

- Disease source and spread tracking;
- Cleaning and sanitizing the full facility;
- Increased surface and groundwater monitoring and reporting related to potential wastewater contamination; and
- Increased oversight and control of manure or manure management.

B. Interventions in the wild

APHIS's Strategic Framework indicates in several places that the agency intends to work with its One Health partners to develop "effective interventions" to prevent transmission at the human-animal interface.[157] The document does not explain what "interventions" means or provide examples. To the extent such interventions involve capturing or killing escaped mink or wildlife, it is critical that APHIS use the most humane measures possible. As discussed in more detail below, certain measures, including steel-jaw leghold traps, body-grip traps, and neck snares, should not be used because they are inhumane and indiscriminate.

First, these devices are inhumane. For example, some neck snares are designed to kill the captured animal by tightening continuously as the animal struggles until strangulation occurs. However, this can take hours, if not days, causing extreme and prolonged agony for the captured animal. In his book *Intolerable Cruelty*, Dr. Gilbert Proulx reported a coyote caught in a killing neck snare taking more than 14 hours to die, and a wolf caught in a killing neck snare taking more than 3 hours to die.[158] Both animals struggled intensely and chewed on the cable, cutting their tongues and gums.[159] "Simply put," wrote Proulx, "these 2 animals had been tortured."[160]

Other neck snares are designed to restrain. They hold the captured animal by his or her neck until the technician arrives to kill the animal, unless the animal has died due to the extent of his or her struggles. Many states allow multiple days to pass between trap or snare inspections—and some states have no general trap or snare check requirements at all.[161] The policy of Wildlife Services—the federal agency that would be most likely to conduct lethal control of mink or other

[156] For more details on the harm of these carcass disposal methods, *see* Center for Biological Diversity, et al., Petition for Emergency Rulemaking (Aug. 11, 2020), https://www.biologicaldiversity.org/programs/environmental_health/pdfs/2020-06-28-APHIS-Petition.pdf.
[157] *See, e.g.*, Strategic Framework at 2.
[158] GILBERT PROULX, INTOLERABLE CRUELTY: THE TRUTH BEHIND KILLING NECK SNARES AND STRYCHNINE 7-17 (Alpha Wildlife Productions 2017).
[159] *Id.*
[160] *Id.* at 16.
[161] Gilbert Proulx & Dwight Rodtka, *Killing Traps and Snares in North America: The Need for Stricter Checking Time Periods*, ANIMALS, Aug. 2019, at 9-13. The states with no general trap check laws are Alaska, Montana, and North Dakota.

wildlife infected with SARS-CoV-2—is to check trapping devices "no less frequently than required by state law."[162] Thus, in states with longer or no trap check requirements, it is likely that animals would suffer for days in traps or snares before being killed, regardless of who was conducting the lethal control.

Steel-jaw leghold traps are also inhumane. Many trapped animals will violently fight the trap after being caught, often biting at the device, which can result in broken teeth and gum damage in addition to the damage to the captured limb, including lacerations, strained and torn tendons and ligaments, extreme swelling, and broken bones.[163] In the summer heat, many animals cannot survive for long without water. In harsh winter conditions, animals can lose a limb or freeze to death after being caught. At other times of the year, prolonged constriction of a limb in a trap can cut off or severely restrict blood supply to the affected appendage, potentially causing the appendage to be lost due to gangrene. For these reasons, steel-jaw leghold traps have been condemned as inhumane by the World Veterinary Association,[164] the National Animal Care and Control Association,[165] the American Animal Hospital Association,[166] and the American Veterinarian Association.[167]

Iossa et al. (2007) provided an extensive review of the injury rates associated with multiple trap types, including padded, off-set, enclosed, and unpadded steel-jaw leghold traps.[168] Leghold traps resulted in minor injuries more than 50 percent of the time in the majority of studies reviewed. They also frequently caused major injuries, such as to river otters (56 percent of the time when various sizes and models of leghold traps were used), raccoons (74 percent of the time when unpadded leghold traps were used), and gray foxes (61 percent of the time when unpadded leghold traps were used).

Enclosed leghold traps (dog proof traps) are particularly inhumane for raccoons, who experience excruciating pain when one of their front feet is caught due to the hyper-sensitivity of those limbs. While such traps, given their design, are intended to reduce bycatch of non-target species, feral cats and any species with a small paw able to reach into the trap and pull up could be captured in such traps. Despite reducing the potential for non-target captures, enclosed leghold traps can result in injuries, amputations, and mortality.

Body-grip traps are similarly cruel. In theory, they are designed to kill small mammals instantly by crushing their necks or torsos. According to Iossa et al. (2007),[169] for a kill trap to satisfy

---

[162] APHIS Directive WS 2.450, Traps and Trapping Devices (U.S.D.A. 2021).
[163] *See. e.g*., G. Iossa et al., *Mammal Trapping: A Review of Animal Welfare Standards of Killing and Restraining Traps*, 16 ANIMAL WELFARE 335, tbl. 2 (2007).
[164] MARC BEKOFF, ENCYCLOPEDIA OF ANIMAL RIGHTS AND ANIMAL WELFARE, VOL. 1 561 (Marc Bekoff ed., 2d ed. 2010).
[165] NATIONAL ANIMAL CARE & CONTROL ASSOCIATION, NACA GUIDELINES 7 (2014), https://www.nacanet.org/wp-content/uploads/2019/03/NACA_Guidelines.pdf.
[166] American Animal Hospital Association, *Leghold Traps* (2014), https://www.aaha.org/about-aaha/aaha-position-statements/leghold-traps/.
[167] *Trapping and steel-jawed leghold traps*, AM. VETERINARY MED. ASS'N (2017), https://www.avma.org/resources-tools/avma-policies/trapping-and-steel-jawed-leghold-traps ("The AVMA opposes the use of contentional (non-padded, non-offset) steel jawed foothold traps (also called leghold traps).").
[168] G. Iossa et al., *Mammal Trapping: A Review of Animal Welfare Standards of Killing and Restraining Traps*, 16 ANIMAL WELFARE 335, tbls. 4, 5 (2007).
[169] *Id.* at 336.

humaneness criteria in North America, 70 percent of animals should be rendered unconscious within 180 seconds or less for most species.[170] Yet, a majority of the killing traps reviewed in the study, including a variety of different models of body-grip traps, failed to meet that standard.

In a more recent study, Proulx and Rodtka (2019) explained that, while the Conibear 120 is one of the most commonly used traps to kill marten and mink, it is incapable of consistently or humanely doing so:

> [T]he Conibear 120 rotating-jaw trap is most popular among [mink] trappers. In the USA, the Conibear 120 trap is recommended in [best management practices] for trapping mink, and neck strikes are identified as proper strike locations. However, as we explained above, the Conibear 120 trap cannot consistently and humanely kill American martens. Mink have a greater cervical musculature and stronger bones than American martens, and cannot be humanely killed, i.e., lose consciousness in ≤3 min . . . by the Conibear 120 trap. In fact, even the mechanically superior and stronger C120 Magnum failed to humanely kill mink captured by the neck. . . . Because the two-prong trigger fails to ensure strikes in vital regions, and the Conibear 120 trap does not have the striking and clamping forces to produce a humane kill, many mink captured in this trap stay alive for many hours, and sometimes until the following day. Thousands of mink are trapped every year in North America, and many of those captured in the Conibear 120 trap must experience pain and suffering for periods of time exceeding [the Agreement on International Humane Trapping Standards'] time limit of 5 min.

Finally, traps and snares capture and kill non-target animals. Regarding snares, for instance, between 1990 and 2014, Proulx et al. (2015) documented more than 100 individuals of sixteen different species unintentionally caught and injured or killed in killing neck snares set in Canada.[171]

Leghold traps can also capture and kill nontarget animals. For example, Andreasen et al. (2018) examined cause-specific mortality in mountain lions unintentionally caught in leghold traps set for bobcats from 2009 through 2015 in their study site in Nevada.[172] They found that if female mountain lions were captured in leghold traps, it directly reduced their survival by causing injuries that made the animals more susceptible to other forms of mortality. Of the 48 lions originally included in the study, 33 died during its seven-year duration. Of those 33 lions, seven died as a consequence of non-target trapping (five were caught in leghold traps and two in snares).

---

[170] *Id.* (citing Powell and Proulx 2003's proposed criteria).

[171] Those species were: black bear; bobcat; Canada lynx; fisher; mountain lion; snowshoe hare; white-tailed deer; wolverine; bald eagle; golden eagle; barred owl; great horned owl; goshawk; red-tailed hawk; rough-legged hawk; and raven. *See* Gilbert Proulx et al., *Humaneness and Selectivity of Killing Neck Snares Used to Capture Canids in Canada: A Review*, 4 CANADIAN WILDLIFE BIOLOGY & MGMT. 55, tbl. 1 (2015).

[172] Alyson M. Andreasen et al., *Survival of Cougars Caught in Non-Target Foothold Traps and Snares,* 82 J. WILDLIFE MGMT. 906, 906 (2018).

The lack of selectivity with body-gripping traps is also consistently noted in the published literature. Linscombe (1976)[173] documented 57 non-target mammals and 127 non-target birds captured in No. 2 Victor and No. 220 Conibear traps. In his study of multiple trap types in Arkansas, Sasse (2018)[174] found that non-target spotted skunks, a species of "greatest conservation need" in Arkansas and that may warrant protection under the ESA,[175] were captured in body-gripping traps set for bobcats, raccoons, coyotes, and foxes. Davis et al. (2012) argued that "it is inefficient, ineffective and even unethical to continue the use of body-gripping lethal traps within open front cubby set [to trap feral mink] in the [Cape Horn Biosphere Region], given the high mortality of various non-target species."[176]

APHIS's Strategic Framework states that the agency intends to "[e]xpand partnerships with academia, industry and non-governmental organizations to broaden reach of communication efforts."[177] We encourage the agency to also partner with experts and organizations in these fields to identify humane alternatives in the event it is necessary to use lethal interventions to prevent the transmission of SARS-CoV-2 or other diseases.

VII. As Part of Its Disease Surveillance Program, APHIS Should Propose to Prohibit the Import and Interstate Movement of Mink and Products Containing Mink Fur

Finally, APHIS's Surveillance Program should include a proposal to prohibit the import and interstate movement of mink and materials containing mink fur. As discussed above, APHIS should prioritize prevention in its approach to addressing SARS-CoV-2. Preventing the spread of SARS-CoV-2 is necessary to protect the health of both humans and animals. As discussed above, farmed mink have proven particularly susceptible to the virus and capable of transmitting it to humans. Thus, it is critical to take action to prevent further infection and spread stemming from mink and mink farms. The virus has already infected multiple mink farms in the United States and hundreds more in Europe; it could easily spread to additional farms, mutate into variants, and put humans, captive mink and wild mink, and other species at risk.

One way to prevent the virus from spreading would be for APHIS to exercise its authority under the Animal Health Protection Act, 7 U.S.C. §§ 8301-8322, to prohibit the importation and interstate transportation of mink and mink parts containing fur. Doing so would ensure that mink infected with SARS-CoV-2 do not enter the United States or travel between states, either of which could increase the risk of transmission between mink, other animals, and humans.

---

[173] GREG LINSCOMBE, LA. WILDLIFE & FISHERIES COMM'N, AN EVALUATION OF THE NO. 2 VICTOR AND 220 CONIBEAR TRAPS IN COASTAL LOUISIANA 563 (1976).
[174] D. Blake Sasse, *Incidental Captures of Plains Spotted Skunks (Spilogale putorius interrupta) By Arkansas Trappers*, 72 J. ARK. ACAD. SCIENCE 187, 188 (2018).
[175] *Prairie Gray Fox, Plains Spotted Skunk May Warrant Protection Under the Endangered Species Act; U.S. Fish and Wildlife Service to Review Species' Status*, U.S. FISH & WILDLIFE SERV. (Dec. 5, 2012), https://www.fws.gov/midwest/news/606.html.
[176] Ernesto F. Davis et al., *American Mink (Neovison vison) Trapping in the Cape Horn Biosphere Reserve: Enhancing Current Trap Systems to Control an Invasive Predator*, 49 ANNALS ZOOLOGICI FENNICI 18, 21 (2012).
[177] Strategic Framework at 2.

A. The Animal Health Protection Act

The Animal Health Protection Act authorizes the Secretary of Agriculture to impose certain prohibitions or restrictions for "the prevention, detection, control, and eradication of diseases and pests of animals." 7 U.S.C. § 8301(1).[178] The Act was designed, in part, to protect the health of animals, humans, and the environment. *See* 7 U.S.C. § 8301(1).[179] In furtherance of this goal, the Act authorizes APHIS to prohibit or restrict the importation and movement in interstate commerce of, among other things, any "animal" or "article" if doing so is necessary to prevent the introduction or spread of any "pest or disease of livestock." 7 U.S.C. §§ 8303, 8505.

The Act defines "animal" as any non-human member of the animal kingdom. 7 U.S.C. § 8302(1). It defines "article" as "any pest or disease or any material or tangible object that could harbor a pest or disease." 7 U.S.C. § 8302(2). The term "pest" includes viruses "that can directly or indirectly injure, cause damage to, or cause disease in livestock." 7 U.S.C. § 8302(13).

To date, the term "disease" remains undefined.[180] 7 U.S.C. § 8302(3). Congress left the regulatory definition of "disease" to the discretion of APHIS so that it would "have maximum flexibility to focus its resources and respond to new or emerging disease threats."[181] Accordingly, APHIS has promulgated regulations to prevent numerous "diseases of livestock," including tuberculosis, chronic wasting disease, and avian influenza. *See* 9 C.F.R. Subch. B, Parts 51, 55, 56. The term "livestock" as used in the Act means "all farm-raised animals." 7 U.S.C. § 8302(10); *see also* 9 C.F.R. § 71.1. The Act's definition of livestock does "not place any conditions or restrictions on the method by which the animal has been produced."[182]

B. Authority, precedent, and need for action

APHIS has and should exercise its authority under the Act to prohibit or restrict the importation and interstate movement of mink and materials containing mink fur. First, APHIS has authority to take such action. Mink are non-human animals. *See* 7 U.S.C. §8302(1). Captive mink are livestock because they are raised on farms. *See* 7 U.S.C. § 8302(10). Materials containing mink fur are "tangible objects that could harbor a pest or disease." 7 U.S.C. § 8302(2). Indeed, as discussed above, the SARS-CoV-2 virus appears to survive and remain infectious on mink fur much longer than most other surfaces. SARS-CoV-2 is a "pest" because it is a virus that injures, causes damage to, and causes disease in captive mink. *See* 7 U.S.C. § 8302(13). The importation and interstate movement of mink and materials with mink fur increases interactions between humans, mink, and mink fur, thereby elevating the risk of SARS-CoV-2 transmission. Thus, prohibiting or restricting such movements is necessary to help prevent the introduction or spread of a "pest or disease of livestock." 7 U.S.C. §§ 8303, 8505.

---

[178] *See also In re: Ronald Walker, Alidra Walker, and Top Rail Ranch, Inc.*, 69 Agric. Dec. 40, 41 (U.S.D.A. 2010).
[179] *Id.* (This Act "is designed to protect, among other things, animal health, the health and welfare of the people of the United States."); H.R. REP. NO. 107-424, at 664 (2002) ("[T]he principal purpose of the Animal Health Protection Act is to protect against animal disease."); World Heritage Animal Genomic Res. v. Stull, No. 5: 20-334-DCR, slip op. at 1 (E.D. Ky. Aug. 14, 2020) (The Act "is concerned with the interstate movement of animals that pose a danger to public health.").
[180] Regulation of the Movement of Animals Modified or Developed by Genetic Engineering, 85 Fed. Reg. 84,269, 84,269 (Dec. 28, 2020).
[181] H.R. REP. NO. 107-424, at 664 (2002).
[182] Regulation of the Movement of Animals Modified or Developed by Genetic Engineering, 85 Fed. Reg. 84,269, 84,269 (Dec. 28, 2020).

Second, there is ample precedent for APHIS to take the requested action. APHIS has prohibited or restricted the importation or interstate movement of numerous animal species to prevent the spread of a wide range of pathogens, including: elephants, hippopotami, rhinoceroses, and tapirs to prevent the spread of ectoparasites, *see* 9 C.F.R. §§ 93.800-93.807; zebras to prevent the spread of equine infectious anemia, *see* 9 C.F.R. § 75.4; hedgehogs to prevent the spread of foot-and-mouth disease, *see* 9 C.F.R. § 75; and land tortoises to prevent the spread of ticks, *see* 9 C.F.R. §§ 74.1, 93.701(c). Placing similar restrictions on farmed mink to prohibit the spread of the SARS-CoV-2 virus would closely parallel these previous actions.

Finally, there is pressing need for action. As discussed above, farmed mink and mink fur are capable of transmitting the SARS-CoV-2 virus to humans, wild mink, and other animals. COVID-19, the disease caused by the virus, poses a potentially deadly threat to humans and mink, and may be dangerous to other species. Infected species or populations (captive or wild) could also become new host reservoirs, potentially creating an opportunity for the virus to mutate or recombine and emerge as a more dangerous variant in the future. Taking the requested action would help to prevent these scenarios from occurring, protect animals and public health, and further the Act's purpose of preventing, detecting, controlling, and eradicating harmful diseases.

VIII. Conclusion

For the reasons described above, as part of its Surveillance Program, APHIS should dedicate significant attention and resources to reducing the risk of transmission of the SARS-CoV-2 virus to and from farmed mink and other species raised for their fur. In doing so, it should emphasize prevention, develop an industry-specific early warning system, collect and disseminate significantly more information about mink and other fur operations, monitor all potential transmission pathways, and, if interventions are necessary, use only humane measures. In addition, because of the threat posed by SARS-CoV-2 to both humans and wildlife, we urge APHIS to exercise its authority under the Animal Health Protection Act to prohibit the import and interstate transport of mink and materials containing mink fur.

Sincerely,

Zack Strong
Senior Staff Attorney
Animal Welfare Institute
(202) 446-2145
zack@awionline.org

Jessica Roberts
Legal Intern, Terrestrial Wildlife Program

Animal Welfare Institute
jessica@awionline.org

/s/Hannah Connor

Hannah Connor
Senior Attorney, Environmental Health
Center for Biological Diversity
(202) 681-1676
hconnor@biologicaldiversity.org

Gillian Lyons
Senior Regulatory Specialist
Humane Society Legislative Fund
(202) 306-5912
glyons@hslf.org

PJ Smith
Director, Fashion Policy
The Humane Society of the United States
(301) 366-6074
Pjsmith@humanesociety.org

/s/Christina Scaringe

Christina Scaringe
General Counsel
Animal Defenders International
(323) 935-2234
ADUSA@ad-international.org

Alicia Prygoski
Senior Legislative Affairs Manager

Animal Legal Defense Fund
(202) 710-6031
aprygoski@aldf.org

Dr. Liz Tyson
Programs Director
Born Free USA
(830) 965-2813
liz@bornfreeusa.org