4.13 ANIMAL DISEASE

SECTION 4.13 ANIMAL DISEASE

4.13-1 HAZARD OVERVIEW

FEMA defines an animal disease outbreak as the introduction of a highly contagious, infectious, or economically devastating animal disease or agent. This definition would encompass the introduction of a new strain of a virus not seen in the animal population, a foreign animal disease introduced accidentally or intentionally on United States soil, or a disease that has been eradicated from the United States being re- introduced (FEMA, 2017).

Any impact from an animal disease outbreak will have adverse animal health issues. The impact from response actions such as quarantine, dispatch, disposal, and loss of public confidence in products would all bring about a financial loss to the industry as a whole while impacting the industries that rely on the State's animal production for products, food, or any combination of the two (FEMA, 2017).

Additionally, the threat to public health from an animal-to-person disease transfer increases with the introduction of a new or foreign disease. Diseases caused by germs that spread between animals to humans are called zoonotic diseases or zoonoses. According to the CDC, "more than 6 out of every 10 known infectious diseases in people can be spread from animals, and 3 out of every 4 new or emerging infectious diseases in people come from animals" (CDC, 2021). Although common, zoonotic diseases can cause a wide range of illnesses in people, from mild to serious; some may even cause death (CDC, 2021b). SARS-CoV-2, the cause of the novel coronavirus or COVID-19, is a zoonotic disease and cause of the COVID-19 global pandemic (CRS, 2021a). For more information on COVID-19, see Section 5.21 Pandemic.

According to the USDA Economic Research Service, "[b]oth U.S. agricultural exports and imports increased significantly over the last quarter century." The type of goods exported has changed such that a major share of American exports include a greater share of high-value processed products including meat and dairy products (USDA ERS, 2022). The increase in both imports and exports of the agricultural goods, including more processed animal products, can lead to the spread of diseases to different parts of the world and the introduction of novel disease outbreaks in the United States. This global web of trade positions the State of New Jersey for a possible outbreak of an animal disease that has the potential to spread throughout the State's livestock population, domesticated animal population, and even impact the diverse wildlife found within the State.

The New Jersey agriculture industry is a robust and profitable economic industry with 9,883 farms generating over $1 billion in total community sales. Animals and animal products generate approximately $113 million sales statewide (USDA, 2017). The agricultural industry is spread throughout the State, with higher concentrations found in the more rural communities in the northern and southern regions (New Jersey State Agriculture Development Committee, 2022; NJDEP Bureau of GIS, 2019).

In the State of New Jersey, the Department of Agriculture (NJDA), Division of Animal Health, maintains disease control programs to protect the health and well-being of livestock in the State. The Division tracks information about emerging diseases around the world that may impact New Jersey, conducts epidemiological investigations of livestock diseases and drug residues, operates an animal health diagnostic laboratory, manages two contagious equine metritis quarantine facilities for imported horses and supports an aggressive livestock welfare program. In addition, the Division is also involved with animal emergency preparedness and response, especially during disasters that affect the health, safety and welfare of animals and their owners (NJDA, n.d.a.).

The following list provides the type of diseases that may affect various animal species found in New Jersey:

Poultry
Avian Influenza
Highly Pathogenic Avian Influenza
Campylobacteriosis
Eastern/Western/Venezuelan Equine Encephalomyelitis
Escherichia Coli (E coli)
Melioidosis
Newcastle Disease
Non-Typhoidal Salmonellosis
Psittacosis
Staphylococcus aureus (MRSA)
Tularemia
West Nile Fever

Equine
Anthrax
Campylobacteriosis
Equine Encephalomyelitis
Eastern/Western/Venezuelan Equine Encephalomyelitis
Glanders
Hendra
Melioidosis
Non-Typhoidal Salmonellosis
Q Fever
Rabies
Staphylococcus aureus (MRSA)
Tularemia
West Nile Fever

Swine
Anthrax
Brucellosis
Porcine and Rangiferine Brucellosis
Campylobacteriosis
Escherichia Coli (E coli)
Melioidosis
Non-Typhoidal Salmonellosis
Q Fever
Staphylococcus aureus (MRSA)
Tularemia

Rodents
Hantavirus (also a disease in Humans)
Staphylococcus aureus (MRSA)

Bovine
Anthrax
Botulism
Brucellosis
BSE
Campylobacteriosis
Cholera
Escherichia Coli (E coli)
Melioidosis
Non-Typhoidal Salmonellosis
Q Fever
Rabies
Schmallenberg Virus
Staphylococcus aureus (MRSA)
Transmissible Spongiform
Tuberculosis
Encephalopathies
Rift Valley Fever

Small Ruminants
Anthrax
Brucellosis
Ovine and Caprine Brucellosis
Ovine Epididymitis
Campylobacteriosis
Escherichia Coli (E coli)
Melioidosis
Non-Typhoidal Salmonellosis
Q Fever
Rift Valley Fever
Schmallenberg Virus
Scrapie
Staphylococcus aureus (MRSA)

Camelids
Glanders
Q Fever
Rabies
Rift Valley Fever
Staphylococcus aureus (MRSA)
West Nile Fever

Dogs
Brucellosis
Canine Brucellosis
Canine Influenza Virus
Cholera
Staphylococcus aureus (MRSA)

Source: NJDA, n.d.a, the Center for Food Security & Public Health, n.d.

Animal Diseases In New Jersey

Avian Influenza

Avian influenza refers to an influenza type A virus known to infect poultry and wild birds. Avian influenza is classified by its pathogenicity, which is the ability of a particular virus strain to produce disease in domestic chickens. Low pathogenicity avian influenza (LPIA) can either cause mild disease with or without signs of illness. LPIA occurs naturally among wild birds (especially migratory waterfowl). High pathogenicity avian influenza (HPAI) is extremely infectious. HPAI is often fatal to chickens and

spreads rapidly across flocks. Wild birds are passive carriers of avian flu and do not become seriously ill from avian flu (NJDA, n.d.b; USDA APHIS, 2023).

Avian flu viruses do not normally infect humans, but sporadic human infections have occurred (CDC, 2023). Symptoms from avian flu have ranged from no symptoms or mild illness to severe, fatal disease. H7N9 and HPAI H5N1 viruses have been responsible for most human illness from avian flu viruses globally as of 2022. The spread of avian influenza from one ill person to another has been reported very rarely and has only spread to a few people. However, because avian influenza A viruses have the potential to change and gain the ability to spread easily between people, monitoring for human infection and person-to-person transmission is extremely important for public health (CDC, 2022).

The NJDA and USDA APHIS Veterinary Services monitor commercial operations, backyard and hobby flocks, poultry auctions and the live bird marketing system for avian flu. NJDA has an emergency response plan in place in case of an outbreak. The plan provides actions that will help limit the spread of the disease, increasing surveillance in quarantine areas, turning around samples rapidly, and disposal of infected birds (NJDA, n.d.b).

Canine Influenza Virus

Canine influenza virus is a highly contagious Type A influenza virus that causes respiratory disease in dogs. The virus was first identified in racing greyhounds and appears to have been the cause of significant respiratory disease on canine tracks throughout the U.S. in 2004-2006. All dogs are susceptible to infection and do not have naturally acquired immunity to the virus. There are two influenza viruses currently maintained in dogs: an H3N2 virus and an H3N8 virus. Neither canine influenza virus has caused reported human infections, although it is theoretically possible (Spickler, 2022).

Equine Herpes Virus

Equine Herpesvirus (EHV) is found world-wide in the horse population. Of the nine known EHVs, types EHV-1, EHV-3 and EHV-4 pose the greatest risk in the U.S. EHV-1 and EHV-4 can cause upper respiratory disease, neurological disease, abortions, and/or neonatal death. EHV-3 causes a venereal disease. The virus can incubate in a horse for as long as 14 days. Recently, there has been an increasing number of neurological diseases in horses infected with EHV-1. Vaccines are available to prevent the respiratory and abortion forms of EHV, but none are labeled as effective against the neurologic form of the disease. EHV has not been shown to be zoonotic (USDA APHIS, 2020b).

Johne's Disease

Johne's disease is caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis*. It infects the small intestine of ruminant animals. Cattle are usually infected soon after birth, but the first symptoms of disease do not appear until two or more years after the initial infection. It is a chronic condition and usually fatal. Sixty-eight percent of U.S. dairy herds have at least one cow that tests positive for Johne's disease, according to a 2007 Dairy NAHMS study. Johne's Disease is found worldwide and can have severe economic impacts on infected herds. As a result, it is important to identify and protect noninfected herds and flocks for future breeding stock and replacement animals for others and help to reduce the national prevalence of the disease (USDA APHIS, 2020c).

Rabies

Rabies is caused by a virus that is present in the saliva of infected animals and is transmitted primarily through the bite of an infected animal to people or other animals. Transmission can also occur when saliva from a rabid animal comes in contact with an open cut, the mouth or the eyes (New Jersey Certified Animal Control Officers Association [NJCACOA], 2018). The virus binds to nerve tissue and migrates to the brain where it replicates and is then shed in the saliva when the animal becomes ill. The incubation period (the time from exposure to illness) of rabies can vary between two weeks and six months or longer, but usually is between one and three months.

NJCACOA recommends that biting animals be observed by the local health department for 10 days to ensure that they are free of rabies. If the animal develops clinical signs of rabies, the animal should be euthanized immediately and tested. If the animal

dies within the 10-day period, brain tissue samples must be sent to the New Jersey State Rabies Laboratory in Trenton, New Jersey for testing. (NJCACOA, 2018).

Ninety-five percent of rabies cases in New Jersey are found in raccoons, bats, skunks, foxes, and groundhogs. Cats account for the vast majority of rabies cases in domestic animals in New Jersey. Small rodents such as squirrel, mice, chipmunks and rats are rarely infected. However, all mammals can be infected with rabies. NJCACOA encourages pet owners to vaccinate their pets against rabies and keep vaccinations up-to-date (NJCACOA, 2018).

4.13-2 LOCATION, EXTENT, AND MAGNITUDE

Location

The geographical makeup of the New Jersey has lent itself to a widespread mixture of farm properties from north to south, with the highest concentration of farms located in the northwest and southern regions. These regions provide a landscape that supports farming, together with proximity to the urban centers that support the transportation and processing of farm animals.

The increasing popularity of "backyard" farm livestock and poultry in New Jersey is widening the distribution of farm animals throughout the state, including into urban and suburban areas. Increased prevalence of backyard farm stock raises concerns for zoonotic transmissions of diseases such as salmonella. The CDC identified 15 people in New Jersey who contracted salmonella from backyard poultry in 2023. The CDC provides details for livestock owners on how to reduce risk of zoonotic transmission.

In addition to the livestock populations, the State estimates that approximately two-thirds of residential households own a pet and 47% of the households own more than one type of pet (New Jersey Department of Health, 2013). This population is evenly spread throughout the State.

Extent

Epidemics result in mass mortality of animals, resulting in the devastation of economic impacts on industries and communities. Some animal diseases, such as Salmonella, influenza, and Equine Encephalitis, can also infect humans. Animal disease costs are due to loss of production, loss of animals, human morbidity and mortality, days of lost work, and legal actions (FEMA, 2017).

Disease outbreaks have many adverse impacts and consequences. Table 4.13-1 summarizes some of the adverse impacts and consequences that can come from animal disease outbreaks (FEMA, 2017).

Table 4.13-1 Impacts and Consequences for Animal Disease Outbreak

Impact	Consequence
Rumors about the cause of disease and who is at risk are common in disease outbreaks	Communications are challenged
Movement of vehicles and people may be restricted because of some highly contagious diseases	Infrastructure failure
If large numbers of animals need to be slaughtered on their farm of origin, the slaughter methods may be dangerous	Threat to public and animal safety
To reduce losses, some farmers may opt to slaughter their herd	Need to evacuate people and animals
Quarantine stations may be needed	Displacement of animals
Some animal diseases infect people	Threat to public and animal health
Some diseases are contagious to wildlife	Adverse effects on the natural environment and wildlife
Many animals may die in a disease outbreak	Need for carcass disposal
In some animal disease outbreaks, e.g., Foreign Animal Diseases, policies dictate that healthy animals in farms adjacent to infected ones should be slaughtered	Need for euthanasia
Many diseases cause considerable suffering in animals	Threat to the well-being of animals

Impact	Consequence
Sick and dying animals evoke sympathetic emotions	Public concern

Source: FEMA, 2017

4.13-3 PREVIOUS OCCURRENCES AND LOSSES

Between 1989 and 2021, New Jersey had 8,409 reported animal rabies cases, including raccoons, skunks, foxes, cats, groundhogs, bovines, equines, dogs, ferrets, deer, and other domestic and wild animals (New Jersey Department of Health, 2021). Table 4.13-2 outlines animal disease events in the State but does not include all incidents.

Table 4.13-2 Animal Disease Incidents in New Jersey

Date(s) of Event	Disease Type	Counties Impacted	Description
2001	West Nile Virus (WNV)	Bergen, Hunterdon, Middlesex, Monmouth, Burlington, Camden, Gloucester, Salem, Cumberland, Atlantic	In 2001, there were a total of 30 WNV veterinary cases reported in New Jersey.
2002	WNV	Atlantic, Burlington, Cumberland, Gloucester, Middlesex, Monmouth, Ocean, Salem	In 2002, there were a total of 29 WNV veterinary cases reported in New Jersey.
2003	Eastern Equine Encephalitis (EEE)	Atlantic, Burlington, Camden, Cumberland, Gloucester	In 2003, there were a total of eight EEE veterinary cases reported in New Jersey.
August-November 2003	WNV	Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Hunterdon, Mercer, Monmouth, Morris, Ocean, Passaic, Salem, Somerset, Sussex, Warren	In 2003, there were a total of 150 WNV veterinary cases reported in New Jersey.
2004	EEE	Burlington, Camden, Cumberland, Gloucester	In 2004, there were a total of six EEE veterinary cases reported in New Jersey.
February 2004	Low Pathogenic Avian Influenza (LPAI) A (H7N2)	N/A	An outbreak of LPAI was reported on two chicken farms in Delaware and in four live bird markets in New Jersey supplied by the farms. In March 2004, surveillance samples from a flock of chickens in Maryland tested positive for LPAI H7N2, which was most likely the same strain as the February outbreak.
August-October 2004	WNV	Burlington, Gloucester, Mercer, Salem	In 2004, there were a total of six WNV veterinary cases reported in New Jersey.
2005	EEE	Burlington, Gloucester, Monmouth, Ocean	In 2005, there were a total of four EEE veterinary cases reported in New Jersey.
August 2006	EEE	Burlington	In 2006, there was a total of one EEE veterinary case reported in New Jersey.
August 2006	WNV	Middlesex	In 2006, there was a total of one WNV veterinary case reported in New Jersey.
2007	Epizootic Hemorrhagic Disease (EHD)	N/A	An outbreak of EHD in wild white-tailed deer caused by an RNA virus was transmitted by biting midges. The outbreak began in the last week of August and first week of September 2007 in New Jersey. NJDEP Division of Fish and Wildlife's Office of Fish and Wildlife Health and Forensics and deer project personnel investigated the outbreak on September 7, 2007, when hunters reported finding 15 deer. The deer were scouting the hunting property, which covered slightly less than 500 acres in Hillsborough Township, north of Amwell road, west of Millstone in Somerset County.
October 2007	EEE	Atlantic	In 2007, there was a total of one EEE veterinary case reported in New Jersey.
October – November 2007	WNV	Morris, Ocean	In 2007, there were a total of two WNV veterinary cases reported in New Jersey.
August – September	EEE	Burlington, Camden, Gloucester	In 2009, there were a total of six EEE veterinary cases reported in New Jersey.

Date(s) of Event	Disease Type	Counties Impacted	Description
2009			
August 2009	WNV	Salem	In 2009, there was a total of one WNV veterinary case reported in New Jersey.
August – September 2010	WNV	Atlantic, Gloucester	In 2010, there was a total of two WNV veterinary cases reported in New Jersey.
October 2010	EEE	Monmouth	In 2010, there was a total of one EEE veterinary case reported in New Jersey.
2011	Canine Parvovirus	N/A	A localized outbreak of Canine Parvovirus was found within shelters in the northeastern region of the State.
October 2011	EEE	Gloucester	In 2011, there was a total of one EEE veterinary case reported in New Jersey.
October 2011	WNV	Monmouth	In 2011, there was a total of one WNV veterinary case reported in New Jersey.
2012	EEE	Atlantic, Burlington, Camden	In 2012, there were a total of seven EEE veterinary cases reported in New Jersey.
2012	WNV	Atlantic, Gloucester, Monmouth, Salem, Sussex	In 2012, there were a total of six WNV veterinary cases reported in New Jersey
2013	WNV	State Total	In 2013, 13 cases of WNV were reported
2014	WNV	State Total	In 2014, 8 cases of WNV were reported
2015	WNV	State Total	In 2015, 26 cases of WNV were reported
2016	EEE	Passaic	In 2016 a case of EEE was reported in Passaic County
2016	WNV	State Total	In 2016, 11 cases of WNV were reported
2017	EEE	State Total	In 2017, 6 cases of EEE were reported.
2017	WNV	State Total	In 2017, 2 equine cases of WNV were reported.
2018	EEE	State Total	In 2018, 5 cases of EEE were reported.
2018	WNV	State Total	In 2018, 13 avian cases and 1 equine case of WNV was reported.
2019	EEE	State Total	In 2019, 11 cases of EEE were reported.
2020	EEE	Atlantic	In 2020, 1 case of EEE was reported in Atlantic County.
2020	WNV	State Total	In 2020, 1 avian case of WNV was reported.
2021	EEE	Atlantic, Camden, Cumberland	In 2021, 1 case of EEE was reported in each of the following counties: Atlantic, Camden, and Cumberland.
2021	WNV	State Total	In 2021, 13 avian cases of WNV were reported.
2022	Highly Pathogenic Avian Influenza (HPAI)	Bergen, Monmouth, Ocean, Warren	The USDA Animal and Plant Health Inspection Service (APHIS) confirmed cases of HPAI in Monmouth County on May 22, 2022 in a backyard producer flock, impacting 60 birds. APHIS confirmed additional HPAI cases in 60 birds in Warren County on October 13 and in 6 birds in Bergen County on November 2, both in backyard flocks (non-poultry). APHIS confirmed a case in Ocean County at an animal rescue/rehabilitation in 90 birds on October 22.

Source: USDA APHIS, 2022a; USDA APHIS, 2022b

FEMA Disaster Declarations

The Federal Emergency Management Agency (FEMA) has not issued any disaster declarations resulting from animal disease incidents (FEMA, 2022).

4.13-4 PROBABILITY OF FUTURE OCCURRENCES

The likelihood of future occurrences of animal disease outbreak is difficult to predict; however, based on the local outbreaks of disease such as rabies and West Nile combined with an increase in global trade, the likelihood of an animal disease outbreak affecting the State of New Jersey is possible. The State has a high concentration of farms located throughout the northwestern and southern regions of the state, making them susceptible to livestock outbreaks. Additionally, population density across the

State combined with the saturation of pets makes the State susceptible to outbreaks in diseases in the domesticated animal populations.

Potential Effects of Climate Change

According to Climate Change Impacts on Human Health and Communities: Addendum to the 2020 New Jersey Scientific Report on Climate Change (NJDEP, 2022), scientists predict that climate change will have a direct impact on mosquito-borne disease dynamics. Mosquito-borne animal diseases include WNV and EEE. Mosquitos are vulnerable changes in water availability and are directly vulnerable to extreme weather. As mosquito habitats and activities change due to climate change, this may affect the viral transmission of the pathogens carried by mosquitoes. Warmer winters and wetter summers may improve conditions for mosquitoes. The distribution and abundance of mosquitoes are expected to be impacted by projected changes to the regional temperature, precipitation rates, and humidity. This may increase the overall prevalence of mosquito-borne diseases (NJDEP, 2022).

Globally, increases in recorded temperatures may lead to greater outbreaks of diseases. Outbreaks such as bluetongue virus within the animal population in Europe have been linked to increases in temperature (Liverpool, 2011).

4.13-5 VULNERABILITY ASSESSMENT

This section discusses New Jersey's vulnerability, in a qualitative nature, to the animal disease hazard. A consequence analysis for this hazard was also conducted and the results are presented in Section 10.0: EMAP. Impacts on the public, responders, continuity of operations, and delivery of services; property, facilities, and infrastructure; the environment, economic condition of the state, and the public confidence in the State's governance are discussed in Section 10.0: EMAP in accordance with Emergency Management Accreditation Program (EMAP) standards. This section addresses assessing vulnerability and estimating potential losses by jurisdiction and to state facilities.

Built Environment

The potential losses to state facilities caused by animal disease are difficult to quantify.

Population and Economy

For the purpose of measuring exposure to animal disease outbreaks, the entire population of the State is considered to be vulnerable, based on the statistic that two-thirds of all residential structures house a domesticated animal. While the threat from domesticated animal exists, the greatest threat lies within the livestock populations. The areas at greatest risk for livestock disease outbreaks are found within the regions containing the greatest concentration of farming locations. As represented in Table 3.0-5 Census of Agriculture for New Jersey, by County (2017) in Section 3.0: State Profile, the counties with the greatest number of farms are Hunterdon (1,604), Sussex (1,008), Warren (918), Burlington (915), and Monmouth (838) (USDA, 2017).

The impact of an animal disease outbreak on the economy within the State of New Jersey is difficult to estimate, as each disease outbreak would require a different approach to management. The loss of any portion of this industry would provide for a trickle-down impact on the State's economy. The agricultural industry employs 1,025 people, with an annual payroll of $46,693,000 (U.S. Census Bureau, 2020). The losses associated with an animal disease outbreak would not only directly impact the livestock value, but also the farming, transportation, processing, and animal medical industry that directly supports New Jersey State farmers.

Ecosystems and Natural Assets

Animal disease could have long term impacts on the fish and wildlife in New Jersey. A serious event can completely deplete a species of its population (NJHMP, 2011). A number of environmental factors, such as water supply, sanitation facilities, food, and climate, can also influence the spread of communicable diseases that are prone to cause epidemics (WHO, 2013). See Section 4.22: Pandemic for additional environmental impacts.

Impact Analysis

Severity and Warning Time

Animal disease outbreaks can range in severity from a single animal infected with a disease to a regional or statewide epidemic. Annually, diseases such as West Nile virus and rabies continue to affect both the domesticated and livestock populations throughout the State, supporting the assertion that some animal disease outbreaks are continuous throughout the State.

Unlike smaller annual outbreaks, the introduction of a novel disease within any population of animal within the State could prove to be catastrophic to the State's animal population. In most instances, immunity to new diseases are not present, leading to a high initial morbidity and mortality rate. This introduction can rapidly escalate the status that requires large-scale euthanasia, quarantine, and isolation, or regulations on transportation. Additionally, based on the number of domesticated animals and the wildlife interface with farming communities, the spread from livestock to wildlife and household pets may pose additional threats to public health across the State. According to the Center for Disease Control and Prevention, over 75% of recent emerging diseases impacting the human population originated within the animal population (CDC, 2013).

Animal disease outbreaks, similar to human contagious diseases, provide little warning from the time of initial infection to the onset of clinical symptoms. In many cases, an animal fails to show any outward symptoms of the disease despite being in a contagious state. While animal monitoring systems are incorporated into the livestock production industry, the time from infection to display of symptoms provides for a great potential for additional transmissions, supporting the difficult nature of ahead-of-time notice for animal disease outbreak.

Secondary Hazards

Animal disease outbreaks have a large number of secondary hazards. Based on the scope of the outbreak impacts, additional hazards may include:

- Human disease transmission
- Wildlife disease transmission
- Domesticated animal disease transmission
- Contamination of land, crop, and water

The extent of the secondary hazards associated with any animal outbreak is based on many factors including the scope of the outbreak, disease transmission method, morbidity and mortality of the disease, the possibility of disease transmission to other populations, and the public perception and response to the outbreak. Any and all of these factors will impact the severity of the secondary hazards, requiring additional support and response from support agencies.