Rabbit Hemorrhagic Disease Response Plan

Maryland Department of Natural Resources

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Introduction

Rabbit Hemorrhagic Disease (RHD) is a highly contagious, non-enveloped Calicivirus affecting rabbits, hares and pikas. The initial form of the virus was first detected in 1984, and has since spread around the globe among domestic rabbits. Subsequent mutations of the virus have given rise to RHD type 2 (RHDV2) which is capable of infecting rabbits native to the new world. This recent development has widespread implications for the conservation and management of wild rabbits and hares in North America, due to the virulence of the disease and the relative vulnerability of its hosts. RHDV2 was first detected in 2018, and has since spread through the desert Southwest, with isolated cases appearing in several eastern states in 2020 and 2021. Though the virus has yet to reach the Mid-Atlantic region at large, it is in the best interest of the relevant managing agencies to prepare for that likelihood. The following document seeks to substantiate the importance of agency attention, provide general background about the disease, and establish basic framework for the prevention and detection of the disease.

Disease Overview

RHD often triggers rapid death in previously healthy rabbits. Other symptoms may include fever, loss of appetite, anorexia, lethargy, diarrhea, conjunctivitis, general respiratory symptoms, and bloody nasal discharge. **RHDV2 is not a zoonotic disease and does not impact human health**; the virus is specific to rabbits, hares and pikas, and cannot be contracted by other livestock or companion animals.

As a non-enveloped virus, RHD is durable in comparison to other viruses, and does not need to be spread directly from host to host. The disease may be spread through direct contact with infected animals, as well as indirect contact with infected carcasses, blood and tissues. The disease may also be spread via fomites (infected bedding, feed, enclosures) and mechanical vectors such as insects.

As previously stated, there are two types of RHD. RHD type 1 is the initial form of the virus, and comes in two strains; RHDV, and RHDVa. Both forms of type 1 specifically effect adult rabbits, with hosts experiencing high rates of mortality. RHDV2 is reported to be less lethal, but to affect rabbits at all stages of life. Mortality rates are variable, and viral shedding may occur after initial infection for a period of at least 30 days. Long term or permanent shedding of the virus has been deemed unlikely.

RHD is stable in the environment, and can remain infectious without a host for a period of at least 3 months, and has the ability to survive extreme temperatures including below-freezing temperatures and multiple freeze-thaw cycles. Viable virus has been detected after 105 days at room temperature on a fomite in a laboratory setting.

RHD was detected in Western states, and has more recently been detected chronologically in Georgia, Florida and Mississippi. To date, RHDV2 has been detected in Arizona, California,

Colorado, Georgia, Idaho, Mississippi, Montana, Nevada, New Mexico, Ohio, Oregon, South Dakota, Texas, Utah, Washington, Wyoming, and Cuba.

The virus is currently classified as a Foreign Animal Disease (FAD) by the USDA. Initial detections of a nominal case within a state or commonwealth must be confirmed at a designated USDA facility.

Rabbits in Maryland

Although they are commonly misidentified as rodents, rabbits and hares belong to the taxonomic order Lagomorphia, a sister taxa to Order Rodentia. Maryland hosts two species of native lagomorph, the eastern cottontail (*Sylvilagus floridanus*) and the Appalachian cottontail (*Sylvilagus obscurus*). Additionally, the state historically contained snowshoe hare (*Lepus americanus*) until the mid-20th century (Maryland Wildlife and Heritage Service 2015).

Eastern cottontails are nearly ubiquitous throughout the state, and constitute an important link on food webs and ecosystems. Rabbits are important food items for mammalian predators such as red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), coyotes (*Canis latrans*), and bobcat (*Lynx rufus*) as well as a wide range of predatory birds. The historic loss of the snowshoe hare, as well as the decline of the Appalachian cottontail, provide important insight into changes in the ecology of the region, and continue to provide an index for habitat quality in ridgeline habitats. Rabbits also play roles in nutrient cycling and grazing regimes. Finally, rabbit hunting provides an important recreational activity for many residents on a seasonal basis.

The Department of Natural Resources (DNR) Wildlife and Heritage service (WHS) manages the two extant species of rabbit, with eastern cottontails being classified as a small game species, and Appalachian cottontails listed as an S1, or highly state rare (Maryland Wildlife and Heritage Service 2015). Although the former species is abundant and widely distributed, population declines or crashes have the potential to cause far reaching effects to trophic systems. Furthermore, contraction of the virus by populations of the endangered Appalachian cottontail may jeopardize the existence of the animal within the state due to pre-existing population depression and habitat fragmentation.

The exact impact of RHD on wild rabbit populations is unknown at this time. However, the virulence and mortality rate of the disease suggest the possibility of population level impacts. Treating disease in wildlife populations is prohibitively costly, impractical, and often impossible. Therefore, given the scale of the potential damage that may be inflicted by the arrival of RHD, it is in the best interest of governmental agencies and stakeholder groups to safeguard against the arrival of the virus in Maryland and be able to respond quickly if it occurs.

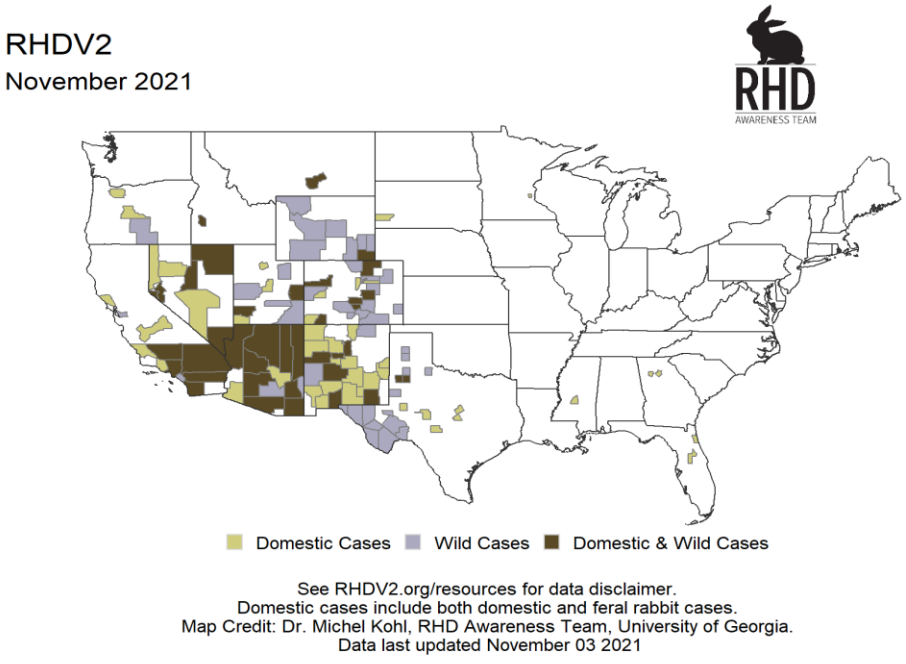
RHDV2 Timeline

RHDV2 was first detected in France in 2010, and subsequently spread across western and northern Europe. Though the initial source of the outbreak in North America is unknown, the virus was first identified in Ohio in a domestic rabbit on September 21, 2018. Additional cases were identified in Washington State in mid-2019, beginning with a pet rabbit on Orca Island. Wild cases were first confirmed in wild black-tailed jackrabbits and cottontails in the Southwest in April 2020, and by 2021 the virus was widespread among Western States, including Arizona, California, Colorado, New Mexico, Nevada, Wyoming and Utah.

Cases east of the Mississippi river were first identified starting with a captive rabbit in Lake County, FL December 30, 2020 and again in St. Johns County, FL on October 18th, 2021. Genetic sequencing from both cases indicated relation between the virus strain and those detected in the Southwest. Georgia has identified two cases; the first on June 22, 2021 in Cobb County and the second on August 2, 2021 in Gwinnett County. The cases are thought to be unrelated, and both sites have since been released from quarantine. Most recently, RHDV2 was detected in domestic rabbits in Rankin County, Mississippi. Currently, RHDV2 has not been detected in wild rabbit populations in the east.

The Pennsylvania Game Commission (PGC) issued an importation ban on wild lagomorphs or their products (meat, hides, carcasses, etc) from any state or region where RHDV-2 had been detected within the last 12 months on July 9th, 2021.

Current Distribution



General Response to Detection

In 2016, an updated Chronic Wasting Disease (CWD) response plan was generated by WHS personnel to address the expansion of the disease outside of the existing management area. RHD management strategies bear some resemblance to CWD protocols that are currently utilized by WHS, but present their own complications. Thus, proposed RHD management will expand upon pre-existing framework developed for Chronic Wasting Disease response in order to reflect projected differences in their epidemiology.

The differing pathology of both diseases have far reaching implications in their respective management. RHD and CWD are caused by viruses and prions, respectively. While viruses are considered to be intracellular parasites that rely on host cells, prions are abnormal proteins, void of any genetic material, that disrupt the form and function of other, healthy proteins. The lack of DNA or RNA makes prions small and extremely durable; the vulnerability of nucleic acids to ultraviolet light and solvents makes viruses inherently less robust. Viral contraction can be reasonably prevented with vaccines, and viruses themselves can be destroyed with disinfectants. Prions cannot be treated prophylactically or reliably destroyed. In essence, viral strains have the potential to be relatively temporary fixtures within a population, while prion diseases may persist almost indefinitely on the landscape.

Differences in patterns between the host species of both diseases also contribute to differences in management strategies. Captive cervids in Maryland are regulated by WHS, and new permits for their live possession have not been issued since 1984. Ear-tagging, high fence requirements, and compulsory necropsies of deceased individuals minimize the likelihood of disease transmission between captive and free-ranging cervids. CWD has thus far only been detected in free-ranging cervids within Maryland. Deer hunting is a popular recreational activity in Maryland and thus hunter transport of potentially infected tissues in Maryland is regulated in order to reduce the likelihood of CWD outbreaks. Wild, free ranging cervids can range widely on a yearly basis, and may facilitate the spread of the disease through seasonal movements.

Conversely, captive rabbits are widely kept on a widespread commercial and recreational basis; captive populations function as reservoirs for disease, transport vectors, and sources of contaminated fomites. WHS does not have jurisdiction or authority over domestic rabbits. The Maryland Department of Agriculture (MDA) mandates the accompaniment of a Certificate of Veterinary Inspection (CVI) for the interstate importation of rabbits. Wild, native species are monitored and regulated by WHS.

Domestic rabbits, their associated products and fomites have played an important role in the spread of the disease in the West, and this pattern is likely to continue in the East; initial detections in Florida, Georgia and Mississippi all occurred in domestic rabbits.

As a result of the aforementioned differences, the designation of management areas for RHD is deemed inappropriate at this time; facilities in States where the virus was detected have been disinfected and reopened after an appropriate quarantine, without experiencing reinfection or additional outbreaks. Static, site specific quarantines for confirmed domestic outbreaks are likely to be more effective at containing the virus without placing undue permanent burden on regional commerce.

Detection in wild populations will likely necessitate the involvement of stakeholders and concerned citizens; pre-emptive random sampling of wild populations by WHS personnel is not likely to be productive. Additionally, differences in consumption and game processing patterns between deer and rabbit hunters may further complicate the collection of hunter-obtained samples; widespread use of deer processors facilitates the collection of annual CWD samples, but comparable services do not exist for rabbit hunters. Passive monitoring by regional operations personnel and pro-active educational media can be utilized by WHS as low cost to impact ratio strategies for detection.

An approximation of response procedures are outlined below:

General Response to Detection within Maryland:

1. Upon receiving laboratory confirmation of an RHD positive sample from within the state, WHS will notify the following contacts within DNR: the Office of the Secretary (OOS), WHS staff, the Office of Communications (OC), and the Natural Resources Police (NRP). Concurrently, WHS will notify the appropriate personnel within: the Maryland Department of Agriculture (MDA), USDA-Wildlife Services (USDA-WS) and the Department of Health and Mental Hygiene (DHMH).

2. WHS will notify key constituency/stakeholder groups, including Wildlife Advisory Commission members, wildlife agencies in the surrounding states, appropriate federal agencies, legislators, and local community officials where the positive case was found, informing them that RHD has been identified in Maryland. This may be done via individual contact or a Press Release.

3. Once a final confirmation is received, the media will be advised of the positive RHD case(s) through a Press Release. The Press Release will include a synopsis of Maryland's RHD surveillance efforts, an outline of likely RHD response management actions, and other RHD-related resources deemed needed or appropriate to the particular facts at the time.

4. A RHD response team will be assembled to include the WHS Director or designee(s), the WHS Furbearer Project staff, the DNR Fish and Wildlife veterinarian, the appropriate WHS regional manager, MDA and USDA staff, and the WHS media-relations coordinator. This team will also determine the research and data needs necessary to effectively manage the disease response. Research and data-collection work may be contracted as appropriate.

5. Key WHS staff members and the OC media relations coordinator will be assigned as RHD media contacts. All RHD-related questions from the public and the media will be routed to this team.

6. DNR will place up-to-date information on the DNR Website in order to fully inform citizens on RHD and the DNR Response Plan. The information will be reviewed and updated routinely.

Response to Discovery in Free Ranging Rabbits

1. WHS will investigate reports of symptomatic wild rabbits, as well as mortality events involving two or more animals.

2. Initial sample will be confirmed at USDA Foreign Animal Disease Diagnostic Laboratory on Plum Island, NY.

3. Upon receiving notice of laboratory confirmation, pertinent WHS regional staff will be notified. Lands managed by Maryland DNR will be posted with signage informing hunters and the general public of pertinent best management practices. WHS will assess and monitor the outbreak, and will implement manual and/or regulatory solutions as needed.

General Guidance

Hunters should not harvest rabbits that appear ill. Additionally, hunters are encouraged to use disposable latex or nitrile gloves when handling or dressing wild rabbits. Entrails and waste from game should be bagged and disposed of in a receptacle that excludes scavenging animals, such as raccoons. Sick or dead rabbits should be reported to Maryland WHS at 410-260-8540 or customerservice.dnr@maryland.gov.

Keepers of captive rabbits may choose to implement broader, biosecurity measures in order to reduce the risk of disease transmission to their stock. Specific resources for disinfection and cleaning procedures have been generated by the USDA and are provided below. General biosecurity practices, as per USDA guidelines are as follows:

• Do not allow pet or wild rabbits to have contact with your rabbits or gain entry to the facility or home.

• Do not allow visitors in rabbitries or let them handle pet rabbits without protective clothing (including coveralls, shoe covers, hair covering, and gloves).

• Always wash hands with warm soapy water before entering your rabbit area, after removing protective clothing and before leaving the rabbit area.

• Do not introduce new rabbits from unknown or untrusted sources. Do not add rabbits to your rabbitry from animal shelters or other types of rescue operations.

• If you bring outside rabbits into your facility or home, keep them separated from your existing rabbits for at least 30 days. Use separate equipment for newly acquired or sick rabbits to avoid spreading disease.

• Sanitize all equipment and cages moved on or off premises before they are returned to the rabbitry. We recommend disinfecting with 10% bleach or 10% sodium hydroxide mixed with water.

• Establish a working relationship with a veterinarian to review biosecurity practices for identification and closure of possible gaps.

Vaccine

Vaccination of wild rabbit populations is not considered to be a practical solution to RHDV2. For captive lagomorphs, there are 2 vaccines licensed within the EU that may be used in the US under a special permit, when administered by a licensed veterinarian. Florida and Georgia have both approved importation of European RHDV2 vaccines by licensed, accredited veterinarians. Both states have also approved the use of the USDA experimentally approved Medgene vaccine that specifically targets the US strain of RHDV2.

Existing vaccinations for RHD type 1 are cross protective for both forms, but do not provide any protection against the RHDV2 strain.

Disinfectants

List O is the end product of a collaboration between The USDA and EPA to develop a list of recommended disinfectants that can effectively treat surfaces that infected rabbits may have contacted. Due to the nominal nature of the virus, the products listed may not be label approved for RHDV2 but have demonstrated efficacy against similar viruses. The list is accompanied by general cleaning guidelines and procedures.

Agency Responsibility Statement

As previously stated, RHDV2 is capable of affecting both captive and wild rabbits. Due to legislative and regulatory differences between the two groups, there are several independent agencies within the State of Maryland that regulate different topics pertinent to lagomorphs in Maryland.

The Maryland Department of Natural Resources Wildlife and Heritage service (WHS) regulates and monitors wild, free ranging populations of native lagomorphs within the state. Regulatory authority pertaining to hunting seasons and bag limits, captive possession, research and

population monitoring belong to WHS. Other pertinent DNR agencies include the Maryland Park Service (MPS), the Maryland Forest Service (MFS), and Natural Resources Police (NRP).

The Maryland Department of Agriculture (MDA) is responsible for matters concerning the keeping of, breeding, importation, sale and humane slaughter of captive rabbits within the state.

Non-governmental Stakeholders

In addition to government agencies, there are a diverse constituency of parties with vested interest in both captive and free-ranging rabbit. Responsible agencies will strive to maintain communication with stakeholders in the event of an outbreak within Maryland.

Small game hunters are important participants in the larger hunting community within the state. As of 2021, roughly 3,000 hunter reported pursuing rabbits in the voluntary hunter mail survey (Maryland Wildlife and Heritage Service, unpublished data).

The American Rabbit Breeders Association (ARBA) is a large nonprofit focused on the promotion of rabbit husbandry and breed improvement practices. ARBA has a membership of approximately 20,000 and has taken pro-active measures to minimize the risk of transmission among domestic rabbits and educate its membership on the virus. The organization has maintained a page on its website dedicated to the dissemination of RHD related information, and has had an official policy on RHDV2 since April 5, 2020.

Private landowners constitute the broadest group of stakeholders. Regardless of land use goals, the majority of cottontail habitat in Maryland exists on private land. Eastern cottontails utilize most forms of habitat located on non-hydric soils in Maryland to some extent, and can persist on limited greenspaces in urban areas due to their small home range sizes.

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