



Aquatic Invasive Species (AIS) Action Plan:

Viral Hemorrhagic Septicemia (VHS)

Natural History

Overview: A disease affecting fish which is caused by the Viral Hemorrhagic Septicemia virus. Discovered in the Great Lakes region in 2005 with review of historic specimens revealing it occurred as early as 2003.

Taxonomy: The version of this virus currently identified in the Great Lakes region is Type IVb. A similar strain (IVa) was found in the Pacific Northwest in the late 1980s and IVb was subsequently discovered off the Atlantic Coast of Canada.

Description: Viral Hemorrhagic Septicemia (VHS) infects freshwater and marine fish species. The disease is caused by a rhabdovirus (rod or bullet-shaped), appropriately named Viral Hemorrhagic Septicemia Virus (VHSV). The disease was first identified in rainbow trout in Europe where it has caused significant

economic loss in commercial aquaculture. Infected fish may exhibit varying degrees of hemorrhaging, but typical external symptoms include hemorrhaging and redness at the base of fins, around the eyes, red patches of skin on or near the head and a swollen abdomen (Figure 1). Internally, the spleen, liver and kidneys may exhibit swelling and/or hemorrhaging. The infection typically results in a disruption of the fish's osmotic balance and affects operation of the swim bladder. In severe cases, death occurs between 2 and 30 days, often preceded by swimming in circles, and a failure to maintain an upright swimming position. VHS is a colder water disease, which affects



Figure 1. Fish infected with Viral Hemorrhagic Septicemia. (Photo: David Kenyon, MI DNR).

susceptible fish at water temperatures primarily between the 37 and 54 °F. Hence it is most often seen in the mid-to-late spring, and is dependent on water temperatures.



Origin: Type IVa is known to occur in the Pacific Northwest, and Type IVb has been found in Atlantic Canada in New Brunswick and Nova Scotia and since 2003 in the Great Lakes region. Other closely related types have been found in Europe and Asia and are likely the source of the disease which is believed to have mutated into the Type IVb strain.

Species affected; Up to 37 species of freshwater and marine fishes are documented as being susceptible to this disease. Additional testing leads to new species being added to the list. The most current list is available on the APHIS website at <http://www.aphis.usda.gov>.

Historic Vectors: Unknown; however, ballast water exchange from trans-Atlantic ship traffic to the Great Lakes, stocking infected fish or possible transfer via use of Pacific herring as bait in the Great Lakes are suspected.

Current Pathways/Vectors: Accidental interbasin and intrabasin transfers via recreational boating and fishing activities. Most likely pathway is through the transportation of live or improperly disinfected baitfish. Emerald shiners are collected from the Great Lakes in large numbers and sold live and preserved for

use as bait. Historically, these shiners were transported for use as bait in some inland waters within reasonable driving distances from the Great Lakes. Transfers may be facilitated by bait-buckets, residual water in boat hulls, and boat/trailer nooks and crannies. Other potential vectors exist via aquaculture, the bait fish industry, use or transfer of fish eggs or roe as bait, and research activities.

Distribution and Status

Distribution: Great Lakes drainage - IL, IN, MI, MN, NY, OH, PA, WI, Ontario and Quebec, Canada. In spring 2006 it was found fish located just west of the PA/OH border in Lake Erie. As of July 2010, neither the virus nor infected fish have been documented in Pennsylvania waters.

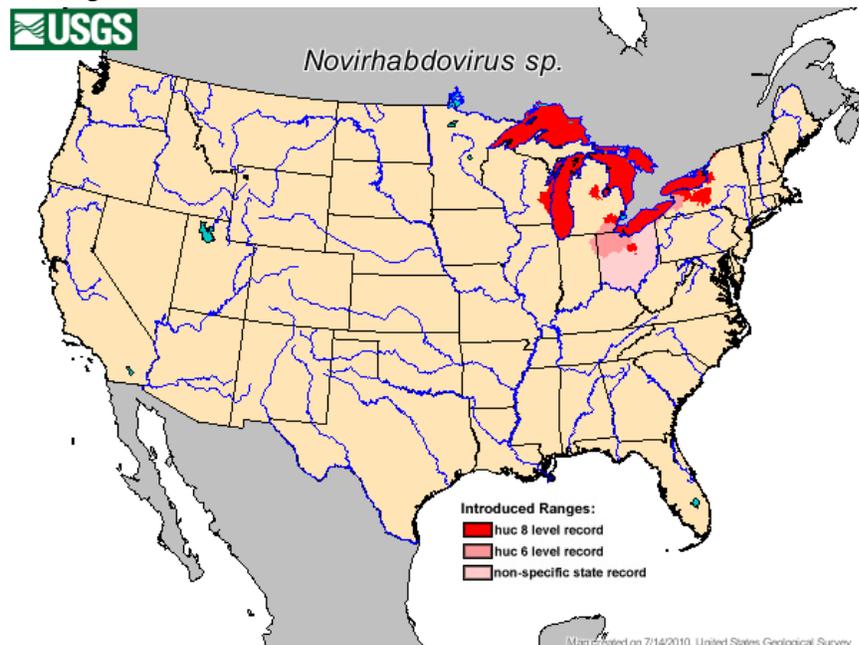


Figure 2. Distribution of Viral Hemorrhagic Septicemia in the United States. Source: USGS.



Federal Legal Status: The United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) issued an emergency order on October 24, 2006 and amended it on November 14, 2006. The federal order requires that VHS-susceptible species fish cannot be transported or exported from the aforementioned states unless they have first been tested and certified to be VHS free.

Pennsylvania Legal Status: The PA Fish and Boat Commission recently promulgated new, specific VHS regulations under Chapters 71.8 and 73.3 (Title 58) of the Pennsylvania Code related to the transportation and introduction of fishes. The PA Fish and Boat Commission also developed new regulations (Chapter 63.54) regarding the taking use and possession of fish eggs in response to VHS concerns in using eggs as bait. The PA Department of Agriculture enacted a quarantine of licensed fish propagators and dealers in those portions of Erie, Crawford, and Potter Counties within the Lake Erie and Lake Ontario drainages.

Threats

Ecological: Within the Great Lakes, when a VHS fish kill occurs, thousands of fish from several species may succumb in localized areas. Gizzard shad are the most commonly seen species in the larger incidents. The scale of these events thus far has not reached levels that would affect this very common species at the population level. In some

cases highly desirable, trophy size fish such as muskellunge have succumbed and this could have an impact on species which are apex predators and highly desirable sport fish. Natural or human assisted movements of this disease into smaller waterways could have greater ecological impacts as a relatively larger percentage of the local population could be affected.

Economic: To date, a VHS outbreak has not occurred within the confines of a hatchery system in the United States. In such conditions where large numbers of fish are reared together in close proximity an outbreak could result in devastating losses. In addition, under APHIS policies, if VHS is discovered in a hatchery, total depopulation, and disinfection are a likely course of action. Thus, VHS presence or outbreak within a hatchery facility could lead to significant economic losses. The baitfish industry has been impacted by its decreased ability to ship live or uncertified baitfish to locations outside of the Great Lakes drainage. Public and private hatcheries have had to modify transportation practices to comply with federal and state orders. Additional costs have been incurred for testing and implementation of biosecurity protocols.

Health: VHS cannot be acquired by humans. There is no evidence to suggest that eating a fish carrying, or infected with, the VHS virus is harmful to humans.



Management

Management Goals: To prevent the spread of VHS beyond those waters where it has already been documented. Improve public awareness of VHS and its impacts and the risks associated with movement of fish, bait and transportation water within and between basins. Implement appropriate biosecurity measures to ensure containment and limit introductions to new waters.

Containment and Prevention Actions to Stop the Spread:

- Ensure compliance with APHIS orders and rules, PFBC regulations and PA Department of Agriculture quarantine.
- Provide outreach and education to anglers, bait dealers, sportfishing industry representatives, news media, and other regulatory agencies. Update websites, brochures, AIS species cards, provide public presentations to targeted groups.
- Ensure that the PFBC Administrative Policy for “*Biosecurity Measures for Commission Operations, Facilities and Equipment*” is followed by staff.
- Continue annual sampling of wild brood and hatchery production fish to monitor for VHS within the state fish hatchery system.
- Continue and expand use of iodophore disinfection of all fish eggs in the state fish hatchery system.
- Limit inbound fish transfers and require valid fish health certifications.

Rapid Response Options:

- Consult the Governor’s Invasive Species Council of Pennsylvania and implement the most current version of their rapid response plan for guidance on addressing VHS or AIS issues in PA waterways outside of fish hatcheries
- Implement the “*Aquatic Invasive Species and Emergency Disease Response Plan for PFBC State Fish Hatcheries*” if VHS or an AIS is detected within the state fish hatchery system.

Resources: As this is an emerging issue, new information may become available on a daily basis. Therefore, links to the following websites will likely provide access to the most current information.

1. Animal and Plant Health Inspection Service: <http://www.aphis.usda.gov>
2. National Veterinary Services Laboratories: (to locate labs that can perform VHS testing) : <http://www.aphis.usda.gov/vs/nvsl/html/aquaapplab.html>
3. Great Lakes Fisheries Commission: <http://www.glfc.org>
4. Great Lakes Fish Health Committee: <http://www.glfc.org/boardcomm/fhealth/fhealth.php>
5. National Aquaculture Association: <http://www.nationalaquaculture.org/pages/issues.html>
6. PA Department of Agriculture, Aquaculture: <http://www.agriculture.state.pa.us/agriculture/cwp/view.asp?a=3&q=129895>



References

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