Viral Hemorrhagic Septicemia (VHS) in Pennsylvania

Summary

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The Disease

Viral Hemorrhagic Septicemia (VHS) is a disease, caused by a rhabdovirus (rod or bullet-shaped), which infects freshwater and marine fish species. This disease was first identified in rainbow trout in Europe where it has caused significant economic loss in commercial aquaculture. There are currently believed to be four types of this disease which has infected freshwater fish in Europe, marine fish in the North Atlantic, Pacific herring and pilchards, and hake in the North Pacific and most recently freshwater fish (Type 4) in the Great Lakes Region of North America. 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. 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 transmitted by a waterborne virus, which enters a fish's body through gills and wounds, and can be transmitted by urine, feces and reproductive fluids. It can be found on the eggs of trout and salmon during spawning of infected broodstock.VHS is a colder water disease, which affects susceptible fish at water temperatures primarily between 37 and 54 °F. Hence, it is most often seen in the mid-to-late spring.

The Spread

The appearance of VHS in North American fresh waters was first documented in freshwater drum in the Bay of Quinte portion of Lake Ontario in Canadian waters. In spring 2006; mortalities of muskies, yellow perch and gizzard shad were first reported from Lake St Clair, the St Clair River and western Lake Erie near Detroit. As spring progressed, freshwater

drum, white bass and yellow perch were reported from western and central Lake Erie including near the Pennsylvania/Ohio border. It was also reported in Lake Ontario gobies and St. Lawrence River muskies. In 2007, and midway through 2008, VHS has been reported from Lake Michigan in Michigan and Illinois, Lake Huron in Michigan, one inland lake in Michigan, two inland lakes in Wisconsin, an inland Ohio Lake and a New York Finger Lake. To date, VHS has not been found in Pennsylvania's portion of Lake Erie or its inland waters.

Federal Regulatory Actions

On October 24, 2006 the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) issued an emergency order prohibiting the importation of certain live fish species from the Canadian provinces of Ontario and Quebec into the United States. In addition, the interstate movement of live fish was prohibited from Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin. An initial list of 37 VHS susceptible species was developed by APHIS. Twenty-two of the species listed are cultured in or found in the wild in Pennsylvania. It is likely that additional species will be added to this list as new information about this disease and species susceptibility is obtained. The release of the October 24, 2006 federal order caused concern among state agencies leading to increased dialogue with APHIS and pending state regulation changes.

On November 14, 2006 APHIS authorities amended the original Federal Order to allow the interstate movement of VHS-susceptible species of live fish under certain conditions. APHIS adjusted the order to allow live salmonids from Ontario and Quebec to be shipped into the US under certain restrictions. In addition, VHS-Susceptible Species of fish could be moved from the eight at-risk states for the under the following conditions:

1. **Movement to slaughter facilities**; provided the fish are for human consumption, the facility is state inspected and the effluent is contained or meets certain dis-infection criteria.
2. **Movement to research or diagnostic laboratories**; provided the laboratory or facility is authorized by the state, tribal or federal competent authority for aquatic animal health, the fish are accompanied by proper forms, and the effluent and carcasses are disposed in accordance with medical waste guidelines.

3. **Other movement**; fish may be transported with documentation from appropriate, state, tribal or federal competent authority for aquatic animal health stating the fish have tested negative for VHS according to specified APHIS procedures.
4. **Movement of VHS-susceptible species through at-risk states**; for live fish originating from non-restricted areas; permission to transit through a state to another state of destination is not required under this Order.

On May 4, 2007 the federal order was amended again to specifically allow catch and release fishing activities as long as the fish are released back into the waters where they were caught.

Pennsylvania Regulatory Actions

Since the APHIS order in late 2006, Ontario, Quebec and the Great Lakes states including Pennsylvania, have revised existing regulations and created new ones to regulate the movement of fish and their parts into and out of the Great lakes states and Great Lakes watersheds. In February 2007, Executive Director Dr. Doug Austen issued a temporary order to prohibit the transportation of fish from the Lake Erie Drainage. In January 2008, those changes were acted on by the Board of Commissioners to become permanent. In July 2008, the Board of Commissioners approved regulations addressing interstate transportation of fish and included eggs used as bait. In brief, these regulations prevent the transportation of susceptible species of fish out of the Lake Erie drainage or other Great Lakes states unless they have first been tested and certified as negative for VHS. Specific details can be found in *58 PA Code, Chapters 63, 69, 71 and 73 of the Fishing and Boating Regulations*.

Concurrent with Commission actions, in October 2007, the Pennsylvania Department of Agriculture issued a Quarantine Order to restrict the transportation of fish out of the Lake Erie and Lake Ontario (Genesee River basin) drainages unless these fish are certified VHS disease free. The order was further amended in December 2007 to update the list of susceptible species. The PA Department of Agriculture's primary authority and area of concern is for the commercial and private aquaculture interests in the Commonwealth but some regulatory roles overlap with the Commission. Both agencies have cooperated in ensuring regulations are complimentary and non-conflicting.

Fish and Boat Commission Preventative Actions

For many decades, the Commission has performed routine fish health and diagnostic disease monitoring through its Fish Health Unit. Since 1984, Lake Erie steelhead brood fish have been sampled for viruses. From 1986 to 2006, Commission trout hatcheries have been sampled for viruses. In addition American shad viral sampling has occurred and beginning in 2007 viral sampling has been conducted on warmwater and coolwater species at Commission hatcheries that produce species other than salmonids. In 2008, Cooperative nurseries that produce steelhead for Lake Erie stocking have been sampled as well. Viral monitoring has not revealed the presence of VHS at any PFBC facility.

The APHIS order named the Great Lakes states and two Canadian Provinces as "affected or at risk" for VHS and restricted interstate movement. Many states fisheries agencies have long been fish trading partners with other states. For example, the Commission can readily produce enough species such as walleyes and tiger muskies to trade for species such as striped bass or channel catfish. Such trading arrangements have been severely limited or eliminated as a result of VHS concerns and regulations. This is an unfortunate side effect of the VHS issue. The Commission has been actively engaged, along with other Great Lakes states in egg disinfection studies to ascertain the appropriate concentrations of disinfecting solutions that will prevent the spread of viruses while maintaining optimum levels of egg survival. Commission membership on the Great Lakes Fish Health Committee (GLFHC) assists with information exchange on these issues. Members of the GLFHC endeavor to incorporate a common set of standards and accepted practices for testing and disease spread prevention. The Commission anticipates conducting targeted sampling of wild fish populations as part of a VHS surveillance plan.

On the Horizon

Commission staff is currently developing biosecurity plans and measures not only for its state fish hatcheries but across the agency. Most agency and public activities that are water related carry some level of risk of transporting unwanted fishes, aquatic species or pathogens. The VHS virus is currently one of the most serious threats to the health of fisheries in Pennsylvania but it is unlikely to be the last. Approaches which address the pathways for the spread of unwanted aquatic organisms and manage those risks appropriately are needed to be

better prepared for controlling the spread of diseases. Commission staff will continue to work internally and engage other resource agencies on regional and national levels to minimize the impacts of VHS.

Resources/Links

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