

WRAC FAQs

Western Regional Aquaculture Center

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February 2011

About Viral Hemorrhagic Septicemia (VHS) Virus

Potential threat of Great Lakes VHS virus in the Western United States

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PROJECT WORK PERIOD: July 1, 2008–August 31, 2010

What is VHS?

Viral hemorrhagic septicemia (VHS) is a disease caused by a virus (VHSV). There are different strains of the virus that can infect marine and freshwater fish species, and the different strains may affect species differently.

VHSV has recently invaded the Great Lakes, resulting in many large-scale fish die-offs and new regulatory restrictions for aquaculture throughout the region.

Where is VHS found?

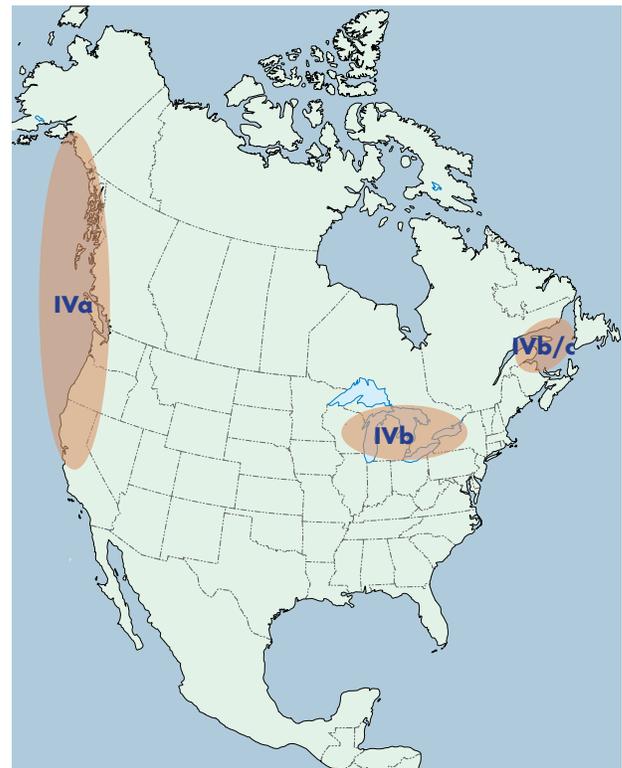
Several strains of VHSV occur in Europe. Some members of one group of strains (type I) cause disease outbreaks in the European trout industry, while others affect marine fish.

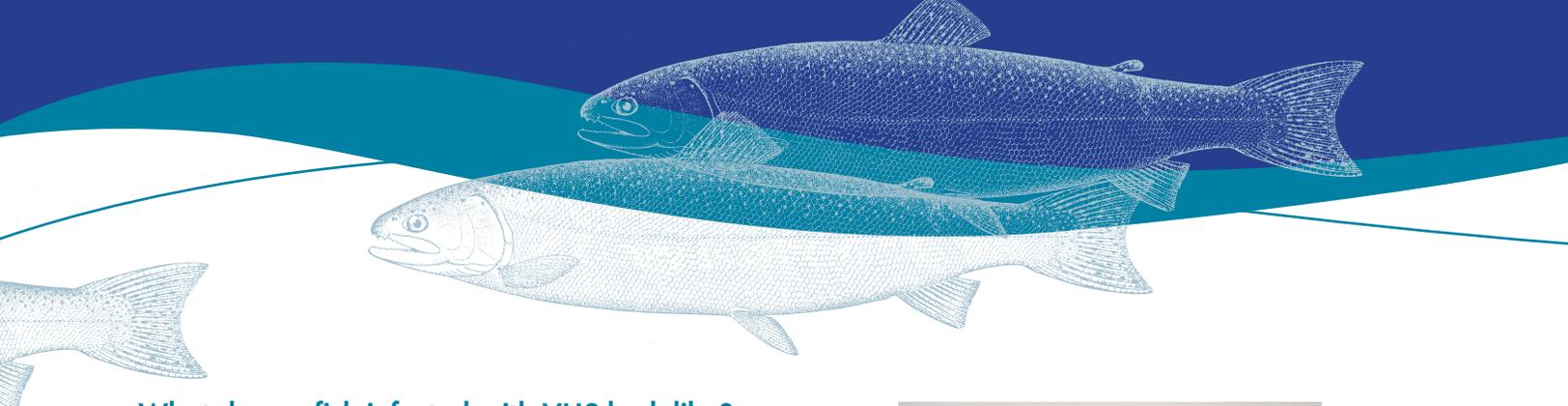
In North America, VHSV was first detected in 1988. West Coast strains (type IVa) occur commonly and can cause disease in marine fish, but appear to have low virulence for salmon and trout.

The Great Lakes strain of VHSV (type IVb) was first detected in 2003. It has now been found in many freshwater fish species in the Great Lakes, and caused disease outbreaks in popular sport fish and baitfish.

Can VHSV infect people?

No, the virus does not affect humans. Fish carrying the VHS virus are safe to eat and to handle.





What does a fish infected with VHS look like?

Disease signs can include:

- Inactive or overactive behavior
- Pale gills and internal organs
- Bloated abdomen
- Bulging eyes
- Bleeding (hemorrhage) on body and internal organs
- Dark body color
- Fluid in body cavity

On the other hand, infected fish can look healthy, with no disease signs; these are called carriers.

What fish can become infected?

VHSV has been detected in 28 species of fish from the Great Lakes region, including several important recreational species such as muskellunge, yellow perch, largemouth bass, and freshwater drum (for a complete list see the USDA-APHIS website).

Several of these species exist as free-ranging populations in the west and could act as carriers and maintain the virus if it was introduced into the west.

Has VHSV been found in any commercially raised fish in North America?

No, as of now detections have only occurred from wild or free-ranging fish.

How is VHS spread?

The exact route of introduction of VHSV into the Great Lakes is uncertain, but possible routes include baitfish movement, activities associated with recreational fishing, ballast water, or natural fish migrations. The same routes could move the virus into the western US and should be carefully controlled.



Photos: Courtesy of Jerri Bartholomew, Oregon State University, Gael Kurath and Evi Emmenegger, USGS Western Fisheries Research Center

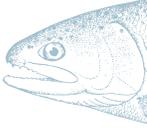
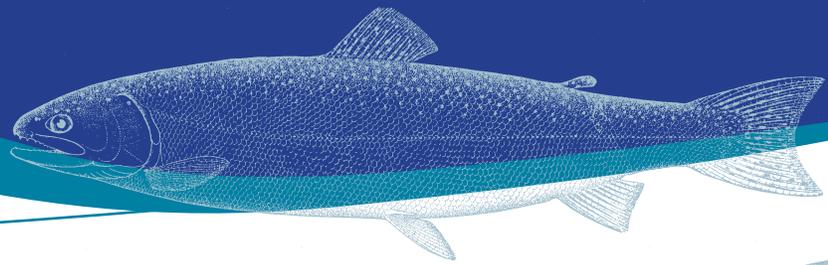
What regulations are in place to limit spread of the virus?

Current restrictions on movement of fish are available on the USDA-APHIS website:

<http://www.focusonfishhealth.org/regulations.php>

To move living VHS-susceptible species, documentation must be obtained from an appropriate State, Tribal or Federal authority for aquatic animal health, stating that the fish have tested negative for the VHS virus under existing national or international standards.

National standards for inspection of fish for VHS virus are detailed in the *AFS-Fish Health Section/US Fish and Wildlife Service Blue Book*, produced by the American Fisheries Society (available at their online bookstore).



What precautions are being taken to limit spread of the virus to aquaculture facilities?

In addition to existing regulations described above, education workshops and increased biosecurity procedures have been provided for extension agents and fish farm staff throughout the western region. Instructional material from workshops for fish farmers and extension agents is available from WRAC. Other sources of information on biosecurity can be found on the following websites:

<https://campus.uwsp.edu/sites/cols-ap/nadf/Workshops/Forms/AllItems.aspx>

<http://www.ncrac.org/Topics/biosecurityfactsheet.htm>

Is there VHSV present in the Western US?

Yes, VHS virus has been isolated since the 1980s from several marine fish, such as Pacific herring, and it is occasionally detected in adult Pacific salmon returning to coastal watersheds. This VHSV in the Western region is type IVa.

What is the difference between VHSV from the Western US and the Great Lakes?

The VHSV found in Pacific watersheds (type IVa) is the same virus species as Great Lakes VHSV, but it is a different sub-group that has never caused disease in freshwater fish.

VHSV from the Great Lakes is type IVb, which has caused large-scale epidemics in freshwater fish, but has never been found west of the Great Lakes region.

Experimental studies have not demonstrated a biological difference between the Pacific and Great Lakes strains. This suggests that the Great Lakes epidemics are due to recent introduction of the virus into a large freshwater ecosystem with abundant susceptible fish hosts, and that Western producers should take measures to prevent introduction of either VHSV IVa or IVb into their facilities.

What do we know about susceptibility of aquaculture fish species in the West?

Research has shown that rainbow trout and Chinook salmon are largely resistant to disease from Great Lakes VHSV, but they can become infected and carry the virus.

Other salmonids, including coho salmon, Atlantic salmon, brook and brown trout are also relatively resistant to disease but their carrier potential is uncertain.

General Web Sites of Interest

Focus on Fish Health-VHS

<http://www.focusonfishhealth.org/>

USDA APHIS Newsroom. Viral Hemorrhagic Septicemia.

http://www.aphis.usda.gov/newsroom/hot_issues/vhs/vhs.shtml



Susceptibility of various fish species to different types of VHS virus:

Fish Species	Great Lakes VHSV Type IVb	Atlantic coast VHSV Type IVb	Pacific coast VHSV Type IVa	European VHSV Type I
Rainbow trout	Low	Low	Low	High
Chinook salmon	Low	Low	Low	Medium
Yellow perch	High	High	High	Low
Pacific herring	Medium	Medium	High	Medium

References

Kim R, Faisal M 2010. Comparative susceptibility of representative Great Lakes fish species to the North American viral hemorrhagic septicemia virus sublineage IVb. *Diseases of Aquatic Organisms* 91:23–34.

Emmenegger EJ, Moon CH, Kurath G. Differential susceptibility of five fish species to North American and European isolates of viral hemorrhagic septicemia virus representing genotypes Ia, IVa, and IVb. In preparation

Acknowledgments

This project was supported by Western Regional Aquaculture Center Grant nos. 2004-38500-14698 and 2005-38500-15812 from the United States Department of Agriculture, National Institute of Food and Agriculture.

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