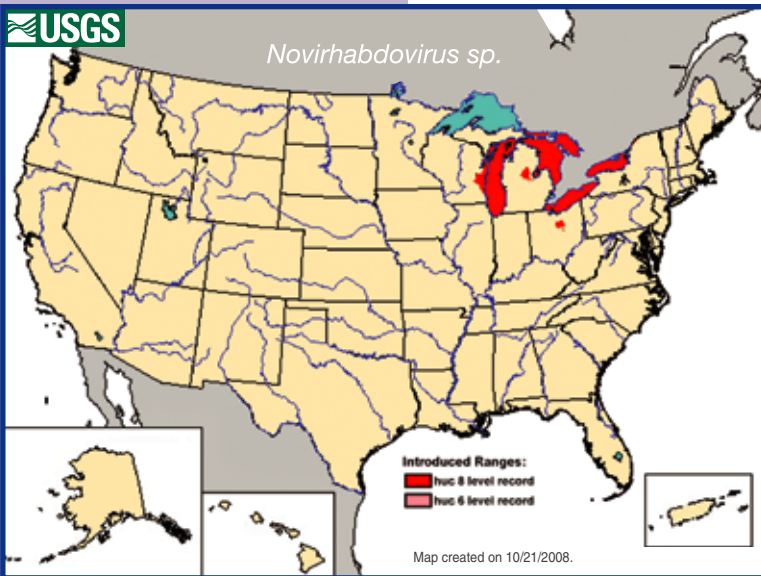




## Viral hemorrhagic septicemia

*Viral hemorrhagic septicemia (VHS) virus is a fish pathogen that is causing great concern in the Great Lakes region of the United States and Canada.*



### NATIVE & INTRODUCED RANGES

Recent outbreaks in the Great Lakes appear to be a new, mutated strain of the marine virus that has become pathogenic for freshwater fish. Although it is unclear exactly when and how the virus was transferred into the Great Lakes, scientists think it was introduced into this region as early as 2003, and related fish mortality has been reported since 2005. The virus could have arrived into the Great Lakes in the ballast water of ocean-going ships, through aquarium and live fish releases, fish stocking, or from the ocean by migrating fish. In North America, VHS is present in the waters of lakes Michigan, Huron, St. Clair, Erie, and Ontario, as well as the Detroit, Niagara, and St. Lawrence Rivers.

### SPREAD

VHS is a highly contagious disease that is easily transmissible to fishes of all ages and many different species. Survivors of the infection can become lifelong carriers of the disease.

Virus transmission can occur through contact with the water or diseased fish, predation on infected fish, or shed with urine and reproductive fluids. It can enter the body through the gills or open wounds. Transfer to new water bodies is thought to be primarily through fish stockings, baitfish transfer, and by moving live contaminated fish from one water body to another. Other possibilities are through recreational angler and boating activities. The intestinal tract of warm-blooded mammals inactivates the virus, and it does not replicate in insects; therefore, waterfowl, insects, and parasites do not likely serve as vectors.

### IMPACTS

#### *Threat to Biodiversity*

At least 50 species of marine and freshwater fish carry the virus, including muskellunge, smallmouth bass, northern pike, freshwater drum, gizzard shad, yellow perch, black crappie, bluegill, rock bass, white bass, redhorse sucker, bluntnose minnow, emerald shiner, round goby, and walleye. While there are no specific visual signs of VHS, symptoms of the disease may include bulging eyes, bloated abdomens, darker coloration, inactive or overactive behavior, and hemorrhaging in the eyes, muscle tissue, skin, gills, and at the base of the fins. Testing is necessary to confirm that a fish is infected with VHS. Bluntnose minnows and emerald shiners often will show no obvious symptoms.

#### *Human Health*

There is no indication that VHS is a threat to human health because it cannot replicate in warm-blooded animals; however, hand washing is always a good practice when handling fish and wildlife that show disease symptoms of any kind.

Photo courtesy of Mohammed Faisal, USGS.



# VHS

Photo courtesy of Mohammed Faisal, USGS.



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## Economic Costs

The Great Lakes fishery represents an estimated 4 billion dollar industry. It is unclear what the long-term risks of VHS will be on this fishery and inland fish stocks; however, observers have already reported large fish kills of certain species. In addition, aquaculture facilities will incur additional testing expenses to insure their fish are disease free and can meet federal and state shipping regulations.

## PREVENTION & CONTROL

In areas where VHS is found anglers and recreational boaters should take the following precautions:

- Use only locally harvested bait in the water body it came from.
- Do not transport bait to another watershed.
- Use certified disease-free bait.
- Remove all mud, aquatic plants and animals from gear, boat motors, and trailers before leaving a body of water.
- When cleaning fish, make sure that waste products do not contact other waterways. Dispose of fish internal organs, skin, scales, heads, and tails in the garbage.
- Boots and equipment used during angling should be thoroughly cleaned and disinfected. Drying or exposure to sunlight for at least five days are both capable of killing the virus.
- After angling at a water body known to contain VHS, clean and disinfect live wells with a 10 percent household bleach and water solution. Rinse well to remove residual chlorine and discard rinse water on land away from storm water drains, as chlorine is toxic to fish.
- Empty bait containers, live wells, and bilges away from water in an area where the water will be absorbed into the ground.

If you think you've observed a case of VHS, report it to state or federal authorities immediately. In October 2006 the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) issued a Federal Order to prohibit the movement of certain live fish species from two Canadian provinces into the United States as well as the interstate movement of the same species from the eight states bordering the Great Lakes. In Pennsylvania, live fish transport out of the Lake Erie and Genesee River drainage basin is prohibited. It is also unlawful to transport, sell, or introduce VHS susceptible species, dead or alive, into the Commonwealth unless laboratory tested and certified as negative for the virus. It is also unlawful in Pennsylvania to use the eggs of VHS-susceptible species as bait. The full list of VHS susceptible species can be found online at [http://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/aquaculture/](http://www.aphis.usda.gov/animal_health/animal_dis_spec/aquaculture/).

## SPECIES DESCRIPTION

The VHS virus is a highly contagious, bullet-shaped virus of the genus *Novirhabdovirus*. VHS strains vary in their severity; for example, in rainbow trout the European freshwater strains can cause severe mortalities, while North American or northern European marine strains cause little or no symptoms.

## HABITAT & BIOLOGY

Fish mortality from the VHS infection is highest at low water temperatures between 48 and 54 degrees Fahrenheit (9-12 degrees Celsius). Deaths from VHS rarely occur at temperatures above 59 degrees Fahrenheit (15 degrees Celsius). Outbreaks often occur during stressful environmental changes such as changes in temperature, for example in the spring when the water temperature is rising, or during spawning. The disease can occur at any age, but younger fish appear to be more susceptible.

## References:

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