Aquatic Invasions News from the Great Lakes Commission **ANS UPDATE**

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VHS – The Viral Invader

By: Gary E. Whelan, Fish Production Manager, Michigan DNR

Fisheries biologists have voiced concerns over aquatic invasive species (AIS) since zebra mussels were first detected in the Great Lakes in the 1980s. Recently, a growing sense of alarm has emerged for aquatic invaders that cannot be seen with the naked eye, such as viruses, bacteria and parasites. Such is the case with the microscopic invader, Viral Hemorrhagic Septicemia (VHS) virus, announcing its arrival in 2005 and 2006 with a significant number of large-scale fish mortalities around the Great Lakes. The pathogenic effects of this microbe are clearly evidenced by massive die-offs among VHS-infected Great Lakes fish, including muskellunge, freshwater drum, yellow perch, gizzard shad, white bass and round gobies.

VHS, typically a marine viral fish disease, has caused mortalities in rainbow trout and turbot aquaculture operations in Europe, and in Pacific herring and pilchard populations along the Pacific Coast of North America. This virus has a number of identified isolates (unique genetic types) grouped in four types; three from Europe and one from North America. The isolate recently found in Great Lakes fish, most similar to the VHS strain previously isolated from the Atlantic Coast in eastern North America, appears to have slightly mutated, causing mortalities in wild freshwater fish populations.

Fish infected with VHS exhibit hemorrhaging in the skin, including large red, patches particularly on the sides and anterior portion of the head. Internally, all organs are often congested with multiple hemorrhages in the liver, spleen and intestines. The swim bladders can also be congested with hemorrhages, giving the otherwise transparent membrane a mottled appearance. The ultimate cause of death is usually internal organ failure, often the kidney, or the inability to osmoregulate the control and balance of chemical elements in the body versus the water. Sick fish will often appear listless, swim in circles, or hang just below the surface.

VHS is transmitted horizontally (between fish) by urine, feces and sexual fluids. Reservoirs include clinically ill and carrier fish that do not show signs of infection. The virus can be found on the surface of the salmonid eggs during spawning of infected female broodstock and is capable of persisting for a sufficient time period to result in vertical (actually egg-associated) transmission between generations (adult to progeny). It is also likely to enter the body through the gills, wounds or ingestion of infected prey, although direct oral transmission is unlikely. Although virulent to fish populations, VHS is not a human pathogen and does not pose risks to human health.

It is estimated that VHS arrived in the Great Lakes around 2002, probably introduced by untreated ballast water originating from the Maritime Region of Canada where the isolate of the virus has been found. The large-scale fish kills caused by VHS, typical of a new virus infecting a native fish community, indicate this aquatic invader is a new arrival to the Great Lakes. VHS-infected fish have been documented in Lake Huron (Cheboygan and Alpena areas), Lake St. Clair, Lake Erie (all basins), Niagara River, Lake Ontario (Rochester area), and the St. Lawrence River (Thousand Islands area). Vulnerable coolwater species include muskellunge, northern pike, walleye, yellow perch, white bass, bluegill, black crappie, smallmouth bass, rock bass, freshwater drum, gizzard shad, round gobies, silver redhorse, shorthead redhorse, emerald shiners, and spottail shiners. The coldwater species are Chinook salmon, lake whitefish and burbot.

It is predicted that VHS will be found in Lake Michigan in the next 1-2 years based on the widespread fish movements, particularly Chinook salmon, between lakes Michigan and Huron. If fish movement proves to be the key vector, the virus will likely take a long time to get established in Lake Superior given the limited movement of fish through the Soo Locks. The range expansion of VHS could be significantly different if the key vector is ballast water exchange. Duluth Harbor in western Lake Superior has the second highest ballast exchange rate in the Great Lakes and the Chicago area also has a very high ballast exchange rate. The virus could quickly be spread by the ballast vector if the virus can remain viable for sufficient time to be transported by this method.

Once introduced into a wild fish community, VHS is impossible to effectively eliminate and difficult to control. This contagious disease can cause large-scale mortalities of valuable adult fish with a wide range of potential carriers throughout the Great Lakes and inland waters. All potential human-caused movement vectors are being evaluated to reduce the potential spread of this pathogen by human intervention.

Members of the Great Lakes Fish Health Committee and the Council of Lake Committees, both under the umbrella of the Great Lakes Fishery Commission, have developed and adopted management measures to contain and slow the spread of this pathogen within state jurisdictional borders and the Great Lakes basin. These measures range from greatly increased VHS surveillance in their waters to restricting bait fish movement within their borders to a moratorium on the hatchery production of selected high risk fish species such as walleye. Other measures being taken to control this pathogen are strict regulation of interstate fish movements between and from infected regions by state departments of agriculture and the U.S. Department of Agriculture – Animal and Plant Health Inspection Service (USDA- APHIS). Also participating in the regulatory process in the Great Lakes region are the Canadian Food Inspection Agency, a federal agency with a similar role to USDA-APHIS in Canada, and the International Organization for Animal Health since VHS is an internationally reportable disease.

Governmental agencies are requesting public assistance to control the spread of this pathogen, similar to other AIS controls. Advised are measures to ensure that both fishing and pleasure boats - along with their bilges and gear - are disinfected and cleaned after each use. Drying items in the sun for 4-6 hours and disinfecting with a bleach solution (1 cup to 10 gallons of water) are very effective. Preventing movement of live fish or water between waterbodies is also advised.

The VHS pathogen, now a permanent part of our Great Lakes aquatic community, will require intensive management for the foreseeable future. The risks posed by this microscopic viral invader provide compelling evidence to halt further aquatic invasions if we are to preserve Great Lakes water quality and our amazing fisheries. **Contact:** Gary E. Whelan, Michigan DNR, 517-373-6948, whelang@michigan.gov.

The ANS Update is a quarterly publication of the Great Lakes Commission to address ANS issues in the Great Lakes basin. Please contact Katherine Glassner-Shwayder at the Great Lakes Commission, Eisenhower Corporate Park., 2805 S. Industrial Hwy., Suite 100, Ann Arbor, MI 48104-6791.
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Written contributions to this newsletter are encouraged.

Great Lakes Panel Update

The 2007 spring meeting of the Panel was held in conjunction with the ANS Task Force meeting May 8-11 in Erie, Penn., at the Tom Ridge Environmental Center. This joint meeting featured a special session on ANS state management planning. Meeting materials are available on the Panel web site (www.glc.org/ans/panel.html#glpmeet). Proceedings from the Great Lakes Panel fall meeting (Dec. 13-14, 2006, in Ann Arbor, Mich.) are available on the aforementioned website. A significant outcome of the fall meeting includes recommendations on rapid response planning. **Contact**: Kathe Glassner-Shwayder, Great Lakes Commission, 734-971-9135, shwayder@glc.org.

Washington Watch

On March 1, Sen. Carl Levin (D-MI) introduced the National Aquatic Invasive Species Act (NAISA) of 2007 (S. 725) to reauthorize and strengthen the 1996 version of the bill. The bipartisan legislation, also sponsored by Sen. Susan Collins (R-ME), outlines a broad-based, national approach to stemming the threat from invasive species. Among its provisions are uniform standards for ballast water discharge and an early detection and rapid response program to head off new invasions. Also introduced early this year, by Rep. Judy Biggert (R-IL) and Sen. Dick Durbin (D-IL), is legislation (H.R. 553 and S. 336) to improve the electric dispersal barrier on the Chicago Sanitary and Ship Canal in Illinois. The bills would authorize the U.S. Army Corps of Engineers to complete construction on the permanent barrier; upgrade and make permanent the original demonstration barrier; and operate both barriers as a system. Funding for the barrier system has also been included in the President's FY2008 Budget request to Congress. **Contact:** Joy Mulinex, Senate Great Lakes Task Force, 202-224-1211, joy_mulinex@levin.senate.gov.

Around the Basin:

ILLINOIS: The Asian Carp Symposium (Aug. 2006 in Peoria) assembled leading national and international scientists to discuss challenges posed by Asian carp and control strategies. Illinois-Indiana Sea Grant also partnered with the Chicago Department of Environment to distribute Habitattitude™ posters to Chicago pet stores with distribution to be expanded throughout the state with DNR assistance. **Contact:** Patrice Charlebois, IL-IN Sea Grant, 847-872-0140, charlebo@uiuc.edu.

INDIANA: In August 2006, the only known infestation of monoecious hydrilla in the Midwest was discovered in Lake Manitou, only a half hour from the Great Lakes basin. Management efforts in 2006 focused on containment, with application of chemical treatment and closure of all lake access points. Plant surveys at nearby lakes found no detections of hydrilla. Multiple-year chemical treatment has been initiated. Indiana's SMP workshop, held in Indianapolis January 2007, focused on aquatic plants in trade. Industry was supportive of strategies to prevent invasions of aquarium and water garden plants. Future stakeholder meetings will focus on recommendations for white and black regulatory lists, as well as strategies to prevent escape of species allowed for sale. **Contact:** Doug Keller, IDNR, 317-232-4080, dkeller@dnr.IN.gov.

MICHIGAN: Gov. Jennifer Granholm has proclaimed May 22-28, 2007, as the fifth annual Aquatic Invasive Species Awareness week. Michigan Sea Grant will conduct trainings for the state's Clean Boats, Clean Waters pilot program, continuing a project funded by MDEQ's Office of the Great Lakes. In September 2006, Michigan Sea Grant and the Great Lakes Commission sponsored a stakeholder's workshop to develop a risk-based process for Michigan's Invasive Species Advisory Council to guide in recommending species listings and delistings under Michigan's new invasive species laws. As of Jan. 1, 2007, oceangoing vessels are required to obtain a permit from MDEQ for port operations in Michigan. Under conditions of the permit, ballast water must not be discharged or must be treated prior to discharge. **Contact:** Emily Finnell, MDEQ, 517-241-7927, finnelle@michigan.gov.

MINNESOTA: Minnesota Sea Grant and DNR continue to implement national Stop Aquatic Hitchhikers!™ and Habitattitude™ campaigns, appearing at the January 2007 Minnesota Green Expo and various boat and angling shows. The Minnesota Invasive Species Council produced a 2007 Invasive Species calendar (www.mda.state.mn.us/misac/). Sea Grant consulted with the National Sea Grant Law Center in Mississippi to evaluate the rights of a state regulating shipping (http://seagrant.umn.edu/downloads/ballast.pdf). **Contact:** Doug Jensen, MN Sea Grant, 218-726-8712, djensen1@umn.edu; or Jay Rendall, MNDNR, 651-259-5131, jay.rendall@dnr.state.mn.us.

OHIO: The ODNR has initiated an internal technical review of Ohio's ANS State Management Plan, first instituted in March 1999. In support of this review, ODNR sponsored an SMP workshop in April, in collaboration with the Great Lakes Commission and the Ohio Sea Grant College Program. Workshop outcomes will lay the groundwork for development a rapid response plan for Ohio. Recognizing baitfish as a high risk ANS vector, ODNR is updating its baitfish publication to include an ANS component. **Contact:** John Navarro, ODNR Division of Wildlife, 614-265-6346, john.navarro@dnr.state.oh.us.

PENNSYLVANIA: The ANS Task Force approved Pennsylvania's Aquatic Invasive Species Management Plan (AISMP) in early 2007. The plan, developed by Pennsylvania Invasive Species Council, was signed by Gov. Rendell in November 2006. A partnership between Sea Grant and PADEP has been established to coordinate the Zebra Mussel Monitoring Network in Pennsylvania. A seminar on Viral Hemorrhagic Septicemia (VHS) was held in January, including discussion on possible VHS regulations. Related educational VHS posters and post cards are available online at http://seagrant.psu.edu. **Contact:** Jim Grazio, PADEP, 814-217-9636, jagrazio@state.pa.us.

WISCONSIN: A DNR biennial 2005-06 report was recently submitted to the governor and legislature on controlling AIS in Wisconsin waters (see DNR web page). A list of waters vulnerable to zebra mussel infestation has been identified by the UW-Madison Center for Limnology. The list will be used to prioritize zebra mussels sampling this summer. Clean Boats, Clean Waters workshops will be held this spring and summer to train volunteer watercraft inspectors. The Natural Resources Board recently approved emergency rules to help control the spread of VHS in Wisconsin's fisheries. **Contact:** Ron Martin, WDNR, 608-266-9270, Ronald.Martin@Wisconsin.gov.

ANS Task Force

The Task Force finalized its strategic plan for 2007-2012; the plan is available on the ANSTF web site listed below. The ANS expert database (developed by USGS) is complete and being populated in coordination with the Regional ANS Panels. The spring ANSTF meeting was held May 8-10, in Erie, Pa., featuring a session on ANS state management plan process/program. Meeting summaries, including follow-up actions and associated documents will be made available at http://anstaskforce.gov/meetings.php. **Contact:** Scott Newsham, USFWS, 703-358-1796, Scott_Newsham@fws.gov.

Upcoming Events

- *Risk Assessment Training Workshop,* sponsored by the Mississippi River Basin Panel on Aquatic Nuisance Species. Kansas City, Mo., Aug. 21-23, 2007. http://wwwaux.cerc.cr.usgs.gov/MICRA/RiskAssessmentWorkshopDraftagendaMRBP04-02-07.pdf. **Contact:** Mike Hoff, USFWS, michael_hoff@fws.gov; 612-713-5114.

On the Bookshelf

- *Invasive Species of Aquatic Plants and Wild Animals in Minnesota: Annual Report for 2006*. 2007. Contact: Jay Rendall, MNDNR, 651-259-5131, jay.rendall@dnr.state.mn.us, or visit http://www.dnr.state.mn.us/ecological_services/invasives/index.html.
- *Stop Exotics, Clean Your Boat* DVD. 2006 (VHS 2001). $5 each. **Contact**: Doug Jensen, MN Sea Grant, 218-726-8712, djensen1@umn.edu.