

## Deadly fish virus lurks off Oregon Coast

Great Lakes show devastation of its freshwater strain

**HENRY MILLER**

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Officials in the Pacific Northwest are worried that a fish virus that causes fish kills in the Great Lakes could get here.

In a sense, it's already here and has been for quite awhile.

Viral hemorrhagic septicemia, better known as VHS, has been found in ocean fish from Coos Bay north to the Gulf of Alaska.

The seagoing strain of the virus, which does not affect humans, has devastated herring schools in Puget Sound near Seattle and Prince William Sound.

And an apparently new mutated freshwater strain has done the same in the Great Lakes, killing fish from minnows to muskies.

"What seems to be the case is these marine strains don't seem to come ashore very readily. And they've had plenty of opportunity with migrating salmon," said Jim Winton, the chief of the Fish Health Section of the USGS Western Fisheries Research Center in Seattle.

"We occasionally find the marine strain of VHS in a spawning salmon, mostly coho," he added. "But it doesn't seem to have spread to freshwater species."

Not so with Isolate IVb, the virus moving through the Great Lakes that first showed up in 2003 in muskellunge in Lake St. Clair.

From there it spread with recorded die-offs beginning in 2005 in Lake Ontario, Lake Erie, Lake Huron and Lake Michigan.

And in May, it showed up in Lake Winnebago, the largest inland lake in Wisconsin.

"It's connected, but not by any fish-passable barriers, to Lake Michigan," said Mike Staggs, director of the Bureau of Fisheries Management for the Wisconsin Department of Natural Resources.

While Wisconsin officials saw a certain inevitability about the arrival of viral hemorrhagic septicemia as it advanced across the Great Lakes, the speed caught them somewhat off-guard.

And it proved costly.

"We have a very extensive lake sturgeon restoration program going on," Staggs said. "And unfortunately, we were raising about four or five strains of lake sturgeon at the same facility where we were raising Great Lakes Chinook salmon, and so there was the potential for cross contamination."

"So we ended up, you know, destroying the fish and not stocking them out."

The list of fish that it infects is long and includes muskellunge, gizzard shad, northern pike, freshwater drum, white bass, round goby (ironically, itself an invasive non-native from the aquarium trade) and a variety of suckers.

The species that VHS infects that are shared by the Great Lakes and the Pacific Northwest include yellow perch, smallmouth bass, walleye, bluegill, crappie, lake trout, steelhead and Chinook salmon.

It takes a week to 15 days of incubation in infected fish.

Symptoms can range from no outward appearance to pale gills, bulging eyes, bleeding around the eyes, fins and sides of the head and behavioral changes such as swimming in a spiral.

Internally, the liver, spleen and intestines can be clotted with bleeding sores, the signs of which can include a bloated-looking, fluid-filled abdomen.

It kills in days. And fish that survive become viral carriers for the rest of their lives.

Stress is one factor that can trigger outbreaks, which is why hatchery, net-pen and fish-transport crowding can accelerate the spread.

And that's also one of the reasons that it seems to slam concentrations of fish such as minnows and herring. Because they swim in tight schools, it mimics the crowding in artificial confinement.

The virus is secreted in urine and feces, or in body fluids while spawning, so the closer the contact, the higher the probability of infection.

For a virus with a reputation as a stone killer — headlines after the initial fish die-offs in the Great Lakes called it "Ebola-like" — the VHS virus is fairly frail, Winton said.

"If you have it in pure water that's filtered with some protein in it to stabilize it, if it was on ice, the virus would be stable for a couple of weeks," he said. "But for the most part, the decay rate at normal temperatures, and in normal kinds of water ... is not particularly good.

"It's a little bit like the herpes virus where you don't get it from toilet seats; you get them from something more direct ... it's not terribly stable in its environment outside of its host."

So the odds of the virus arriving intact in a frozen package of Uncle Norm's secret sturgeon bait from the Great Lakes are theoretically and biologically possible, but it's a long shot, officials said.

But there are other potential pathways that have fisheries officials here concerned, especially because of virtually unregulated, unmonitored commerce via the Internet.

"You don't hear it discussed much, but I can go on Google right now and find virtually anything from someplace in the world that somebody will ship me something that is either dangerous or harmful, or even illegal."

Jim Gores, the invasive species coordinator for the Oregon Department of Fish and Wildlife, has been thinking about a similar scenario.

"The thing that got my attention was I was doing a pond shop check down in Grants Pass last year," he said. "And a guy who was running a koi pond shop down there said he was having a hard time finding sources of koi (ornamental goldfish) that could be certified as being VHS-free.

"And so that told me right then and there that he cares about that. But what about some guy who's just out for a buck, who says 'Who cares? So they've got a little disease in them, so what? I'll make money off of them so that even if half of them die' ... and boom, we've got it."

Virus strains that wipe out host populations are themselves almost always doomed to extinction, said Paul Reno, a just-retired professor of microbiology in the Department of Fisheries and Wildlife at Oregon State University.

"I think one of the keys here is that a disease that kills off a high percentage of the population very rapidly will die out," he said. "Whereas a disease that either doesn't kill anything, or kills at a very slow rate, is going to be around a lot longer, and it's going to be successful a lot longer."

But even if the lethal Great Lakes strain peters out, or fish develop immunity, the big question for those dealing with issues such as salmon and herring in the Pacific Northwest and minnows and muskies in the Great Lakes fish populations is the long-term consequences after it's done.

Because the virus hits hardest at the most dense concentrations of fish — baitfish and minnows — it is killing off the main food source for a those highly prized game fish.

For Winton, it's an intimate question.

"I have personal knowledge, because I can't catch a salmon in Puget Sound because I can't find the herring," he said. "And you know the forage base has really been hammered.

"And then, of course, a lot of the top predators aren't where they used to be. Or they aren't in the numbers that they used to be."

And for Staggs, now six months into the discovery of VHS in Lake Winnebago, it's a question of how many dominos are going to knock each other over.

And how many can be picked up.

"Gizzard shad are a big forage species in Lake Winnebago that has sturgeon, walleye, and we're trying to restore some Great Lakes spotted muskie strains," he said. "And all of those depend on gizzard shad.

"So if we had a giant population problem with them, it would have system effects, no question."

*hmiller@StatesmanJournal.com or (503) 399-6725*