

NEWPORT, Ore. – A new study has found that a parasite that causes deadly “whirling disease” in juvenile trout and other salmonids may be transmitted from one fishing hole to another – and from one stream to another – on fishing boots and waders.

Please wash your gear everytime you use it!!!

The spread of whirling disease within the United States over the past half century has primarily been through the movement of infected fish through hatcheries, researchers say. But increasingly whirling disease has begun to show up in streams not stocked with infected fish and researchers have discovered that its transmission is not accomplished directly from fish to fish.

“The bottom line is that we’ve found that the spores that eventually infect the fish and lead to whirling disease can survive out of water for eight hours on the soles of waders,” said Paul Reno, a microbiologist with the Coastal Oregon Marine Experiment Station at Oregon State University. “In laboratory tests, we found that these spores can indeed attach themselves to the bottom of boots and waders, and become viable when reintroduced into clean water containing trout.”

Whirling disease is a neurological disorder caused by the parasite, *Myxobolus cerebralis*, which primarily affects juvenile trout causing severe deformities of the skeleton and skull – and can lead to mortality rates as high as 100 percent. It also can affect Atlantic salmon, steelhead and possibly other salmonids, though there have been fewer impacts on those species.

“Characteristically, it affects little fish – the fry – which then swim around in circles and, if the infection is severe enough, eventually most will die,” Reno said. “After the spores enter through the skin, the parasite eventually works its way through the fish and imbeds into their skulls and skeleton, degrading the cartilage. Originally, it was thought to affect the equilibrium of the fish, but a few years ago an anatomist found that the degraded cartilage was actually pinching their nerves and causing deformities.

“If the fish are big enough, they seem to be able to withstand the effects,” added Reno, who is a professor in OSU’s College of Agricultural Sciences. “That may explain why it hasn’t caused as many problems with salmon and steelhead.”

The disease was first recorded in U.S. waters in the mid-1950s in Pennsylvania, and it slowly made its way west, appearing in Colorado in the early 1980s, and in Montana’s blue-ribbon trout rivers in the mid-1990s.

In Oregon, whirling disease has been identified over the past two decades in tributaries of the Grande Ronde system in the northeastern part of the state, and more recently in Clear Creek on the Clackamas River system.

The life cycle of the parasite causing whirling disease is complex, Reno said. Once established in the skull of an adult fish, *Myxobolus cerebralis*, which is only about 10 microns, or .01 millimeters in size, is released into the water after the fish dies and decomposes. These microscopic parasites are then devoured by tubifex worms that live in the mud of freshwater streams and lakes, he added.

“These worms act as a second host for the parasite, which metamorphoses into these 300-micron monsters that are shaped like a river anchor,” Reno said. Then known as triactinomyxon, or “TAMs,” the parasites remain in the mud-dwelling worms until they are excreted into the lower water column. Nearby trout redds are particularly vulnerable to the parasite, which can attach to the skins and shoot spores into the juvenile trout, penetrating their skin and beginning the cycle once again.

Interestingly, the TAMs only live in certain strains of host tubifex worms.

“Susceptible strains of tubifex worms are found pretty widely across the state, as are strains that are more resistant,” said Jerri Bartholomew, a microbiologist with OSU’s Center for Fish Disease Research. “There is no obvious reason why whirling disease hasn’t become established in other places in Oregon, except that tubifex densities are often fairly low.”

In their studies, Reno and his colleagues at OSU’s Hatfield Marine Science Center in Newport wore waders and stepped into a water tank that contained mud with tubifex worms at the bottom. They found that stepping in the mud containing infected worms released the spores, which then attached to the waders. Wearing the waders into a separate clean tank, with healthy rainbow trout, was enough to infect the fish.

Conversely, when dead, infected trout were used as a source of the parasite, the spores adhering to the bottom of the waders could infect the worms. Even after the waders were left to dry for several hours, enough infectious material remained to infect new hosts.

Reno said the OSU researchers also tested whether the parasite could be passed through birds – especially mergansers, mallards and crows – that might feed on the juvenile fish or worms, but results were inconclusive.

Rainbow trout appear most susceptible to whirling disease, Reno said, and European researchers are developing strains of fish that are more resistant to infection.

The OSU study was funded by Montana State University.

About OSU’s Hatfield Marine Science Center: The center is a research and teaching facility located in Newport, Ore., on the Yaquina Bay estuary, about one mile from the open waters of the Pacific Ocean. It plays an integral role in programs of marine and estuarine research and instruction, as a laboratory serving resident scientists, as a base for far-ranging oceanographic studies and as a classroom for students