



COLORADO STATE PARKS
BEST MANAGEMENT PRACTICES



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Parks

Whirling Disease
Information and Status



WHIRLING DISEASE AND COLORADO'S TROUT

Source: all information was taken directly from Colorado Division of Wildlife website: <http://wildlife.state.us/fishing/whirling.htm>

Whirling disease is a parasitic infection of trout and salmon caused by a microscopic amoeba that produces a spore. The water-borne parasite (*Myxobolus cerebralis*) may not directly kill trout, but fish heavily infested can become deformed or exhibit the erratic tail-chasing behavior from which the disease gets its name. Eventually, heavily infected young fish may die. The parasitic disease probably originated in Europe, where native brown trout have developed a natural resistance to the parasite through co-evolution. But these fish can still carry and transmit the spore.

How it Affects Fish

The whirling disease parasite has a two-host lifecycle that involves trout and an alternate host, a common bottom-dwelling tubifex worm. When an infected trout dies, large numbers of spores are released and then ingested by the tubifex. The spores incubate within the worm's gut, multiplying rapidly. When released from the worm, these water-borne spores can infect susceptible fish by attaching to their bodies, or when fish eat infected worms. Whirling disease spores are hardy, resist freezing, drought and can remain viable for decades.

Trout and salmon native to the United States did not evolve in areas with the whirling disease spore. Consequently, most native species have little or no natural resistance. Young fish are at greatest risk because the parasite attacks their soft cartilage, causing nerve damage, skeletal deformities and in some cases death. Once a fish reaches three to four inches in length, cartilage forms into bone and the fish is no longer susceptible to effects from whirling disease. However, they remain carriers of the parasite.

Whirling Disease in Colorado

Whirling disease was first observed in the United States around 1958. The parasite was accidentally introduced in Colorado in the 1980s through imported trout from a private hatchery. It's now found in at least 20 states, including West Virginia, Pennsylvania, New York, Ohio, Michigan and most western states.

Whirling disease is thought to be a major factor in the declines of wild rainbow trout populations in certain Colorado waters. It's suspected that the outbreak of the disease may be linked to other environmental factors that aren't yet apparent. The parasite has

been confirmed in 13 of Colorado's 15 major river drainages, including the Colorado, South Platte, Gunnison, Arkansas and Rio Grande rivers.

Stocking

A policy implemented in spring 1995 prevents the stocking of trout from hatcheries testing positive into waters where whirling disease has not been found. This includes wilderness areas and streams where native trout may be restored. Trout from positive hatcheries will be stocked into waters where the parasite has been found to minimize the risk of contaminating other watersheds. Only trout from negative testing hatcheries can be stocked into waters where the parasite has not been found.

WHIRLING DISEASE AND THE LISTING OF IMPAIRED WATERS

Source: Information was taken directly from the Trout Unlimited website:

<http://www.cotrout.org> 6/21/00.

As part of a larger package (including streams harmed by low flows, sediment, and temperature), TU has asked the Colorado Water Quality Control Commission to add 18 streams suffering from whirling disease to Colorado's "303(d) list" of impaired waters. Each of these streams has been identified by the Colorado Division of Wildlife (DOW) as being "severely" or "moderately to severely" impacted by whirling disease. Colorado is required to prepare a list of all of the state's impaired streams every two years. In the past the list has generally focused on streams that do not meet standards for a specific pollutant (such as zinc or ammonia), but the list is also supposed to include streams where the designated use of the stream is impaired. For the streams proposed by TU, this designation is for coldwater aquatic life, class one – i.e., a healthy fishery.

The WQCD has defined significant impairment as a decline in the abundance or diversity of aquatic species. The loss of even a single species represents a loss of diversity. And, a decline in the abundance of a single species can also constitute impairment. The protection of the Clean Water Act and Colorado Water Quality Control Act extends to non-native species, provided that the stream has previously supported a healthy fishery. When the species affected is rainbow trout, which the WQCD has used as an indicator species for many pollutants, the decline is particularly compelling. Native cutthroat trout are also severely affected by whirling disease, so heavily infected streams could not support a native fishery.

If a stream is listed, the Water Quality Control Division (WQCD) will work with all involved parties to determine the specific causes of impairment and then to develop a stream-specific solution. **In some streams, the problem may be excessive sediment providing habitat for the Tubifex worm, which perpetuates whirling disease. In others, it may be whirling disease spores released in effluent from fish hatcheries.** Whatever the causes of the problem, the WQCD is charged with developing a river-specific plan to address them. Federal money under the Clean Water Act and Farm Bill may then be available to help finance restoration.

Whirling disease is a big problem, and addressing it will require the authorities, expertise, and resources of many parties. While the DOW has authority over stocking, it does not have authority over other activities that may be necessary to restore an impaired stream. For example, **although the DOW can clean up the effluent from its**

own hatcheries, it does not regulate hatchery effluent; the WQCD does that. Where impairment results in part from the accumulation of sediment and organic materials providing habitat for the Tubifex worm, DOW again has no authority to address the problem – but the WQCD does. Given the abundance of Tubifex worms in disturbed habitats, it is vital to look at whirling disease not just from a stocking standpoint but from a larger environmental perspective. Or, as Daniel Gustafson from the Montana State University Department of Biology has written, "Whirling disease, treated as a fish health problem, has no sure solutions in sight ... Whirling disease, treated as an environmental problem has many obvious solutions."

Stocking policies

Last fall, the Division of Wildlife released new research suggesting that the stocking of infected fish in WD+ reservoirs was increasing the level of infection in brown trout populations downstream (for highlights from the research, see the whirling disease page). CTU believes this research offers further evidence that the stocking of infected fish (even in habitats that already have the WD parasite present) can harm the resource. There have been many questions about how the DOW will – or will not – respond to these important new findings in their management programs, where "lightly" infected trout continue to be stocked in numerous waters around the state (the so-called "B waters").

The response is now underway. DOW Director John Mumma instructed aquatics section staff to review all of the current B waters in light of the new research and determine where changes in the stocking of WD+ fish should take place. That review is taking place this month, so if you want to provide input you should contact the Division as soon as possible (the DOW's address is 6060 Broadway, Denver, CO 80216).

Rifle Falls Hatchery

The Division of Wildlife's hatchery clean-up program includes plans for shifting to spring water supplies and eradicating whirling disease at the Rifle hatchery, one of the state's most productive hatchery facilities. Because of its size, the Rifle hatchery is a vital piece of efforts to provide adequate production of disease-free fish for Colorado's western slope. Late last year, the Rifle City Council (who must approve portions of the Division's proposal that involve City Park land) decided to cut off talks with the Division of Wildlife on this project. The City has some very valid concerns about the project – for example, protection of the unique stream and canyon within the Park. CTU shares these environmental concerns, but believes the City should try to resolve these issues with the DOW rather than rejecting the project outright.

After all, if there is any developer who would be willing and able to work with local government to ensure environmental protection under their project, it will be the Division of Wildlife! If you'd like to encourage the Rifle City Council to return to the table with the DOW and work on developing a plan to eliminate WD from the Rifle Falls hatchery while still protecting the Park, you can write to them at: City of Rifle, 202 Railroad Avenue, Rifle, CO 81650.

The following are excerpts selected by Trout Unlimited from the DOW report.

Trout Unlimited recommends reading the full report to fully assess the significance of the research.

"STREAM FISHERIES INVESTIGATIONS", SEPTEMBER 1999

"Our filtration research clearly indicates that small lakes, reservoirs, and earthen ponds where Mc-infected rainbow trout have been stocked or reared are often "hot zones" of high infectivity. The earthen bottom rearing ponds on the CDOW's Poudre and Roaring Judy Fish Rearing Units produce very high levels of TAM actinospores." p. 79 "The empirical data in Tables 2 through 15 suggest that there is a positive correlation between density of TAM actinospores detected in the outflow of lakes and reservoirs and the number of Mc-exposed catchable trout stocked." p.79

"We have found very high levels of Mc actinospore density on a sustained basis at two different stations downstream of Montgomery Reservoir ... [which] has been stocked with Mc-infected catchable trout on a sustained basis for more than 10 years ... In contrast, just 0.3 km upstream from Montgomery Reservoir we have never detected Mc actinospores in water samples ... Moreover, we have not detected genomic DNA of the Mc parasite in either water or trout samples from the stream above the lake." p. 106

"Cottonwood Lake, in the headwaters of South Cottonwood Creek in the Arkansas River drainage is another small (17 hectare – 43 acre) lake with a decade long history of stocking of Mc-infected catchable rainbow trout ... Again, we found 100 percent incidence of Mc-infection ... downstream of the lake ... we found very little evidence of Mc-infectivity in trout 3 km upstream of Cottonwood Lake. There was zero incidence of Mc-infection." p. 107

"Our water filtration studies on the Cache la Poudre River and the CDOW Poudre Rearing Unit clearly point to the effluent water leaving the unit as a major source of Mc actinospore production in the Poudre River drainage." p. 108

"There is much hope in the data presented that we are going to succeed (to a considerable degree) in stopping the spread of this pernicious parasite. We make that bold statement with the caveat that the agency (CDOW) and the public does not give up on the effort and cease to follow through." p. 112

"If the stocking of Mc-infected trout into standing bodies of water is terminated, the level of Mc actinospore production can decline quite dramatically within a year or two. IF there is not some other source of Mc myxospores to sustain a high level of Mc infectivity. Once again, our empirical evidence suggests that in many cases there is not a "naturally occurring" environmental source." p. 113

"We believe the data presented substantiates the conclusion that the incidence and severity of infection in young brown trout is strongly correlated with the management practice of stocking Mc-infected trout in small lakes and reservoirs that have streams flowing through them ... Continuing to manage these coldwater habitats with the stocking of Mc-exposed trout in light of the evidence presented in this report is not in the best interests of protection and/or enhancement of habitat or maintenance of species diversity in the long term." p. 115 (emphasis ours)

RESEARCH FINDINGS FROM THE 6TH ANNUAL WHIRLING DISEASE CONFERENCE; Feb.3 and 4, 2000 in Idaho sponsored primarily by U.S. Fish and Wildlife Service and Trout Unlimited.

Susceptibility

Studies in Wyoming suggest that Snake River cutthroat are more resistant to whirling disease than are rainbow trout. Mountain whitefish can get whirling disease, though clinical signs of the disease were less distinct and appeared later in life than is true for rainbow trout. Atlantic salmon appear to be quite resistant, while lake trout apparently do not become infected at all.

Genetics or environment? Assessments of rainbow trout in the Colorado River (where WD has been devastating) vs. Big Thompson River (where WD has not had major impacts) showed a great deal of overlap genetically – suggesting that environmental factors and not genetics may be responsible for the differences in how WD has affected the two rivers.

Transmitting the disease Colorado studies have found that Tubifex worms exposed to feces from infected brown trout become infected with whirling disease. Traditionally, it was believed that spores were only released when a fish died and decomposed (or was eaten by a predator). It now appears that viable spores may be shed in the feces of live trout.

Stocking and WD

Studies in Colorado have indicated that the level of infectivity in wild fish may drop when the stocking of infected fish is halted. Studies in Idaho have also found a steady decline in the percent of returning salmon and steelhead that are infected with WD, coinciding with when Idaho ended the stocking of WD+ trout.

Tubifex worm studies

Contrary to past assumptions, WD infection in Tubifex worms appears to persist throughout the life of a worm, and worms can release the "TAM" spores that infect fish more than once during their lives. There also appears to be substantial variation in the numbers of spores produced by different variants of Tubifex from different geographical areas. Finally, as is the case for trout, WD reduces the survival and reproductive success of infected worms.

For more information on whirling disease, visit:

- Trout Unlimited – <http://www.cotroun.org>
- Colorado Division of Wildlife- <http://www.dnr.state.co.us/wildlife/>
- The Whirling Disease Foundation - <http://www.whirling-disease.org/>