North Carolina Wildlife Resources Commission
Whirling Disease Frequently Asked Questions
29 July 2015

What is whirling disease?

Whirling disease is a disease of salmonid fish, the family of fish that includes trout and salmon. The disease is caused by a microscopic parasite known as *Myxobolus cerebralis*. In an infected fish, the parasite can affect nerves and cause cartilage damage that results in the outward signs of whirling disease, which include abnormal whirling or tail-chasing behavior and sometimes a black tail in younger fish. In older fish, signs may also include deformities to the head or body. These abnormal behaviors make the fish more susceptible to predation and make it harder for it to find food. Severe whirling disease infections can kill trout, but fish with no visible signs of disease may still carry the disease.

Where is whirling disease found?

The parasite that causes whirling disease (*Myxobolus cerebralis*) was introduced to North America from Europe, where it's native. It was first discovered in the United States in Pennsylvania in 1956. Since then, it has been reported in numerous states and continues to spread. The presence of the parasite doesn't always mean whirling disease will cause dramatic population losses. In a number of states, the parasite has been observed only in isolated cases and has had very little noticeable impact. However, the disease can be a serious problem in hatcheries, and in Montana and Colorado, impacts on wild trout populations have been more pronounced. The whirling disease parasite's range is expanding in the United States and the impacts vary from river to river.

What kinds of fish are susceptible to whirling disease?

All species of trout and salmon can be infected with the parasite, but not all species will develop whirling disease. There is a wide range in susceptibility to the disease. Rainbow Trout and Brook Trout appear to be the most susceptible of trout species in North Carolina. Brown Trout can become infected with the parasite and may carry the disease, but they are much more resistant to the disease and have not been as greatly impacted as Rainbow Trout.

Scientists have also found that the age of the fish when first exposed to the parasite is very important. Very young fish are highly susceptible, but after a fish reaches four months old it is fairly resistant to whirling disease.

What will whirling disease do to trout populations in North Carolina?

The parasite that causes whirling disease is established in hundreds of waters across the United States, its presence does not always mean a dramatic population loss. How an outbreak affects a trout population will depend on many factors including water quality, water temperature, and substrate quality.

How long has whirling disease been around?

Whirling disease was first described in Germany in 1903. It was first detected in the United States in the 1950s and the parasite is now widespread. In the 1990s, national attention was directed at the problem when whirling disease was linked to declines in trout populations in the Intermountain West.

How is whirling disease transmitted?
Whirling disease is transmitted by infected fish and fish parts. It may also be transmitted by birds and anglers can carry the parasite on infected fishing equipment. However, infected fish and fish parts are the main vector for the spread of the disease. A single fish can be infected with many thousands of spores (up to a million or more)!

Is there a cure for whirling disease?
No, there is no known cure for fish infected with the whirling disease parasite. Whirling disease can be controlled in hatchery environments with careful management. Its effects on wild fish can't be controlled as easily; prevention is the best option for wild fish. Generally, once the parasite is established in a stream, it is extremely difficult to eradicate. However, there are things that can be done to reduce the impact of the disease. The more that is learned about whirling disease, the better scientists and fisheries managers will be able to deal with it.

Can humans get whirling disease?
No, whirling disease does not infect humans. Eating an infected fish is not known to cause any harmful effects.

Can other kinds of fish or animals get whirling disease?
The whirling disease parasite is very specialized and will only infect fish in the trout and salmon family. Other fishes like bass, pike, and catfish cannot become infected by the parasite. Also, mammals like dogs and cats cannot be infected by the parasite.

Tell me more about the whirling disease parasite
The whirling disease parasite *Myxobolus cerebralis* is a microscopic organism that cannot be seen with the naked eye. Although it was originally classified as a protozoan, the parasite is now considered a very primitive form of animal.

What is the parasite's life cycle?
The whirling disease parasite has a complicated life cycle that requires two hosts, one is a small worm and one is a fish. Without these two hosts, the parasite cannot complete its life cycle and will die without multiplying. The worm host of the parasite is called *Tubifex tubifex*. This worm is very small (about 1/2-inch in length) and is very common and widespread around the world. The fish host is a salmonid fish.

During its life cycle, the parasite takes several physical forms that look very different from each other. Two of these are infective spore forms, called the myxospore and the triactinomyxon (TAM). The myxospore is a very small, round, durable spore that infects the Tubifex worm while in the sediment of a stream. Once inside the worm, the parasite multiplies and transforms into the next spore form, the TAM. The TAM is released from the worm into the water column where it floats until it comes into contact with a susceptible fish. The TAM attaches to the fish's skin and injects the parasite into the fish's body.

Once inside the fish, the parasite travels along the nervous system until it finds its food source, cartilage. Primarily, the parasite moves to the head of the fish and begins to digest cartilage and multiply. Inside the fish, the parasite change form again and becomes a myxospore. When the fish dies, these myxospores are released back into the environment as the skeleton decomposes. The myxospores are then ready to begin the cycle of infection again.

What are Tubifex worms?

Whirling disease requires two hosts – a worm and a fish. Tubifex worms are the required invertebrate hosts for the parasite. These oligochaete worms are called *Tubifex tubifex* and are related to the common earthworm. They are very small (about ½-inch in length) and are very common and widespread around the world. They live in sediments of lakes and streams, and thrive in areas with abundant fine sediment and rich organic material. Researchers have tested many kinds of worms and have determined that only *Tubifex tubifex* can be host to the whirling disease parasite.

How can I prevent the spread of whirling disease?

The parasite that causes whirling disease is an aquatic nuisance species. As with all aquatic nuisance species, there are several steps that can be taken by anglers and the general public to prevent the spread of whirling disease:

- Do not transport live fish from one water body to another. Even if a fish looks fine on the outside, it may carry the whirling disease parasite or other pathogens, and can introduce disease. Illegal stockings can result in unwanted introductions that can have irreversible consequences. The Commission requires a stocking permit to stock any fish into North Carolina's public waters.
- Clean carefully all equipment such as boats, trailers, waders, boots, float tubes, and fins. Rinse all mud and debris from equipment and wading gear, and drain water from boats before leaving the area where you've been fishing. The spores of the whirling disease parasite are known to adhere to these kinds of materials and can potentially be carried on gear from one stream to another. Careful cleaning using disinfectants such as household bleach will kill all forms of the parasite and reduce the risk of spreading this and other aquatic nuisance species. Remember to rinse your equipment thoroughly after using bleach to prevent this chemical from entering bodies of water.
- Dispose of fish parts carefully when cleaning fish. Dry disposal is best; dispose of the carcass in the garbage, by deep burying, or by total burning. Please do not dispose of fish heads, skeletons or entrails in any body of water. This can spread parasites and disease. Also, don't discard entrails or heads of fish down a garbage disposal. The whirling disease parasite can survive most water treatment plants and infect areas downstream.
- Contact the Commission if you observe signs of whirling disease in fish.

Information courtesy of Whirling Disease Initiative