

2001 REPORT TO CONGRESS

Whirling Disease Initiative

submitted by the

**Whirling Disease Steering Committee
of the
National Partnership
for the Management of Wild and Native Coldwater Fisheries**

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BACKGROUND

Over the past decade, the microscopic parasite *Myxobolus cerebralis*, which causes whirling disease in many salmonid fish species, has been spreading and infecting hundreds of river and stream reaches in the Western United States. The impacts of this parasite on susceptible trout can be dramatic: darkening of the tail, skeletal deformities, frenzied tail chasing (thus the name “whirling” disease), and death. This microbe is extremely hardy and long-lived, with a life cycle that employs both a fish host and an aquatic worm host known as *Tubifex tubifex*.

A Eurasian native, *M. cerebralis* made its way to North America in the 1950s. It was once believed to be relatively harmless to wild fish, but research in the mid-1990s found that it was decimating rainbow trout populations in some of the Rocky Mountain region’s finest river fisheries, from Montana’s Madison River to the Gunnison River in Colorado. Native cutthroat trout and whitefish have been found to be susceptible. Whirling disease is therefore a major threat both to biological diversity and to the multi-million dollar fishing and tourism economy. The whirling disease parasite has been reported from 23 states, from New York to California, and has generated great concern among anglers, scientists, and fisheries managers.

THE WHIRLING DISEASE INITIATIVE

The Whirling Disease Initiative was established by Act of Congress in 1997. The Initiative’s purpose is to promote, prioritize, and help fund cooperative research with direct implications for whirling disease afflicting wild trout and salmon populations. Its focus is on devising management-oriented solutions to the disease, and its ultimate clients are state and federal fisheries-management agencies.

General oversight of the Initiative is provided by the National Partnership for the Management of Wild and Native Coldwater Fisheries. The National Partnership is a consortium of organizations concerned with the status of wild and native fisheries in the United States – Federal and state agencies, professional associations and private advocacy organizations (Appendix A). Its purpose is to exert general oversight of the Whirling Disease Initiative, and also to assess the overall status of coldwater fisheries and identify areas where similar initiatives could be warranted (Appendix B). To do this, the Partnership’s Board of Representatives convenes annually for an intensive briefing by whirling disease researchers and discussions of fishery health.

In-depth scientific direction is given to the Whirling Disease Initiative by its Steering Committee. The committee is made up of representatives from state fish and wildlife agencies, Federal natural resource agencies, and the Whirling Disease Foundation (Appendix C). The Committee prepares an annual research plan, issues Requests for Proposals based on its topical priorities, selects and approves projects for funding following scientific peer review, and distributes the research results

within the scientific and fishery management communities and to other stakeholders. The Montana Water Center is the administrative entity that manages the program.

Each year, Federal funding comes to the Initiative through the Division of Hatcheries, U.S. Fish and Wildlife Service. The Initiative sponsors from 10 to 15 research projects in each cycle. A research cycle is from 15 to 18 months, including two field seasons. Typically two to four investigators are involved in each project, and they bring to the project a match of 25 to 150% of the amount of the Federal grant (Appendix D). Projects are chosen for funding by the Steering Committee, following peer review by a minimum of three independent reviewers. During the Initiative's five-year history, the Steering Committee has chosen to support a mix of projects, ranging from basic biological research to applied research directly testing potential management solutions. Early projects were principally aimed at explicating the biology of whirling disease. In 2000, the Steering Committee began shifting the priority toward field research more closely tied to possible management strategies. This "applied" focus was continued into 2001 with the encouragement of larger-scale field projects addressing the ecology of whirling disease and its behavior in the alternate, aquatic-worm host.

ACTIVITIES IN 2001

Projects Concluded in 2001

During the 2000-2001 cycle, 14 research projects and a contracted project to develop a computer model were funded with a total of \$577,346 in Federal dollars, leveraging an additional \$502,600 in non-Federal match. Research teams included 43 investigators from six states (Appendix E). Selected highlights from four just-concluded projects are:

Field Diagnostic Apparatus: The purpose of this project was to develop an apparatus for collecting triactinomyxons quantitatively from natural waters, so the degree of infection of a stream can be readily assessed. A treatment sequence using rotating-drum and packed-bed filters performed well with known concentration of TAMs in the laboratory. Coupled with pre-filtration and post-concentration steps, it was then demonstrated successfully in the field. The "tamometer" is now ready for use in assessing parasite loads in streams.

Stream Characteristics vs Infection Rates: Age-0 brown, cutthroat, rainbow, and brook trout were collected in streams of all sizes throughout the Salt River drainage, Wyoming. Trout not infected with whirling disease were only found in the headwaters of four mountain tributaries, all upstream from barriers to fish movement. Disease infection rates and histological evidence of whirling disease were highest at sites with large amounts of fine sediments and low channel slopes. Such sites were found in some spring streams with very low channel slopes, some spring streams with higher channel slopes and habitat improvements that resulted in numerous deep pools with abundant aquatic vegetation, and mountain tributaries downstream from complexes of beaver dams.

Temperature Modeling: The seasonal pattern of stream temperatures is a key determinant of the distribution, spread, and intensity of the whirling disease epizootic. The investigators used a validation database of Montana stream temperatures to develop a model and database to calculate the mean daily water temperature for any location on any stream in Montana, for any day in the past 21 years. For a particular stream of interest, one week of calibration data is needed. This model will allow statistical examination of the disease epidemiology as it relates to water temperature.

Worm Infection Assays: The investigators developed a rapid technique for sectioning the worm host of whirling disease to examine the course of infection within individual worms. Three strains of worms with varying susceptibility to infection were examined. The new technique allowed the investigators to trace the differing courses of infection they exhibited. It also allowed them to identify infected worms at an earlier stage than was previously possible. This should permit researchers to rapidly determine if worms taken from streams are or will shortly be releasing triactinomyxons.

Projects Funded Through 2002

In spring 2001, the Steering Committee selected 13 new projects for funding in the 2001-2002 research cycle. These range in subject from immunologic methods for whirling disease diagnosis, to large-scale field studies of the parasite's population-level impacts. A total of 35 investigators from nine states are involved. Adding grant and match funding, the dollar value of this work is \$921,981.

Papers Published or Presented

Research specifically targeting whirling disease in North America now has a history of several years, and publications are beginning to appear in the peer-reviewed scientific literature. Also, scientists routinely present their findings at technical conferences, particularly the annual Symposium sponsored by the Whirling Disease Foundation. Between January and September of 2001, five papers stemming from Initiative-sponsored research were published in peer-reviewed literature (Appendix F). Roughly fifteen papers based on Initiative-funded work were presented at the Whirling Disease Symposium in February 2001.

Annual Meeting of the Board of Representatives of the National Partnership

The Partnership Board of Representatives convened September 26-28, 2001 in Bozeman, Montana (Appendix G). A full day was given to discussion of the state of scientists' understanding of whirling disease, and deliberation on the most fruitful directions for new and continuing research. The second day was devoted to discussion of intellectual-property issues, the role of the Partnership, and potential additional research initiatives concerned with the health of coldwater fisheries. David Nickum of Trout Unlimited agreed to chair the Board of Representatives in the coming year.

Expert-Panel Review of the Initiative

In summer 2001 the Steering Committee engaged an independent review panel to evaluate all aspects of the Whirling Disease Initiative. The committee sought recommendations on organizational and procedural matters, and especially on moving the focus of research from basic biology to the ecology and management of whirling disease. Three experts were empaneled; none was from an organization that had ever received Initiative funding. The reviewers were: Dr. Ted Meyers, State of Alaska; Dr. John Schachte, State of New York; and Dr. Karl Johnson, University of New Mexico. They interviewed more than forty individuals who had familiarity with the Initiative from a variety of perspectives – administrative, fishery-management, or research. They provided the Steering Committee with a set of recommendations relating to administration and oversight of the Initiative, proposal solicitation, peer-review and selection, and high-priority topics

to be investigated (Appendix H). The Steering Committee considered the recommendations in a special meeting. It chose to adopt several unchanged, to adopt others in a modified form, and not to implement other recommendations.

PLANS FOR 2002

2001-2002 Ongoing Projects

As noted above, 13 projects that received funding in May 2001 are underway (Appendix I). These will conclude on or before December 31, 2002. During 2001 a project was begun in the state of New Mexico; this is the first time New Mexico investigators have been funded through the Initiative.

Solicitation for 2002-2003 Projects

In October 2001 the U. S. Congress voted to fund another round of research through the Whirling Disease Initiative. This work will begin May 1, 2002 and conclude at the end of 2003. The solicitation for research proposals has been distributed (Appendix J). For this new round of project funding, the Steering Committee has raised the suggested project funding cap, strongly encouraged collaborative projects that test management strategies, and identified several specific field-focused research topics that it particularly wishes to see investigated.

SUMMARY

While little hope exists for the eradication of whirling disease, research sponsored by the Initiative has made great strides in illuminating the basic biology of the disease and beginning to define management approaches that offer promise for containing and decreasing its impact. In the coming year, the Initiative will further focus its efforts on experimental management tactics to test the more promising possibilities, while continuing to support vital basic research to enhance our overall understanding of this disease.

The Steering Committee particularly thanks Montana's Congressional delegation – Senator Conrad Burns, Senator Max Baucus, and Congressman Dennis Rehberg – for their advocacy of this research. They also thank the Representatives of the National Partnership member organizations for their time and guidance.

APPENDICES

- A. National Partnership Board of Representatives
- B. Partnership Charter
- C. Whirling Disease Steering Committee
- D. Research Sponsorship Summary
- E. Project Findings 2000-2001
- F. Abstracts of Published Papers, 2001
- G. Partnership Meeting Agenda, September 2001
- H. Initiative Review Panel Report, October 2001
- I. Project Summaries 2001-2002
- J. December 2001 Request for Proposals