

**PHASE III PROGRAM PLAN
2003-2008
WHIRLING DISEASE INITIATIVE
Report revised: October 27, 2005**



Section I. INTRODUCTION

Purpose of Five-Year Plan

The purpose of this Five-Year Plan is to guide the third and final phase of the Whirling Disease Initiative, which will focus on: (1) addressing preliminary data gaps (as identified by the Risk Assessment); (2) development, testing, and dissemination of tools to allow fishery, hatchery and watershed managers to achieve the two goals of the Initiative (see page 4); and (3) developing and implementing a *formal* Whirling Disease Initiative outreach program. The five-year plan should serve as the foundation for future, annual research/development plans and requests for proposals, as well as outreach activities. The activities described herein are anticipated to take place over roughly the next five-year period (2003 to 2008), although development of a full suite of effective, well-characterized management tools could take longer. This is a research initiative and we cannot be certain when all the goals and objectives will be accomplished. This five-year plan revision is an attempt to lay out a plan for program closure within a defined timeframe; however, it must be emphasized that our research projections are speculative and unforeseen actions may be warranted.

Whirling Disease Background

Over the past decade, the microscopic parasite *Myxobolus cerebralis*, which causes whirling disease in many salmonid fish species, has spread and infected hundreds of river and stream reaches throughout the 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. The whirling disease parasite is extremely hardy and long-lived. Like the malaria parasite, it infects two very different hosts alternately. In the case of whirling disease, the life cycle employs a fish host and an aquatic worm host (*Tubifex tubifex*); and therefore, reaching an understanding of the parasite has required defining the biology of infected fish, infected worms, parasite spores and the so-called "TAM" life stage.

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. Most salmonids have been found to be susceptible. Whirling disease is therefore a major threat both to biological diversity and to the Nation's multi-million-dollar fishing and tourism economy. The whirling disease parasite has been reported in 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. Its purpose is to conduct research that develops practical management solutions to maintain viable, self-sustaining wild trout fisheries in the presence of the whirling disease parasite. The Initiative's ultimate clients are state, tribal, and federal fisheries-management agencies, and the constituencies they serve.

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. Board of Representatives*). The overall goal of the Partnership is to move biological research and management trials forward to make available to fishery managers practical options for controlling the disease. The National Partnership provides long-term direction to the Whirling Disease Initiative. To do this, the Partnership's Board of Representatives convenes annually for a detailed briefing by whirling disease researchers, and participates in discussions concerning fisheries health and research needs (*Appendix B. Partnership Charter*).

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. Steering Committee*). Working in collaboration with Montana Water Center staff, the Steering 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 and coordinates outreach and educational activities.

Each year, Federal funding earmarked in the Interior Appropriations Bill comes to the Initiative through the Division of the National Fish Hatchery System, US Fish and Wildlife Service. Projects are chosen for funding by the Steering Committee, following peer review by three independent reviewers. During the Initiative's seven-year history, the Steering Committee has chosen to support a variety 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 deliberately shifting the Initiative priority toward field research more closely tied to possible management strategies. This "applied" focus has become ever stronger, with the encouragement of large-scale field projects addressing the ecology of whirling disease and the testing of potential methods for controlling its effects or spread.

The Initiative has sponsored from eight to 20 research projects in each cycle. A research cycle generally runs from May of one year through December of the following year, thus allowing for two research field seasons. More than 115 research projects have been carried out by university, public-agency scientists, and private firms since 1997. A total of more than \$8 million of Federal and matching funds has been expended or committed by these projects. Typically two to four investigators are involved in each project, and they bring to the project cash or in-kind match of 25 to 150 percent of the amount of the Federal grant (*Appendix D. Whirling Disease Initiative Statistics and Table 5*). Students are involved in most projects, either as technicians or, more often, as graduate research assistants.

Although not a formal Initiative requirement, publication of research results is strongly encouraged by the Partnership Board and the Steering Committee. To date, 35 peer-reviewed publications have been produced.

Initiative Cooperating Organizations/Agencies

The Whirling Disease Initiative strives to foster collaboration amongst many scientific entities, governmental agencies, and fisheries organizations. *Table 1* identifies those entities and their roles.

Table 1. Whirling Disease Initiative Cooperator Responsibilities

Agency/Entity	Administration		Technical Oversight	Research Work	Outreach Activities
	Program	Financial			
Montana Water Center	X	X	X		X
US Fish and Wildlife Service	X	X	X		
Montana State University		X			
WDI National Partnership Board	X		X		
WDI Steering Committee	X		X		
WD Foundation	X	X	X		X
MSU Wild Trout Lab				X	
State Universities				X	
State Agencies				X	
Federal Agencies				X	
Private Firms				X	X

Section II. INITIATIVE STRUCTURE & OVERVIEW

In the nine-year history of the Whirling Disease Initiative, the emphases of program objectives and their associated activities have changed. The primary two objectives—program administration and research project management—are ongoing and take place every year. In the early years of the Initiative there was very heavy emphasis on the biological research objective (Objective 3) since the disease is complex and its severity and spread are dependent on a number of biological and environmental factors. In autumn 2002, the Board of Representatives of the National Partnership directed that program emphasis move away from biological research toward testing and demonstration of field strategies (Objective 4), and ultimately the development of management tools. Potential management tools were identified and evaluated by the Whirling Disease Steering Committee and subsequently modified by the National Partnership Board in 2003 (see *Section III. Management Tools* of this report for details). For the 2006-2007 research cycle, the Partnership Board and Steering Committee further expanded the program's emphasis to include projects that (1) take an epidemiological or ecological research approach focusing on the incidence, severity, spread and effects of whirling disease across populations of wild fish; (2) synthesize information on what is known about whirling disease; and consistent with their 2003 decision (3) generate information that will be directly usable in formulating fishery management tools.

In a complementary action to management tool development, the Board also directed that an outreach program to fishery managers be initiated (Objective 5B) in the final phase of the Initiative. A marketing firm was engaged in 2003 to help the Initiative focus its outreach program goals, and to survey fisheries managers about their informational needs and favored methods of receiving research results. The consultant's findings and recommendations provided the backbone of the Phase III outreach program effort and are outlined in Objective 5B (see *Appendix E* for consultant's final report and *Section IV. Establishment of Formal Outreach Program* of this report for details).

In 2003, the Montana Water Center, in partnership with the Steering Committee and several Partnership Board members, developed a preliminary draft of a five-year program plan to guide the remainder of the Initiative's work. That five-year plan was further revised and subsequently approved at the October 2003 National Partnership Board meeting. This report is yet another revision of the five-year report, which has been reworked at the request of our sponsoring agency, the US Fish and Wildlife Service, and is updated

each year. The USFWS requested that a more structured format be used when reporting on Whirling Disease Initiative actions, projects, and deliverables. The next section of this report was specifically prepared to satisfy that request.

Whirling Disease Initiative Purpose, Goals, Objectives, Tasks, and Products:

PURPOSE:

Provide fishery managers with as complete and effective a set of management tools as possible, to allow them to maintain populations of wild and native salmonids in the presence of the whirling disease parasite.

GOALS:

Goals of fishery managers that are supported by the Initiative:

Goal 1. To prevent introduction and establishment of the disease into streams that are parasite negative.

Goal 2. In parasite-positive streams, to maintain or re-establish self-sustaining fish populations.

OBJECTIVES, TASKS, & PRODUCTS:

Objective 1. Provide Administrative Framework

Administrative services performed by Montana Water Center staff are those necessary to support overall Initiative goals. Work performed under this objective has continued through all phases of the Whirling Disease Initiative.

Task 1A. Perform administrative and management services: Administration, management and operational infrastructure of the Whirling Disease Initiative; contractor and custodian of funds; hire and supervise Whirling Disease Initiative staff; National Partnership Board meeting coordination; communication link with Montana State University administration and Grants and Contracts Office; manage and maintain Whirling Disease Initiative office; report to Congress and USFWS (sponsoring agency).

Methods/Activities: Montana Water Center staff are responsible for seeing that multiple administrative tasks are accomplished, including: acting as administrator for Cooperative Agreement and budget with USFWS; administer and manage all subcontracted research projects; disburse funds for the principal investigators; documenting use of public resources for Initiative's funders/sponsors; maintain financial filing system; plan, organize, and coordinate the annual National Partnership Board meeting.

Products: Whirling Disease Initiative staff and office; annual Cooperative Agreement; reports (comprehensive annual report to Congress, annual budgets, briefings); contacts and subcontracts; grant expenditures and financial statements/files; annual National Partnership Board meeting.

Objective 2. Research Project Management & Oversight

Whirling Disease Initiative research project management is conducted in a three-tiered process. The National Partnership Board oversees the Whirling Disease Initiative and provides long-term program planning, direction, and evaluation. The Steering Committee develops and modifies a long-term program plan, formulates an annual work plan and Request for Proposals, and supervises a peer-review process for allocating funds to projects. The Montana Water Center is responsible for the general administration of the Whirling Disease Initiative, including: convening the Board of Representatives and Steering Committee, maintaining communication within the Partnership, and submitting detailed reports on all research components of the Initiative.

Task 2A. Administer competitive research grant program.

Methods/Activities: Develop and distribute annual research grant Request for Proposals (RFPs); organize and operate proposal peer-review and proposal ranking process; award research contracts and subcontracts; communication link with research teams; monitor research progress; write research progress reports; maintain research archives; document work progress and track project spending; ensure full performance of all subcontractors and grantees, consistent with funds received and expended.

Products: Research contact lists; research projects; research project filing system; annual reports; research project final reports; research project briefings and summary reports; research team publications; research archives.

Task 2B. Organize and support sponsoring agency and technical advisors (USFWS, National Partnership Board and Steering Committee): Incorporate into the Initiative the technical expertise and institutional concerns of the public agencies, professional associations, and advocacy organizations concerned with fisheries health in the United States; meeting management and facilitation; review and modify the Initiative program plan as appropriate; review progress of the Initiative (goals, objectives, cooperative agreement, charter).

Methods/Activities: Develop briefings and summary reports for distribution to partners and advisory committees; schedule, organize, and facilitate: meetings, conferences, annual meetings, field trips; solicit feedback from National Partnership Board at autumn annual meetings; review the status of the disease; review progress of the Initiative; review and potentially revise the Partnership Charter; advise the Steering Committee on conduct of the grants program and the outreach program; review and revise the Initiative program plan; make recommendations on filling vacancies on Board and Steering Committee.

Products: Reports and briefings, meeting minutes, Cooperative Agreement, Partnership Charter, program plan.

Task 2C. Provide organizational/financial support for Whirling Disease Symposium.

Methods/Activities: Facilitate funded investigators to present their findings; work with Whirling Disease Foundation on program planning; report on the status of the Initiative; and fund travel to the Symposium by non-Federal Steering Committee and Partnership Board members.

Products: The Annual Whirling Disease Symposium, project completion presentations, discussion session.

Objective 3. Conduct Whirling Disease Research

Objective 3A. Conduct Basic Research

Objective 3B. Conduct Applied Research

Task 3A. Conduct basic research projects: Investigate and promote a better understanding of the parasite's life cycle; the susceptibility of different salmonid species and strains; the ecology and epidemiology of the disease; correlation between environmental and landscape features, and disease occurrence; and correlation between habitat characteristics (flow regime/channel configuration) and severity of disease.

Task 3B. Conduct applied research projects: Field sampling methods; diagnostic techniques; ways of quantifying the severity of the disease in fish and worms; effects of habitat modification (enhancement, rehabilitation, and degradation) on worm and fish populations; effect of land types and stream strata on infection rate; feasibility of direct filtration for TAM removal; the role of anglers and other vectors in the spread of the disease; and the effects of anadromous fishery management strategies.

Methods/Activities: Solicit research proposals; conduct targeted whirling disease research investigations within 20-month time frame; write progress and final project reports; publications.

Products: Research team results and final reports, student theses and dissertations, presentations at Whirling Disease Symposium, and research team publications.

Objective 4. Test Management Strategies

Task 4A. Test management strategies: Evaluate at full scale subjects such as controls on point sources of infection, enhancing the resistance of wild fish stocks, reducing oligochaete habitat, or the effects of riparian restoration projects.

Task 4B. Develop applied management tools (e.g. risk assessment, prevention, detection, treatment).

Methods/Activities: University and public agency biologists and fishery managers conduct targeted research investigations that test whirling disease management strategies (e.g. risk assessment, prevention, detection, treatment, etc.).

Products: Research team results and final reports; presentations at Whirling Disease Symposium; research team publications; defined management tools.

Objective 5. Conduct Outreach & Education Activities

Objective 5A. Document Results from Research Projects (Phases I & II)

Objective 5B. Develop and Implement a Formal Whirling Disease Outreach Program (Phase III)

Conducting outreach activities has been an ongoing, yet somewhat limited, effort since the inception of the Whirling Disease Initiative in 1997. Now, in Phase III of the Initiative, a concerted effort to increase accessibility and availability of whirling disease information has been launched. The primary audience to

be served through the outreach program is technical professionals—fishery managers and administrators, hatchery operators and fish health professionals, researchers and agency land managers. The secondary audience comprises fishery I&E professionals, both within the agencies and in private organizations such as the Whirling Disease Foundation, Trout Unlimited and the Federation of Fly Fishers. These technology transfer professionals in turn will serve and educate anglers and the general public.

Objective 5A. Document Results from Research Projects (Phases I & II)

Task 5A. Document results from research projects.

Methods/Activities: Publish summary reports for distribution to project partners; facilitate publicity; establish and maintain Whirling Disease web site; link web site to Whirling Disease Foundation; establish technical library/archive of project proposals, reports, and publications; disseminate research results to interested parties; maintain communications links with researchers, project partners, and technical advisors.

Products: Summary reports (annual reports, five-year report); contact lists; Whirling Disease Initiative web site; Montana Water Center filing system; technical library/archives; data repository.

Objective 5B. Develop and Implement Formal Whirling Disease Outreach Program (Phase III)

Assure that those who need to know the research and testing results and pertinent information generated outside the Whirling Disease Initiative, have full access to the data and their interpretation by experts.

Task 5B. Communicate findings from research and testing projects to fishery managers and NGOs.

Task 5C. Disseminate applied management tools (e.g. risk assessment, prevention, detection, treatment) to interested parties: Develop outreach materials/learning tools; give presentations; expand current Whirling Disease Initiative web site, build interactive component to web site; serve as central point of contact for persons seeking whirling disease information; distribute outreach materials; report to project partners.

Methods/Activities: Montana Water Center Assistant Director hired an outreach specialist in summer 2004 to: lead outreach effort; develop outreach plan; compile audience lists; develop and distribute printed and multi-media materials explaining the biology and spread of the disease and techniques for mitigating its spread and severity; make formal presentations at regional or national fisheries meetings; make targeted visits to fishery managers at their workplaces; respond to requests for information from biologists, agency personnel and land managers; expand the Whirling Disease Initiative web site with detailed project results and management guidance; assess the current situation for whirling disease, including pertinent state laws and the true geographical scope and severity of the disease; develop annual updates for key stakeholders to keep them apprised of the situation and to combat apathy; further develop the RAW risk assessment methodology and make it into a useful product for fishery managers; compile status-and-trend information and mount it on the web site; compile state-by-state information on policies and regulations and mount a compendium on the web site; create and promote the authoritative whirling disease electronic resource that is both customized by audience and an easy-to-use central information repository; develop and distribute a periodic newsletter; collaborate with the Whirling Disease Foundation on outreach activities; build strategic alliances to leverage resources; maintain communication links with researchers, project partners, technical advisors, fishery managers, MSU, the media, and the general public.

Products: Contact lists; whirling disease bibliography; interactive web site; outreach materials/technical handouts; presentations; newsletter; whirling disease video; publications; media coverage.

PROJECT MILESTONES

As a first step in achieving the objectives previously listed, *Table 2* outlines activities proposed for the next program period—May 2006 to December 2008. They focus strongly on the ecological and outreach objectives. Milestone *Tables 3* and *4* layout a more comprehensive overview of project activities. *Table 3* documents activities and deliverables from 1997 to 2002.

Table 2. Project Milestones for Program Cycle, May 2006 to December 2008

Activity	Date
Meeting of the National Partnership Board of Representatives	October 25-27, 2005
Request for Preproposals issued by the Steering Committee/Water Center	November 10, 2005
Preproposals submitted to the Water Center	December 23, 2005
Interim reports for projects concluding in 2006 due	December 31, 2005
Final reports for 2004-2005 projects due	December 31, 2005
Steering Committee selects projects for full proposals	January 5-6, 2006
Request for full proposals released	January 10, 2006
Annual Report to Congress and USFWS	January 31, 2006
Distribution of outreach materials and outreach presentations to fishery managers	Ongoing, 2006-2007-2008
Database/data repository project activities (establish database, establish data policy, work with PIs on metadata and dataset exchange, etc.)	Ongoing, 2006-2007-2008
Whirling Disease Symposium, Denver	February 9-10, 2006
Full proposals due	March 2, 2006
Peer review of proposals	March 5 – March 28, 2006
Research projects chosen for funding	April 6-7, 2006
Contracts in place; research projects begin	May 1-15, 2006
Interim reports for projects concluding in 2007/2008 due	December 31, 2006
Final reports for 2005-2006 projects due	December 31, 2006
Annual report to Congress and USFWS	January 31, 2007
Interim reports of projects concluding September/December 2008 due	December 31, 2007
2006-2007 projects conclude; final reports due	December 31, 2007
Metadata and datasets for 2006-2007 projects due	June 30, 2008
2006-2008 projects conclude; final reports due	December 31, 2008
Metadata and datasets for 2006-2008 projects due	June 30, 2009

Table 3. Milestones for Whirling Disease Initiative; 1997 to 2002

The administration of all milestones outlined in this table is the responsibility of the Montana Water Center.

Objective / Task	Product / Output	Quantity of Outputs (if applicable)					
		1997	1998	1999	2000	2001	2002
Objective 1: Provide Administrative Framework Task 1A. Perform administrative & management services	Cooperative Agreement & Budget	1	1	1	1	1	1
	Managing subcontracts	12	20	16	14	13	12
	Administer & maintain expenditures/financial records	12	22	36	30	28	26
	Reporting: Annual Report to Congress	1	1	1	1	1	1
	5-Year Plan	NA	NA	NA	NA	NA	1
	Manage WDI staff & maintain WDI office	On going	X	X	X	X	X
Objective 2: Research Project Management & Oversight Task 2A. Administer competitive research grant program Task 2B. Organize & support sponsoring agency & technical advisors Task 2C. Organizational / financial support for Whirling Disease Symposium	Maintain research contact lists	On going	X	X	X	X	X
	Steering Committee meetings facilitated	*	*	*	4	6	6
	National Partnership Board meetings facilitated						
	Conference calls	*	*	*	*	1	1
	Annual autumn meeting	0	1	1	1	1	1
	WD Symposia: Research presentations	1 NA	1 12	1 21	1 17	1 15	1 21
	Grant Process: RFPs	1	1	1	1	1	1
	Proposals peer reviewed	24	25	30	23	21	22
	Projects funded	12	20	16	15	14	12
	Communication w/research teams	On going	X	X	X	X	X
Reporting: Briefings	On going	X	X	X	X	X	
	Summary reports	1	1	1	1	1	
Objective 3: Conduct Whirling Disease Research 3A. Conduct Basic Research 3B. Conduct Applied Research Task 3A. Investigate parasite's life cycle, susceptibility of salmonid species and strains, ecology and epidemiology of disease, etc. Task 3B. Field sampling methods, diagnostic techniques, quantifying severity of disease in fish & worms, etc.	Research projects/results/final reports by category:						
	1. Ecological Modeling & Stats	0	0	0	0	1	2
	2. Habitat Restoration & Mgt/Hydrology	0	0	0	3	2	2
	3. Epidemiology	0	0	3	1	1	4
	4. Fish Culture	0	1	1	1	1	1
	5. Fishery Mgt/Population Censusing	2	1	1	0	1	0
	6. Immunology	0	5	4	1	0	1
	7. Fish Pathology	2	0	0	1	2	0
	8. Parasitology	1	0	0	0	0	0
	9. Invertebrate Ecology & Taxonomy	5	3	2	3	4	1
	10. Methods	2	3	3	1	1	1
	11. Salmonid Ecology	0	2	2	3	0	0
	12. Other	0	5	0	0	0	0
	Total	12	20	16	14	13	12
	Publications	0	0	0	1	5	16
Objective 4: Test Management Strategies Task 4A. Evaluate projects, resistant stock, host habitat, etc. Task 4B. Develop applied management tools.	Tests/results/final reports by category:						
	1. Risk Assessment application	0	0	0	0	0	0
	2. Evaluate full-scale projects						
	3. Resistant fish stock						
	4. Host habitat						
	5. Reclaim degraded watercourses						
	6. Others						
Management Tools	NA	NA	NA	NA	NA	NA	

Objective / Task	Product / Output	Quantity of Outputs (if applicable)					
		1997	1998	1999	2000	2001	2002
Objective 5: Conduct Outreach & Education Activities	WD web site (update & maintain)	NA	Establish Web site	X	X	X	X
	Interactive WD web site	NA	NA	NA	NA	NA	NA
5A. Document Results from Research Projects (Phases I & II)	Archive research products: reports, publications, etc.	NA	On going	X	X	X	X
	WD Bibliography (update, maintain)	NA	On going	X	X	X	X
5B. Develop & Implement WD Outreach Program (Phase III)	Expanded WD Bibliography	NA	NA	NA	NA	NA	NA
	Publicity products: Press releases Media contact: interviews	*	*	*	*	*	*
Task 5A. Document results from research projects.	Reporting: Briefings Summary reports	On going 1	X 1	X 1	X 1	X 1	X 1
Task 5B. Communicate findings from research/testing projects to fishery managers.	Outreach materials: Contact lists Educational mailings/handouts Newsletter Outreach CDs (tech transfer)	NA	NA	NA	NA	NA	NA
Task 5C. Disseminate applied management tools.	Outreach/education presentations	*	*	*	*	*	*
	Outreach publications	NA	NA	NA	NA	NA	NA

Key:

NA = Not Applicable.

* = Information not available.

X = Ongoing activity.

Table 4 projects program activities and deliverables for Whirling Disease Initiative Phase III, 2003 through 2008. This plan and timeline are based on the fact that the disease is still spreading. It assumes that the Whirling Disease Initiative will continue to be funded through the US Fish and Wildlife Service at the levels shown through 2008. As in the past, Whirling Disease Initiative activities will be coordinated with those of the Whirling Disease Foundation to optimize the benefits from both.

Previous to the request for a long-term program plan by the USFWS, the Steering Committee and the National Partnership Board had chosen **not** to establish timelines for either the research/testing program or the outreach program, beyond the 20-month, 2004-2005 funding cycle. Consequently, we emphasize that the outputs shown in *Table 4* are speculative at best, and will likely need to be adjusted in the future. A good example of this is the range of projected investigations shown in *Table 4* for *Objective 4. Test Management Strategies*. We have intentionally assigned a low range of projected numbers (two to five per year from 2005 to 2007) because it is projected that the Initiative will sponsor fewer but larger-scale, longer-term, land-management projects in the coming years.

Table 4. Milestones for Whirling Disease Initiative Phase III, 2003 to 2008

The administration of all milestones outlined in this table is the responsibility of the Montana Water Center.

Objective / Task	Product / Output	Quantity of Outputs, if applicable (2005 - 2008 estimated)					
		2003	2004	2005	2006	2007	2008
Objective 1: Provide Administrative Framework Task 1A. Perform administrative & management services	Cooperative Agreement & Budget	1	1	1	1	1	1
	Managing subcontracts	21	19	22	15-30	15-30	15
	Administer & maintain expenditures/financial records	On going	X	X	X	X	X
	Reporting: Annual Report to Congress 5-Year Plan	1 1	1 1	1 updated	1 NA	1 NA	1 1
	Manage WDI staff & maintain WDI office	On going	X	X	X	X	X
Objective 2: Research Project Management & Oversight Task 2A. Administer competitive research grant program Task 2B. Organize & support sponsoring agency & technical advisors Task 2C. Organizational / financial support for Whirling Disease Symposium	Maintain research contact lists	On going	X	X	X	X	X
	Steering Committee meetings facilitated	5	6	7	5-8	5-8	4-5
	National Partnership Board meetings facilitated						
	Conference calls	1	2	1	1-3	1-3	1-3
	Annual autumn meeting	1	1	1	1	1	1
	WD Symposia:	1	1	1	1	1	1
	Research presentations	16	10	12	10	10	10
	Grant Process:						
	RFPs	1	2	1	1	1	0
	Preproposals reviewed	NA	18	28	17	?	
Proposals peer reviewed	17	20	16	10	15-20	NA	
Projects funded	8	12	10	5-10	10-15	NA	
Communications w/research teams	On going	X	X	X	X	X	
Reporting:							
Briefings	On going	X	X	X	X	X	
Summary reports	1	1	1	1	1	1	
Objective 3: Conduct Whirling Disease Research 3A. Conduct Basic Research 3B. Conduct Applied Research Task 3A. Investigate parasite's life cycle, susceptibility of salmonid species and strains, ecology and epidemiology of disease, etc. Task 3B. Field sampling methods, diagnostic techniques, quantifying severity of disease in fish & worms, etc.	<u>Research projects/results/final reports by category:</u>						
	1. Ecological Modeling & Stats	0	0	0	+	+	0
	2. Habitat Restoration & Mgt/Hydrology	0	4	3	+	+	0
	3. Epidemiology	1	1	1	+	+	0
	4. Fish Culture	0	0	0	?	?	0
	5. Fishery Mgt/Population Censusing	0	2	2	+	+	0
	6. Immunology	1	0	0	-	-	0
	7. Fish Pathology	0	1	0	-	-	0
	8. Parasitology	1	3	3	+	+	0
	9. Invertebrate Ecology & Taxonomy	0	0	0	-	-	0
	10. Methods	2	1	0	-	-	0
	11. Salmonid Ecology	0	0	0	?	?	0
	12. Other	0	0	1	?	?	0
Total	5	12	10	5-10	5-10	0	
Publications	5	1	10	5-10	5-10	5-10	

Objective / Task	Product / Output	Quantity of Outputs, if applicable (2005 - 2008 estimated)					
		2003	2004	2005	2006	2007	2008
Objective 4: Test Management Strategies Task 4A. Evaluate projects, resistant stock, host habitat, etc. Task 4B. Develop applied management tools.	<u>Tests/results/final reports by category:</u>						
	1. Risk Assessment application	2	2	2	+	+	0
	2. Evaluate full-scale projects	0	0	+	+	+	0
	3. Resistant fish stock	0	0	1	+	+	0
	4. Host habitat	1	1	2	+	+	0
	5. Reclaim degraded watercourses	0	0	+	+	+	0
	6. Others	0	0	?	?	?	0
	Total	3	1	5	2-5	2-5	0
	Management Tools	0	?	1-2	1-2	2-4	3-5
Objective 5: Conduct Outreach & Education Activities 5A. Document Results from Research Projects (Phases I & II) 5B. Develop & Implement WD Outreach Program (Phase III) Task 5A. Document results from research projects. Task 5B. Communicate findings from research/testing projects to fishery managers. Task 5C. Disseminate applied management tools.	WD web site (update & maintain)	X	X	X	X	X	X
	Interactive WD web site	NA	Establish	X	X	X	X
	Archive research products: reports, publications, etc.	On going	X	X	X	X	X
	WD Bibliography (update, maintain)	X	X	X	X	X	X
	Expanded WD Bibliography	NA	X	X	X	X	X
	Publicity products:						
	Press releases	3	5	3	5	5	5
	Media contact: interviews, PSAs, etc.	NA	1	4	2	2	3
	Reporting:						
	Briefings	On going	X	X	X	X	X
	Summary reports	1	1	1	1	1	1
	Outreach materials:						
	Contact lists	NA	On going 3	X	X	X	X
Educational mailings/handouts		Establish 850	6	5	5	5	
Newsletters		0	3	X	X	X	
Newsletter recipients			2550	3500	4000	4000	
Outreach video/CDs (tech transfer)			0	1	1	1	
Outreach/education presentations	2	2	7	5-10	5-10	5-10	
Outreach publications (articles, editorials, etc.)	NA	2	5	1-5	1-5	1-5	

Key:

NA = Not Applicable.

***** = Information not available.

X = Ongoing activity.

- = It is predicted that the trend from 2005 to 2008 will be a decrease in the number of basic research projects conducted.

+ = It is predicted that the trend from 2005 to 2008 will be an increase in the number of applied research projects conducted, management strategies tested, and management tools developed.

? = It is not possible to predict what the trend will be for this task.

Section III. MANAGEMENT TOOLS

Potential management tools were identified and evaluated by the Whirling Disease Steering Committee in 2003. The committee rated each tool according to its expert judgment of the tool's feasibility of development, technical and administrative feasibility of application, likely degree and breadth of effectiveness, time requirement for implementation, financial and other costs, and likely side effects. The uncertainty associated with each was also taken into consideration: some techniques are much better developed or demonstrated than others. The ranking matrix developed and used by the Steering Committee to evaluate potential tools is shown in *Appendix F*. The various potential types of tools are listed below, as rated by the Steering Committee and subsequently modified by the National Partnership Board at its October 21-23, 2003 meeting.

The following research and demonstration projects that *contribute directly to the development of these types of tools* will be supported in the Whirling Disease Initiative in the near future:

Watershed and riparian management actions - these include such actions as flow augmentation, channel modification or monitoring the effects of changed practices in the riparian zone or upland areas.

Filtration - straining of tributary flows (including hatchery effluent) to remove TAMs, using either constructed or wetland systems.

Exploitation of fish disease resistance - capitalizing on genetic or life-history traits that confer resistance to whirling disease in wild or stocked fisheries.

Diagnosis - assaying fish, water and worms for the presence and intensity of a whirling disease infection. Characterizing Tubifex habitat is also of interest.

Vector control actions - these will depend on what are judged the most important modes of disease spread: fishing gear, wild birds, stocking of infected fish into private ponds, "bucket biologists," interbasin transfer of water, etc.

Semi-quantitative risk assessment - using a scheme incorporating knowledge of life history traits to prioritize among risk factors and identify populations most at risk of disease introduction and spread. And assess risks to native species conservation and recovery.

Development of these types of tools is less urgent at present and generally will not be supported at this time:

Mathematical models - the Steering Committee does not believe that advanced mathematical models to predict the spread and severity of the disease have promise in the foreseeable future.

Hatchery manipulations - the needed structures and practices are well known, and are being implemented by hatchery managers.

Prophylactics - there has been sporadic work over the course of several years on drugs to control whirling disease. The results have never shown promise.

Fish passage barriers - these are judged ineffective for control of the spread of whirling disease.

Exploitation of resistance in worms - despite several years of research, the Steering Committee has been unable to conceptualize any potential disease-control tools that would exploit Tubifex biology. Stocking resistant worms was judged not feasible.

Monitoring and Revision

At their last meeting, the Steering Committee and Partnership Board chose not to implement a formal process for monitoring the success of particular lines of research, and changing research priorities as a result. However, this will be done informally by the committee each year as it develops its request for proposals and selects projects for funding. This plan will be reviewed annually by the Partnership Board and altered as appropriate. The program plan will be revised, and provided to all appropriate entities, annually to reflect these alterations.

Section IV. RESEARCH EMPHASIS BROADENS IN 2006-2007 RFP PROCESS

In October 2005, the Partnership Board made the decision to broaden the 2006-2007 RFP process to include broad-scale, synthetic research projects and the solicitation for a comparative analysis of whirling disease testing methods. The Whirling Disease Steering Committee was directed to consider projects that (1) take an epidemiological or ecological research approach focusing on the incidence, severity, spread and effects of whirling disease across populations of wild fish, (2) synthesize information on what is known about whirling disease, and (3) generate information that will be directly usable in formulating fishery management tools. Research preproposals would also be sought under the "topical, management-oriented research projects" category, which has been a research focus since 2003.

Section V. ESTABLISHMENT AND IMPLEMENTATION OF WHIRLING DISEASE INITIATIVE OUTREACH PROGRAM

Foundation of the Program

At its October 2002 meeting, the National Partnership Board charged the Steering Committee with beginning to distribute research results to fishery managers. The first step taken by the committee was to engage a marketing firm to focus its outreach goals and survey fishery managers about their information needs and favored methods of receiving research results. The conclusions reached by the consultant, after surveying 90 fisheries professionals in the 23 states where whirling disease is found, were:

- fisheries professionals are interested in receiving more information on whirling disease,
- these professionals do not view the information they are currently receiving as of the highest quality,
- whirling disease is an important part of the job for those surveyed,
- no specific topic relating to whirling disease is of more interest than another.

In its September 2003 report to the Steering Committee, the consultant recommended these activities within the outreach program:

- establish contact lists of fish professionals at local, state, regional, federal and tribal levels,
- assess the current situation for whirling disease, including pertinent state laws and the true geographical scope and severity of the disease,
- develop annual updates for key stakeholders to keep them apprised of the situation and to combat apathy,
- create and promote an authoritative whirling disease electronic resource that is both customized by audience and an easy-to-use central information repository,
- enhance outreach efforts by going where the fish professionals are,
- build strategic alliances to leverage resources.

The foundation of the outreach program was laid by the Steering Committee and the Partnership Board when they met October 21-23, 2003, with the following guidelines established for the program:

1. Goal

The goal of the program is that everyone who needs to know has a full set of usable current information on whirling disease biology and control.

2. Audience

The primary audience to be served is technical professionals - fishery managers and administrators, hatchery operators and fish health professionals, researchers and agency land managers. The secondary audience comprises fishery I&E professionals, both within the agencies and in private organizations such as the Whirling Disease Foundation, Trout Unlimited and the Federation of Fly Fishers. These technology transfer professionals in turn will serve anglers and the general public. Information products for those

audiences will not be developed under the Whirling Disease Initiative.

3. Disseminating Information

Research results are the primary matter to be conveyed. It would be impossible to disseminate only results of Partnership-funded work, since nearly every project draws from multiple funding sources. Insofar as possible, information on disease status and trends will also be compiled and distributed.

4. Level of Effort

The annual range of financial expenditure considered appropriate for the outreach program is \$50,000 minimum, up to 20 percent of the full budget (\$200,000) if the Initiative is funded at \$1 million. The Water Center is directed to create a new position for a Whirling Disease Outreach Coordinator, who will build and run the outreach program. The Center will also involve students, and a marketing firm may be engaged to develop information products under contract. All activities will be coordinated with the Whirling Disease Foundation, which has an active outreach program.

5. Initial Program Guidance

During the 2004-2005 project cycle, the Water Center is directed to: 1) compile updated contact lists for the audiences named above; 2) update the Whirling Disease Foundation bibliography of funded work and mount a searchable version (that includes theses and dissertations) on the web; 3) create presentations and technical handouts for fishery professionals and take them on the road to meetings sponsored by state fish & game agencies and state and regional American Fisheries Society groups; and 4) distribute periodic electronic newsletters.

Additional activities that will be taken on as time allows include: 1) mount final reports of Initiative-funded projects (more than two years old) on the web site, searchable by keyword; 2) further develop the RAW risk assessment methodology and make it into a useful product for fishery managers; 3) compile status-and-trend information and mount it on the web site; and 4) compile state-by-state information on policies and regulations and mount a compendium on the web site.

2004-2005 Outreach Program Update; Program Accomplishments

From June to August 2004, the Montana Water Center conducted a search for a Whirling Disease Outreach Coordinator. Amy Rose was hired on August 16, 2004 and developed and managed the outreach program until September 30, 2005. A new outreach coordinator, Kajsa Stromberg, was hired in October 2005, and is scheduled to take over management and implementation of the program in November.

The outreach coordinator is hired by and reports to the Assistant Director for Research. As directed by the Partnership Board and Steering Committee, the outreach coordinator is responsible for developing and implementing the Whirling Disease Initiative outreach program and disseminating outreach materials to a primary audience of technical professionals and a secondary audience comprised of fishery I&E professionals. The coordinator also has primary responsibility for making whirling disease presentations to fish professionals throughout the country, compiling whirling disease research and outreach information, developing informational materials, developing and maintaining the Whirling Disease Initiative web site, and developing and distributing a Whirling Disease Initiative newsletter.

In the outreach program's first year, from approximately August 2004 to October 2005, a great deal was accomplished. A preliminary, one-year outreach program plan was established and approved by the Partnership Board in fall 2004. An up-to-date contact list was compiled, comprised of more than 800 fishery professionals at local, state, regional, federal, and tribal levels. Those individuals, in turn, have been the recipients of all Initiative outreach information and publications since, including the new *Whirling Disease Initiative Newsletter*. Issue 1 of the newsletter was released in January 2005, and

Issues 2 and 3 were released in April and September 2005, respectively.

As was the intent of the Board and Steering Committee, an Initiative web site was established to be the definitive resource on the disease and its management. Ms. Rose worked extensively with the Montana Water Center web-site specialist to create the new Whirling Disease Initiative web site at: <http://whirlingdisease.montana.edu>, which was launched in early January 2005. This site now provides a platform to showcase an extensive whirling disease bibliography, whirling disease project research information, publications, event announcements, and outreach tools targeted at fishery and land managers.

Further, Ms. Rose presented at six regional and national fishery meetings in 2005, these include: the 11th Whirling Disease Symposium, the Great Plains Fishery Workers Association, three state chapter AFS annual meetings, and the AFS Annual Fish Health Section Meeting in Minneapolis, Minnesota. Other outreach activities in 2005 included: four research team field visits in spring and summer 2005; contracting for a whirling disease video to be conducted by the MSU Film Department; and development of a national whirling disease brochure.

Table 5. Whirling Disease Initiative Budget, Phases I, II, and III

(Note: The outputs and associated costs shown for the years 2006 to 2008 are speculative, and will likely need to be adjusted in the future.)

Component / Task	Program & Budget Summary											
	Phase I			Phase II			Phase III					
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
											Numbers & costs estimated	
1. Program Administration & Project Management (includes IDCs)	\$157,601	\$121,775	\$123,412	\$142,654	\$164,629	\$152,748	\$132,865	\$171,441	\$196,167	\$160,000	\$100,000	\$0
Outreach Program Database Project	NA	NA	NA	NA	NA	NA	\$5,000	\$100,000	\$125,000 \$20,000	\$140,000 10,000	\$100,000 \$0	\$0 \$0
Match or In-Kind Contributions¹	\$80,000	\$80,000	\$76,000	\$79,000	\$84,000	\$79,000	\$69,000	\$107,000	\$80,000	\$80,000	\$80,000	NA
2. Research Projects	12	20	16	14	13	12	8	12	10	5-8	2-5	0
Whirling Disease Initiative Funding	\$342,399	\$578,225	\$576,588	\$557,346	\$535,308	\$547,252	\$557,585	\$676,990	\$643,625	\$640,000	\$300,000	\$0
Match or In-Kind Contributions	\$408,693	\$477,605	\$600,381	\$502,600	\$386,673	\$442,292	\$516,270	\$343,870	\$423,048	\$200,000	\$100,000	\$0
Total WDI Award	\$500,000	\$700,000	\$700,000	\$700,000	\$700,000	\$700,000	\$695,450	\$948,431	\$984,792	\$950,000	\$500,000	\$0
Total Match	\$488,693	\$557,605	\$676,381	\$502,600	\$470,673	\$521,292	\$585,270	\$450,870	\$503,048	\$280,000	\$180,000	\$0

¹ Match and in-kind contributions shown are a combination of: National Partnership Board members donated time; WDI Steering Committee members donated time; proposal reviewers donated time; and Montana Water Center forgone indirect cost returns [14% (1997-2002) and 17% (2003-2004) were assessed]; MSU negotiated research rates with OMB were 40% (1997-1999) and 41.5% (2000-2005).

Table 6. Whirling Disease Initiative (estimated) Match or In-Kind Contributions, 1997 to 2004

Contributor	Number of People	Year	Activities	Rate	Hours	Total (dollars)
National Partnership Board	9	1997	Attend 2-day annual meeting, WDI document review.	\$50/hour	30	13,500
WDI Steering Committee	7	1997	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	100	17,500
Proposal Reviewers	3	1997	Reviewed 24 WD research proposals.	\$30/hour	24	2,160
MWC forgone IDCs	NA	1997	MWC receives 14% IDCs and forgoes 26% on those IDCs.	NA	NA	47,000
1997 Match or In-Kind Contribution Total						\$80,160
National Partnership Board	9	1998	Attend 2-day annual meeting, WDI document review.	\$50/hour	50	22,500
WDI Steering Committee	7	1998	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	100	17,500
Proposal Reviewers	3	1998	Reviewed 25 WD research proposals.	\$30/hour	25	2,250
MWC forgone IDCs	NA	1998	MWC receives 14% IDCs and forgoes 26% on those IDCs.	NA	NA	38,000
1998 Match or In-Kind Contribution Total						\$80,250
National Partnership Board	9	1999	Attend 2-day annual meeting, WDI document review.	\$50/hour	40	18,000
WDI Steering Committee	7	1999	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	100	17,500
Proposal Reviewers	3	1999	Reviewed 30 WD research proposals.	\$30/hour	30	2,700
MWC forgone IDCs	NA	1999	MWC receives 14% IDCs and forgoes 26% on those IDCs.	NA	NA	38,000
1999 Match or In-Kind Contribution Total						\$76,200

Contributor	Number of People	Year	Activities	Rate	Hours	Total (dollars)
National Partnership Board	9	2000	Attend 2-day annual meeting, WDI document review.	\$50/hour	30	13,500
WDI Steering Committee	7	2000	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	100	17,500
Proposal Reviewers	3	2000	Reviewed 23 WD research proposals.	\$30/hour	23	2,070
MWC forgone IDCs	NA	2000	MWC receives 14% IDCs and forgoes 27.5% on those IDCs.	NA	NA	46,000
2000 Match or In-Kind Contribution Total						\$79,070
National Partnership Board	9	2001	Attend 2-day annual meeting, WDI document review.	\$50/hour	30	13,500
WDI Steering Committee	7	2001	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	100	17,500
Proposal Reviewers	3	2001	Reviewed 21 WD research proposals.	\$30/hour	21	1,890
MWC forgone IDCs	NA	2001	MWC receives 14% IDCs and forgoes 27.5% on those IDCs.	NA	NA	52,000
2001 Match or In-Kind Contribution Total						\$84,890
National Partnership Board	9	2002	Attend 2-day annual meeting, WDI document review.	\$50/hour	30	13,500
WDI Steering Committee	7	2002	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	90	15,750
Proposal Reviewers	3	2002	Reviewed 22 WD research proposals.	\$30/hour	22	1,980
MWC forgone IDCs	NA	2002	MWC receives 14% IDCs and forgoes 27.5% on those IDCs.	NA	NA	48,000
2002 Match or In-Kind Contribution Total						\$79,230

Contributor	Number of People	Year	Activities	Rate	Hours	Total (dollars)
National Partnership Board	9	2003	Attend 2-day annual meeting, WDI document review.	\$50/hour	30	13,500
WDI Steering Committee	7	2003	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	90	15,750
Proposal Reviewers	3	2003	Reviewed 17 WD research proposals.	\$30/hour	17	1,530
MWC forgone IDCs	NA	2003	MWC receives 17% IDCs and forgoes 24.5% on those IDCs.	NA	NA	39,000
2003 Match or In-Kind Contribution Total						\$69,780
National Partnership Board	9	2004	Attend 2-day annual meeting, WDI document review.	\$50/hour	30	13,500
WDI Steering Committee	7	2004	WD research proposal review, review WD draft documents, SC meetings, attend 3-day WD Symposium, attend 2-day Partnership meeting.	\$25/hour	90	15,750
Proposal Reviewers	3	2004	Reviewed 30 WD research proposals.	\$30/hour	30	2,700
MWC forgone IDCs	NA	2004	MWC receives 17% IDCs and forgoes 24.5% on those IDCs.	NA	NA	76,000
2004 Match or In-Kind Contribution Total						\$107,950
Total						\$657,530

APPENDICES

- Appendix A. National Partnership Board Representatives**
- Appendix B. National Partnership Charter**
- Appendix C. Whirling Disease Steering Committee**
- Appendix D. Whirling Disease Initiative Statistics**
- Appendix E. *Findings and Recommendations, Fish Professional Communication Survey and Outreach for the Whirling Disease Initiative.* Strategicom, September 2003.**
- Appendix F. Priority Matrix Ranking Potential Whirling Disease Monitoring and Control Tools**