

**Bonneville Power Administration  
Fish and Wildlife Program FY99 Proposal Form**

**Section 1. General administrative information**

Evaluate and Monitor Bacterial Cold Water Disease (BCWD) caused by *Flavobacterium psychrophilum* impacting hatchery-raised and wild salmonid populations in the Pacific Northwest.

**Bonneville project number, if an ongoing project** 9149

**Business name of agency, institution or organization requesting funding**

Abernathy Salmon Culture Technology Center, U.S. Fish & Wildlife Service.

**Business acronym (if appropriate)** SCTC/USFWS

**Proposal contact person or principal investigator:**

Name	<u>Dr. Peter W. Taylor</u>
Mailing Address	<u>1440 Abernathy Creek Road</u>
City, ST Zip	<u>Longview, WA 98632</u>
Phone	<u>360-425-6072</u>
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Email address	<u></u>

**Subcontractors.**

Organization	Mailing Address	City, ST Zip	Contact Name

**NPPC Program Measure Number(s) which this project addresses.**

7.2A.6, 7.2D.4, 7.2D.6

**NMFS Biological Opinion Number(s) which this project addresses.**

NA

**Other planning document references.**

NA

**Subbasin.**

Lower Columbia

**Short description.**

Develop protocols for monitoring BCWD in hatcheries and natural waters and determine the impacts and interrelations of this disease on hatchery and wild stocks of salmonids.

**Section 2. Key words**

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish		Construction		Watershed
*	Resident fish		O & M		Biodiversity/genetics
	Wildlife		Production		Population dynamics
	Oceans/estuaries	X	Research		Ecosystems
	Climate		Monitoring/eval.		Flow/survival
	Other	*	Resource mgmt	X	Fish disease
			Planning/admin.	*	Supplementation
			Enforcement	*	Wildlife habitat enhancement/restoration
			Acquisitions		

**Other keywords.**

Bacterial Cold Water Disease, hatchery-wild interactions.

**Section 3. Relationships to other Bonneville projects**

Project #	Project title/description	Nature of relationship

**Section 4. Objectives, tasks and schedules**

**Objectives and tasks**

Obj 1,2,3	Objective	Task a,b,c	Task
1	methods development	a	media and sampling methods
		b	identification methods
2	hatchery sampling	a	bacterial profiling

3	environmental sampling	a	bacterial profiling
4	data analysis	a	hatchery vs environmental profiles

**Objective schedules and costs**

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	05/1998	05/1999	30%
2	01/1999	01/2000	30%
3	06/1999	06/2000	30%
4	06/2000	06/2001	10%

**Schedule constraints.**

**Completion date.**

FY 2001

**Section 5. Budget**

**FY99 budget by line item**

Item	Note	FY99
Personnel	Technician, GS-7	26,000.00
Fringe benefits		7,900.00
Supplies, materials, non-expendable property		15,000.00
Operations & maintenance		20,000.00
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		10,000.00
PIT tags	# of tags:	
Travel		5,000.00
Indirect costs		
Subcontracts		
Other		
<b>TOTAL</b>		<b>83,900.00</b>

**Outyear costs**

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	52,000.00	52,000.00		
O&M as % of total	28%	28%		

## **Section 6. Abstract**

This project proposes to develop a method for early monitoring of BCWD in salmonid hatcheries. Using simple bacteriological methods designed for use in the field (ie. at the hatchery level), critical control points for the detection and management of BCWD will be determined. This monitoring system would allow management to minimize the impact of the disease on fish production and reduce economic impacts of the disease on hatchery budgets. Methods developed for hatchery monitoring will also be applied to surrounding environmental waters (ie. sources containing wild fish) in order to determine disease relationships between hatchery and wild fish populations. This project addresses FWP goals in areas of fish health, costs of production, and hatchery-wild fish interactions. This project will take three years to complete.

## **Section 7. Project description**

### **a. Technical and/or scientific background.**

Myxobacterial infections caused by *Flavobacterium psychrophilum* (Bacterial Cold Water Disease, BCWD), *F. columnare* (Columnaris Disease, CD), and other yellow pigmented bacterial species (YPB) have recently begun to impact salmon production in the Pacific Northwest. Federal, State, Private, and Tribal hatcheries have all reported rising fish health problems due to both these pathogens (28th Meeting, PNFHPC, Feb., 1997). Current control methods for both diseases consist of maintaining good management practices to prevent the disease or use of medicated feeds once clinical signs appear and an appropriate diagnosis has been made. Unfortunately good management practices are no guarantee that the disease will not occur and medicated feeds are only useful when the disease is caught before the fish go off feed. A monitoring system needs to be developed that would detect and minimize these diseases before they reach a full-blown clinical stage. Methods to define critical control points for the disease within the hatchery system and to define bacterial population numbers within a hatchery would be an invaluable tool for early detection to reduce fish mortality and improving economic costs. Definition of critical control points might also be extended to surrounding environmental waters and give valuable insight to the relationship of disease transmission between propagated and wild fish.

### **b. Proposal objectives.**

1. Develop suitable methods for monitoring myxobacterial fish pathogens present in the water. Define most suitable concentration method and most suitable identification methods for target bacteria.
2. Develop a monitoring program to define critical control points for bacterial sampling at hatcheries. Monitor all in-coming and effluent sites on a hatchery for a complete production cycle (1 to 1.5 years) in order to establish a profile of the bacterial

population dynamics for a facility.

3. At hatcheries utilizing environmental waters (ie. river water) monitor those water sources above and below intake and discharge sites for the presence of myxobacterial pathogens. Sample populations of wild fish in those waters for presence of the pathogens.

**c. Rationale and significance to Regional Programs.**

FWP, Section 7.2A.6: This proposal would improve pathogen detection in both hatchery waters and environmental waters adjacent to hatcheries. The identification of critical disease control points would aid in the preclusion and containment of myxobacterial diseases within the system.

FWP, Section 7.2D.4: This proposal would minimize disease impact on cultured and wild stocks, improve rearing efficiency, and improve disease detection and control.

**d. Project history**

**e. Methods.**

Objective 1 (section 6b): Identify an appropriate bacteriological media for the selected isolation of target bacteria (Ordal and Rucker, 1944; Shotts, 1991, Shieh, 1980). This will be done in the laboratory by screening four or five potential media to determine which produces most suitable growth. Identify the most practical sample collection methods for concentration and processing of water samples (based on Standard Methods, 1975). Utilizing serology (Sanders et al., 1976) and PCR (Toyama et al., 1994) develop appropriate bacterial identification methods.

Objective 2 (section 6b): Bacterial profile of hatchery water will be determined by sampling ovarian fluid and milt from parental fish, sampling in-flow water of the husbandry unit (incubator, trough, raceway, etc.), and sampling effluent water of the husbandry unit.

Weekly samples will be diluted appropriately and triplicate volumes plated onto isolation media for incubation, counting, and identification. Differences between in-flow and effluent water will be analysed statistically.

Objective 3 (section 6b): Samples from environmental water above and below the hatchery will be similarly tested to determine if up-stream water (wild fish) could be an infective source or if effluent water (hatchery fish) might be a source.

**f. Facilities and equipment.**

The Abernathy Salmon Culture Technology Center, Longview, WA, has complete laboratory facilities for conducting bacteriological research. The facility has complete

capabilities for serodiagnostic research, polymerase-chain-reaction screening, bacterial culturing and bacterial identification. Additional equipment purchases would include an additional bacteriological incubator, thermocycler of PCR, and spectrophotometer.

**g. References.**

Anacker, R.L and E.J. Ordal. 1958. Studies on the myxobacterium *Chondrococcus columnaris*. Proc. Soc. Exper. Biology and Medicine 78: 25-32

PNFHPC. 1997. 28th Annual Meeting, Portland, OR.

Sanders, J.E., R.A. Holt and J.L. Fryer. 1976. Serological comparison of *Flexibacter columnaris* isolates using rabbit and Rainbow Trout antisera. J. Fish. Res. Board Can. 33: 1386-1388

Shieh, H.S. 1980. Studies on the nutrition of a fish pathogen, *Flexibacter columnaris*. Microbios Letters 13: 129-133

Shotts, E.B. 1991. Selective isolation methods for fish pathogens. J. Applied Bacteriol. 70: 75S-80S

Standard Methods. 1975. Standard Methods for the Examination of Water and Wastewater. 14th Edit. APHA-AWWA-WPCF. Washington, D.C.

Toyama, T., K. Kita-Tsukamoto and H. Wakabayashi. 1994. Identification of *Cyrophaga psychrophila* by PCR targeted 16S ribosomal RNA. Fish Pathology 29: 271-275

## **Section 8. Relationships to other projects**

This is not intended to duplicate the Relationships table in Section 3. Instead, it allows for more detailed descriptions of relationships, includes non-interdependent relationships, and includes those not limited to specific Bonneville projects.

## **Section 9. Key personnel**

Principal Investigator: Dr. Peter W. Taylor, Research Fish Pathologist, 0.5FTE. Will oversee all aspects of the project. Will train appropriate field personnel in sample collection at participating hatcheries. Will conduct all laboratory analysis of samples and all analysis of data collected.

## **Resume**

Dr. Peter W. Taylor

U.S. Fish and Wildlife Service  
Abernathy Salmon Culture Technology Center  
Longview, WA 98632

Education: BS, Wildlife and Fisheries Science, New Mexico State Univ., 1973  
MS, Aquaculture and Fisheries, Auburn Univ., 1975  
PhD, Fish Pathology, Auburn Univ., 1977

Certification: Certified Fisheries Scientist, AFS, 1988  
Certified Fish Pathologist, FHS/AFS, 1989

Employment:

1996 to present U.S. Fish and Wildlife Service, Salmon Culture Technology Center,  
Longview, WA 98632  
1992-1995 National Biological Survey, Southeastern Fish Culture Lab., Marion,  
AL 36756  
1986-1991 MS Coop. Extension Service, Miss. State Univ., Belzoni MS 39083

Current Responsibilities: Conduct research in areas of fish health impacting Region 1 of the USFWS. Supply expertise in fish health to hatcheries operating in Region 1.  
Expertise: Over ten years experience as a clinical diagnostician in fish health working with warm water and cold water aquaculturists. Have over ten years experience conducting research in areas of parasitology, bacteriology, virology, and immunology of fish. Have served as a fish health specialist for projects sponsored by USAID, USDA, and FDA both nationally and overseas.

Publications:

Taylor, P.W., J.E. Crawford and E.B. Shotts. 1995. Comparison of Two Biochemical Test Systems With Conventional Methods For The Identification of Bacteria Pathogenic to Warmwater Fish. *Journal of Aquatic Animal Health*, 7: 312-317

Jenkins, J.A. and P.W. Taylor, 1995. An alternative Bacteriological medium for the isolation of *Aeromonas*. *Journal of Wildlife Diseases*, 31(2): 272-275

Taylor, P.W. 1992 Fish-eating Birds as Vectors for *Edwardsiella ictaluri* on Commercial Catfish Ponds in Mississippi., *Journal of Aquatic Animal Health*, 4: 240-243

## Section 10. Information/technology transfer

Information will be published in peer-reviewed journals, reports to hatchery managers, direct meetings with hatchery managers, and workshops if warranted.