FY 2007-2009 F&W Program Project Solicitation

Section 10. Narrative

Project ID: 200732100

Title: CBFWA Fish Passage Technical Services

Sponsor: Columbia Basin Fish and Wildlife Authority

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A. Abstract

The implementation of specific language and measures in the Northwest Power and Conservations Council's (NPCC) Fish and Wildlife Program (F&W Program) regarding the Fish Passage Center (FPC) is an essential element of fish passage management and monitoring in the region. The long-term coordination of these functions is necessary to ensure that entities throughout the Columbia River Basin, and in particular the state, tribal and federal fish and wildlife agencies, continue to receive technical information and analytical support critical for their effective participation in regional decision-making processes regarding hydrosystem operations and fish passage. Because the members of the Columbia Basin Fish and Wildlife Authority (CBFWA) are the primary entities that the FPC was initially established to assist under the Pacific Northwest Electric Power Planning and Conservation Act, the CBFWA is uniquely qualified to ensure the intent of the 2000 F&W Program and 2003 Mainstem Amendments to the F&W Program, relative to the Fish Passage Center, are met. For FY 2007-09, the CBFWA proposes to: (1) manage the real time and historic smolt monitoring (and related) databases, (2) provide routine analysis and reporting,

consistent with the oversight committee structure described in the 2003 F&W Program mainstem amendment, (3) provide technical assistance and information to fish and wildlife agencies and tribes in particular, and the public in general, on matters related to juvenile and adult salmon and steelhead passage through the mainstem hydro system and associated impacts on resident fish populations, (4) coordinate planning and implementation of the annual Smolt Monitoring Program, (5) gather, organize, analyze, house and make widely available monitoring and research information related to anadromous fish passage (adult and juvenile) and resident fish impacts due to implementation of the water management and passage measures that are part of the F&W Program, (6) provide technical information as requested for use by the fish and wildlife agencies and tribes and others in developing and evaluating in-season flow and spill requests, (7) provide the technical assistance necessary to help fish and wildlife agencies and tribes and others develop and coordinate recommendations for storage reservoir and river operations that, to the extent possible, avoid potential conflicts between anadromous and resident fish.

B. Technical and/or scientific background

This proposal meets the requirements of the F&W Program lawfully adopted under the provisions of the Pacific Northwest Electric Power Planning and Conservation Act (NW Power Act), and embraces the " Principles for Fish Migration and River Management Technical Assistance" outlined below.

The CBFWA, an organization composed of the four state and two federal fish and wildlife management agencies and eleven of the thirteen Indian tribes of the Columbia River Basin, is uniquely qualified to seamlessly transition from the current FPC management structure to one that is consistent with the F&W Program and the principles for fish migration and river management technical assistance. The CBFWA members are the legally recognized managers of the fish and wildlife resources. These responsibilities are theirs through federal and state statutes, treaties and court actions. The CBFWA members comprise the

entities that the FPC was originally established to serve through the NW Power Act and the F&W Program.

The " Principles for Fish Migration and River Management Technical Assistance" that will inform the CBFWA' s actions under this proposal are:

- Recognize that state, tribal and federal governments of the Columbia River Basin (sovereigns) and their fish management agencies have shared responsibilities for the well-being of the anadromous and resident fish populations;
- Mutually support the coordinated collection, analyses, and open exchange of information concerning anadromous and resident fish populations affected by the operation and development of the Federal Columbia River Power System (FCRPS);
- Recognize that essential technical services concerning anadromous fish migration have been provided to the fish and wildlife managers of the Columbia River Basin for the past two decades;
- Insist that these ongoing technical services, as well as additional technical services related to the effects of river management on resident fish populations, must be available without interruption or loss of efficiency now, in 2006, and thereafter;
- Assure that these technical services will be equally available to each of the state and federal fish and wildlife agencies and Columbia River Basin tribes;
- Agree to adapt this effort to long term research, monitoring and evaluation needs of the F&W Program, consistent with the new FCRPS BiOp and regional restoration and recovery plans;
- Recognize that the NPCC has spoken in support of the need for these technical services to be provided for, and by, the fish and wildlife agencies and tribes in its F&W Program since 1982 and its budget recommendations for Fiscal Year (FY) 2006; and

- Recognize that a contractual relationship the CBFWA and BPA must assure that these technical services are provided:
    - on a long-term basis without fragmentation, interruption or loss of continuity; and in a manner:
    - in a manner that serves the anadromous and resident fish management needs of the state and federal fishery agencies and the tribes;
    - within a governance structure that assures openness and objectivity and separates policy advocacy from the provision of the technical services, which are to be provided in a neutral and objective fashion;
    - by an organization that is administered in an open, sound and business-like manner under the oversight of the state, tribal and federal partners utilizing the services; and
    - in a manner that is based on a solid scientific foundation.

Oversight Structure

CBFWA will work within the oversight structure established for the FPC by the NPCC in the F&W Program 2003 mainstem amendment. This structure includes a Fish Passage Oversight Board established by the NPCC to include entities that utilize the technical services of the project, have statutory responsibilities for managing the fish resources that are the subject of data collection and analyses within the project, and are identified in the F&W Program as the primary reason for providing these technical services, and stakeholders with specific interest in fish passage issues. The oversight structure also includes technical oversight and independent scientific review.

CBFWA will also ensure the oversight structure for this project is consistent with the collaborative effort by the sovereigns and their fish and wildlife agencies to revise the 2004 NOAA Fisheries FCRPS Biological Opinion, currently under remand by the U.S. District Court in Portland, Oregon.

The intent of the oversight structure CBFWA works with others to ultimately put in place is to ensure technical services provided under this project maintain high standards for scientific integrity, objectivity and transparency. Consistent with the F&W Program, no information collected or analyses performed through this project will be considered proprietary.

C. Rationale and significance to regional programs

The objectives of this project relative to other regional programs is to; 1) provide real time and historical passage characteristics data such as juvenile survival, juvenile travel time passage distribution and timing, and environmental data that can be used in regional management forums such as the Technical Management Team, the various Biological Opinion remand work groups and the Implementation Team of the NOAA regional forum; 2) to maximize regional utility of fish mark groups by pursuing opportunities to coordinate and collaborate among programs to accomplish multiple application for mark groups wherever possible; and 3) to support sub-basin efforts by providing passage characteristics data through the mainstem migration.

The project is proposed specifically to implement the language of the F&W Program 2003 mainstem amendment regarding technical support for the state, tribal and federal fishery managers. The project is also intended to address the needs of key sovereign parties in the FCRPS Biological Opinion remand collaborative process, including providing technical support for their participation in the establishment of a long-term system monitoring and evaluation program and in the real time operation of the Columbia River hydrosystem. The technical support provided under this project will include system monitoring and evaluation, analysis of passage characteristics and hydrosystem operation mitigation measures, and collaborative analysis relating hydrosystem operations to the long-term performance of sub-basin plans. The project is integral to the implementation and reporting for the Smolt Monitoring Program and the Comparative Survival Study.

The Fish Passage technical project historically and as proposed has provided technical design and coordination with the objectives of assuring that mainstem monitoring of passage characteristics is consistent and maintains continuity. This relates to all sub-basin projects and monitoring such as contemplated through the CSMEP project by coordinating with and providing passage characteristics data on the mainstem migration portion of the lifecycle of groups populations from various sub-basins. In addition, a project objective relative to other regional programs is to maximize utility of mark groups to multiple applications by coordination and collaboration among many projects.

This proposal will provide those services prescribed for the FPC in the F&W Program 2003 mainstem amendment. They specifically are:

- Provide technical assistance and information to fish and wildlife agencies and tribes in particular, and the public in general on matters related to juvenile and adult salmon and steelhead passage through the mainstem hydro system.
- Plan and implement the annual Smolt Monitoring Program (SMP).
- Gather, organize, analyze, house and make widely available monitoring and research information related to juvenile and adult passage, and to the implementation of water management passage measures that are part of the F&W Program.
- Provide technical information necessary to assist the agencies and tribes in formulating in season flow and spill requests that implement the water management measures in the F&W Program, while also assisting the agencies and tribes in making sure that operating criteria for storage reservoirs are satisfied.
- In general, provide assistance necessary to coordinate recommendations for storage reservoir and river operations that to the extent possible avoid potential conflicts

D. Relationships to other projects

The project proposes to utilize a core staff, and oversight structure that provides a central point of development, coordination and implementation of the Smolt Monitoring Program and the Comparative Survival study; provide a basis for future collaboration on long term system monitoring and evaluation, and provide the technical assistance required by and provided in the mainstem amendments for the state, federal and tribal fishery agencies consistent with the F&W Program. The project establishes a new foundation of technical support for sub-basin plans, providing critical information regarding the impacts of the hydrosystem operation on sub-basin mitigation measures. This management structure recognizes the interrelationship and interactive nature of the functions conducted by the CBFWA Fish Passage Technical Services Project (FPTS).

E. Project history (for ongoing projects)

The FPC was established by agreement among CRITFC, National Marine Fisheries Service, Bonneville Power Administration and the Columbia River Fisheries Council in 1983. The Northwest Power Planning Council included the FPC (then called the Water Budget Center, WBC) as a measure in the first Fish and Wildlife Program. The FPC was designed to provide technical support and assistance to the fishery agencies and tribes, in their interaction with the hydrosystem operators and regulators related to fish passage mitigation. The FPC is intended to provide an efficient resource for coordination and technical assistance on regional activities on which the state, tribal and federal fish and wildlife agencies have mutual interest.

Throughout the 23 year history of the FPC, the project has many accomplishments which have been and continue to be invaluable to the fishery agencies and tribes and the region at-large.

On a day-to-day basis the FPC has successfully designed and overseen implementation of the annual Smolt Monitoring Program and has made the resulting passage characteristics data available to the region at large.

On an annual basis the FPC has completed and distributed to the region the following annual reports:

- **FPC Annual Reports** (1998-2005 are posted on the website, early issues can be requested in hard copy)
- **Annual Fishway Inspection Reports** (1998 - 2005 are posted on the FPC website, earlier issues can be requested in hard copy)
- **CSS Annual Reports** (2000 - 2005 are posted on the FPC website)
- **Annual Reports to the Oregon Department of Environmental Quality**

Other Miscellaneous documents which are posted to the FPC website

- PITtag Travel Time Data for Support of SOR#2006-05.
- Status of Subyearling Migration - August 2005
- Proposed Spill Evaluation - Salmon Managers - December 10, 2003
- Final NWPPC Response Flow and Spill Update Summary of Data Analysis and Review Regarding Mainstem Fish Passage Relating to Flow - January 2003 (Summary developed by state, tribal and federal salmon managers; subject to additional modifications upon additional review).
- 2001 John Day Dam Spill Benefits Analysis - 10/22/01
- 2001 Migration Summary Graphic Presentation - 10/08/01
- Preliminary Analysis of the 2001 Migration - 08/10/01
- Updated status of the 2001 Migration - (Updated 06/05/01)
- Review of Muir et al presentation to Northwest Power Planning Council.
- Comments on " Review of Survival, Flow, Temperature, and Migration Data for Hatchery-Raised Sub-Yearling Fall Chinook Salmon above Lower Granite Dam, 1995-1998" by Dreher et al.
- FPC Staff Presentations for the January 2000 PIT Tag Workshop
    - A Separation-by-code App

- Future Monitoring Release Application: Testing of 134 kHz PIT Tag Detection Equipment in Outfall Slots of Rapid River Hatchery Ponds
  Authors: Larry Basham and Henry Franzoni

Fish Passage Center Memos posted to the FPC website

- Projections of transport proportions under gas cap spill - May 15, 2006
- Comments on Framework Report April 17, 2006 draft circulated for workgroup review - April 26, 2006
- COMPASS Model Discussion - March 1, 2006
- Data Request Annual Mortalities of Juvenile Salmon - March 28, 2006
- Changes to FPC Work Statement- February 28, 2006
- FPAC memo to CBFWA Re: BPA proposal to transfer Fish Passage Center' s Fish Passage Advisory Committee functions and services to the Department of Energy PNNL and CBFWA - February 16, 2006
- Predicting 95% passage for sub-yearling Chinook to manage spill - February 21, 2006
- Presentation of Comparative Survival Study to the ISAB - February 7, 2006
- Estimates of Collection Efficiency and Transportation Proportion for Subyearling Chinook originating above Lower Granite Dam 2006 - February 6, 2006
- Updated Subyearling Chinook Analysis 1998-2005
- (Web-Based Power Point Presentation) - December 6th, 2005
- (Native Power Point Presentation) - December 6th, 2005
- CSS Workshop Document relating to transportation and within year SARs - December 2nd, 2005
- Review of University of Washington's presentation entitled "Injunctive Spill Retrospective Analysis" - November 18, 2005
- Federal Columbia River Power System - Summer Spill - After Action Report - October 31, 2005 - November 10, 2005

- Preliminary Survival Analysis for Subyearling Chinook originating above LGR - October 25, 2005
- Libby Operations Review and Preliminary Analysis - October 25, 2005
- Timing Estimation of Juvenile Salmonid Migration at Lower Granite Dam - October 21, 2005
- Response to PNGC and Northwest River Partners Comments on FPC Preliminary In-River Survival Analysis - October 5, 2005
- Snake River Summer Spill Analysis through August 31, 2005 at Lower Granite Dam - September 16, 2005
- Preliminary Survival Analysis for Subyearling Chinook originating Above LGR - September 12, 2005
- Origin (Hatchery or Wild) of run-at-large at LGR in August - August 16th, 2005
- Update of Adult Passage in the Snake River - 08/08/2005
- Juvenile passage update - 8/01/2005
- Update of Adult Passage in the Snake River - 07/28/2005
- Juvenile Passage Update - 7/28/2005
- Preliminary Review of 2005 Spring Migration - 07/20/05
- McNary Subyearling Cumulative Passage Index Plot Adjusted Total - 07/13/05
- Projected Flow Impact of Montana SOR for Libby and Hungry Horse - 07/13/05
- Adult Passage in the Snake River - 07/07/05
- Preliminary Estimates of Collection Efficiency and Transportation Proportion for Subyearling Chinook originating above Lower Granite Dam 2005 - 07/06/05
- Review of Court Ordered Spill Implementation Plan - 06/16/05
- Fall Chinook Overwintering - 05/10/2005
- Data request for historical operations - 05/03/05

- Data request for flow conditions experienced by the 2001 and 2005 spring Chinook adult returns - 04/19/05
- Data request for estimated proportion of Snake River yearling migrants transported annually since 2000 - 03/09/05
- Smolt Monitoring Program 2005
- ISAB Findings from the Reservoir Operations/Flow Survival Symposium, November 9-10, 2004 - 12/16/04
- Water Travel Time in the Snake and Columbia Rivers - 10/28/2004
- Comments on NPCC Draft Columbia River Basin Research Plan - 10/27/2004
- Mis-calibrated Spill at Bonneville Dam - 10/01/2004
- Draft BiOp 2004 - Comments on Draft Biological Opinion - 09/29/04
- Status of 2004 Fall Chinook Migration - 08/16/04
- 1995 to 2003 Weekly and Seasonal Summer Flows at LGR and MCN - 07/09/2004
- 1975-2003 Brownlee Drafts - 07/07/04
- Proposed Flow Shaping Recommendation based on Steelhead and Subyearling Chinook Timing at McNary Dam - 04/29/04
- 1995-2003 Biological Opinion Operations - 04/29/04
- Transportation of Fall Chinook Smolts and Related Fall Chinook Migration and Tag Data Concerning Summer Spill for Fish Passage - 04/06/04
- Comments on NOAA Fisheries technical Memorandum– Effects of the Federal Columbia River Power System on Salmon Populations - 01/30/04
- Comments on NMFS white paper entitled " Passage of Juvenile and Adult Salmonids at Columbia and Snake River Dams" - 01/30/04
- Review of the Beeman/Skalski proposal, entitled, Bonneville Dam Summer Spill Evaluation - 01/21/2004
- Summary of Documented Benefits of Spill - 12/17/03
- Juvenile Fish Passage in the Lower Columbia River in August Washington Stocks - 12/15/03

- Historical Fish Passage Data - 12/05/03
- Lower Monumental Historic Passage Distribution - 11/07/03
- Historical Review of Fish Passage Data - 10/23/2003
- Historical Review Power Point presentation
- Methods for estimating 95% - 08-18-2003
- Update status of sub-yearling Chinook passage and the determination of a 95% passage date - 08/18/03
- Update status of sub-yearling Chinook passage - 8/12/2003
- Timing of the 2003 Migration - 8/11/2003
- Ice Harbor Survival Test - 08/06/2003
- Review of Issue Brief No. 2, " The Variable Impact of Dams on Columbia and Snake River Salmon Populations" by Jay O' Laughlin and the supporting paper by Levin & Tolimieri. - 06/30/03
- 1995-2002 Biological Opinion Operations - 4/18/2003
- Response to questions in data request from Tom Karier, Northwest Power Planning Council - 12/10/02.
- NWPPC Mainstem Amendment Analysis Review - 12/10/02
- Preliminary Update on Juvenile Migration Characteristics - 10/14/02
- Memo regarding Prediction of Adult Returns based upon Spring Chinook Jack counts and Steelhead adult counts at dams - 08/14/02
- Memo regarding 2002 Spring Chinook Jack Return - 07/30/02
- Flood Control Targets

  Status of Selected Columbia River Projects with Respect to Flood Control Targets and Upper Snake Project Refill Data 2/28/02
- NMFS 2001 Report
  - Comments on NMFS 2001 Report and Bill Muir's NMFS' Presentations to NWPPC and IT. 2/28/02
  - Comments on the NMFS /UW Draft report entitled, "Survival Estimates for the Passage of Spring-Migrating Juvenile

Salmonids Through Snake and Columbia River Dams and Reservoirs, 2001". 2/28/02

- BiOp 2000 Comments for BiOp 2000 regarding NMFS Survival Study at The Dalles

Weekly reports summarizing hydrosystem operations, spill, flow, gas bubble symptoms, and dissolved gas levels are distributed to over 450 private and public individuals through email and regular mail since 1983. In addition, the weekly reports are posted on the FPC website. An FPC Internet Web page is maintained daily. The vast majority of data and analyses disseminated by the FPC are downloaded through the FPC web site. On a daily basis data downloads from the FPC web site range from 650 to 4,650 per day.

The FPC began as The Water Budget Center in 1983, under BPA project number #8712700, which combined the FPC with the Regional Smolt Monitoring Program. In 1994 the Fish Passage Center Project was given an independent project number, #19940330.

F. Proposal biological objectives, work elements, and methods

Objectives:

The biological objectives of the project is to facilitate the successful migration of juvenile and adult salmonids through the hydrosystem within the constraints of established passage and other mitigation programs for anadromous and resident fish. This is accomplished by providing fishery resource managers and hydrosystem operating agencies with real time and historical passage characteristics information and analysis that they may consider in implementing regional programs such as the NOAA Biological Opinion, the Smolt Transportation Program and the Vernita Bar agreement. In addition, a key element of provision of the same data and analysis to the public and region-at-large is a key element of accomplishing this objective since

hydrosystem passage management issues are public issues discussed in public forums.

The downstream fish passage measures of the F&W Program include measures for flow and spill to provide mitigation for the effects of the development and operation of the Federal Columbia River Basin Power System, (FCRPS), on migratory salmon and steelhead and resident fish. The F&W Program also includes monitoring and evaluation to assess the progress in accomplishing the biological objectives of the program at a basinwide level. The primary purpose of the CBFWA Fish Passage Technical Services Project (FPTS) is defined in the F&W Program to provide technical assistance and information to fish and wildlife agencies and tribes in particular and the public in general on matters related to juvenile and adult salmon and steelhead passage through the mainstem hydrosystem.

Specifically, the F&W Program establishes that the FTPSP shall:

1) Plan and implement the annual smolt monitoring program
2) Gather, organize, analyze, house, and make widely available monitoring and research information related to juvenile and adult passage, and to the implementation of the water management and passage measures that are part of the F&W program
3) Provide technical information necessary to assist the agencies and tribes in formulating in-season flow and spill requests that implement the water management measures in the F&W Program, while also assisting the agencies and tribes in making sure that operating criteria for storage reservoirs are satisfied
4) Provide the technical assistance necessary to coordinate recommendations for storage reservoir and river operations that, to the extent possible, avoid potential conflicts between anadromous and resident fish.

5) Implementation of NOAA Biological Opinion measures: The NOAA Fisheries 2004 Biological Opinion for the FCRPS includes fish passage measures, flow and spill and the implementation of the Annual Smolt Monitoring Program. The FPTS, in conducting the tasks and objectives established by the F&W Program, gathers research and monitoring information, makes available information and analysis that relate directly to proposed action (PA) included in the NOAA Fisheries Biological Opinion. In addition, the FPTS carries out activities required by the Biological Opinion, such as the Smolt Monitoring Program and the Section 10 permit Endangered Species Act requirements for FPTS activities.
6) Implement and report on the Adult and Juvenile Fish Facilities Inspection Program: The agencies and tribes share duties as a part of collaborative initiatives and activities that they routinely undertake. This approach takes advantage of the regional coordination systems that are in place at the FPTS and the cost effectiveness and efficiencies of implementing these programs through the project. These are within the scope of the F&W Program, and include the Adult Fish Facilities Inspection Program and the Comparative Survival Study. The Adult and Juvenile Fish Facilities Inspection Program is funded by the state and federal salmon management agencies.
7) Technical Support for the Biological Opinion Collaborative Remand process: The FPTPS will provide technical support for the fishery agencies and tribes in their participation in the collaborative process for restructuring the federal hydrosystem plan for protecting salmon and steelhead protected under the Endangered Species Act (Biological Opinion Remand).
8) Technical assistance to Regional Research Monitoring and Evaluation: The FPTPS will participate in long-term development of

Research, Monitoring & Evaluation in coordination with CSMEP, as requested by those managers participating in the BiOp remand, and as needed for the SMP. A primary element of this objective is to pursue coordination and collaboration among marking programs to maximize efficiency and cost benefit through multiple applications of work groups.

9) An objective of this proposal is to avoid disruption of data collection, analysis, or access to the public.

Description of Methods Used to Collect the Data; Analyze the Data

Because this is a proposal to transfer FPC tasks currently prescribed under the F&W Program to one entity, all tasks will be completely coordinated with each other, without disruption in the analytical and technical support provided to the state, federal and tribal fish and wildlife agencies. Project staff will utilize all of the methods and procedures outlined in FPC32 Smolt Monitoring Program Remote Site Data Entry Program protocols. The SMP sampling design developed by the state, federal and tribal fishery managers with technical support from the FPC for 2006 will be implemented. Long-term planning for the future SMP as with past SMP, will take place through the collaborative process assuming support by all fish and wildlife managers and specifically meeting Biological Opinion requirements.

Work Element – Develop RM&E Methods and Designs

Develop annual smolt monitoring plan with the Fish Passage Advisory Committee of CBFWA. Coordinate with other research and monitoring at mainstem projects. Develop work statements, budgets, and proposals with the SMP project leaders.

Develop Comparative Survival Study (CSS) annual study design, marking requirements and resulting budget requirements. Prepare annual proposal submittal.

The SMP design is developed through scientific review and collaboration. The development of methods and designs by the FPTS project is based upon input and agreement of state, federal and tribal fishery managers. In addition, the implementation of monitoring programs that take place at hydroelectric projects require coordination; collaboration and agreement of project operators. Since these monitoring programs affect ESA listed stocks ESA section 10 permit requirements for application implementation and reporting must be met.

A preliminary draft design is developed based upon the management needs identified by the NOAA Biological Opinion and input from fishery managers. The fishery managers review the draft in terms of data generated, application of data, continuity and consistency to maintain the historical data time series and management needs. Annual monitoring designs by necessity must incorporate and address project facilities, operation changes and concurrent research, which can affect sampling. In addition available funding on an annual basis has a real affect on the design of the monitoring program.

Work Element – Coordination

Participate in committees, meetings and presentations as requested by the agencies and tribes, including the ESA regional processes. Provide assistance in the Regional RME program. Facilitate the coordination of the SMP and CSS with the Regional RME program. Coordinate Fish Passage Advisory Committee communications and discussions. Facilitate FPAC meetings. Participate in FPAC conference call discussions. Attend FPAC meetings, TMT and IT meetings, Water Quality Team meetings, Water Temperature Modeling meetings and COE ADEP process meetings. Attend other interagency meetings as requested by the agencies and tribes. Project staff will coordinate with the state, tribal and federal fishery mangers, COE and other project operators to assure that onsite SMP sampling activities and concurrent research activities are properly implemented.

Work Element – Collect/Generate/Validate Field and Lab Data

Information on the status of the Columbia Basin salmonid smolt migration is collected each year through the Smolt Monitoring Program (SMP) to aid the Fishery Agencies and Tribes in making management recommendations to smolts as they migrate from natal streams through the hydro system to the ocean. SMP data is used to determine relative fish abundance at dams, fish migration timing at traps and dams, fish travel time between monitoring sites, and fish survival from traps and dams to downstream monitoring sites. All of this data is collected for the purpose of in-season management of flows and spills and the post-season evaluation of the effect of that year' s management actions on migrating salmonids.

This information is obtained from eleven monitoring sites in the Columbia River basin. These monitoring sites include four traps in tributaries above Lower Granite Dam, three dams on the lower Snake River, one dam in the mid-Columbia River reach, and three dams on the lower Columbia River. During periods of monitoring, the daily collection information from each of these sites is transmitted to the FPTS, where it is stored and compiled into data summaries for distribution to interested parties in the region. These sampling data include fin clips and other marks. This data is posted daily on the FPTS' s web page. Details of the sampling at the traps and dams may be found in the individual reports prepared by the respective monitoring organizations. Washington Department of Fish and Wildlife (WDFW) reports on sampling at Lower Granite, Lower Monumental, Rock Island, and McNary dams. Oregon Department of Fish and Wildlife (ODFW) reports on sampling at Little Goose Dam and the Grande Ronde River trap. Idaho Department of Fish and Game (IDFG) reports on sampling at the traps on the Salmon and Snake rivers. Nez Perce Tribe (NPT) reports on the sampling at the Imnaha River trap. Pacific States Marine Fisheries Commission (PSMFC) reports on the sampling at John Day and Bonneville dams.

Coordinate marking and sampling activities among all sites and other activities and programs at the sampling sites. Provide mark release information to remote site personnel, for releases upstream of each site. Provide assistance to remote site personnel. Maintain SMP data, validation and error checking process throughout the season. Send error reports to SMP project leaders. Obtain required ESA (Section 10) and state permits for SMP and GBT tagging and sampling by all SMP participants.

Data auditing procedures will be implemented using procedures outlined in the Fish Passage Center' s September 17, 1997 memorandum describing the data auditing tasks. This will assure continuity and consistency with past procedures and historical data documentation.

Work Element – Submit/Acquire Data

The FPTS will acquire the smolt monitoring data from the traps and dams via electronic transmission and will develop, maintain, and modify remote data entry requirements for the SMP sites as necessary. The FPTS project will develop software needed to implement the program and will update annually the data collection and reporting manual for remote sites.

Monitoring data from SMP remote sites is immediately displayed on the FPTS website.

Work Element – Create/Manage/Maintain Database

CBFWA will maintain the existing FPC website and will rename the website The Columbia River System Monitoring Site. The access to all data and analysis will remain public. All data and analyses will remain in the public domain to avoid disruption in meeting needs of state and tribal managers and the public.

Develop, maintain software and hardware at FPTS to maintain and manage SMP data. Develop software and analytical tools necessary for analysis and reporting of data from SMP and CSS. Maintain a consistent long-term database of daily and annual migration characteristics, hydrologic data,

hydrosystem operations data, reservoir operations, water quality, hatchery releases, mark recapture information and other information utilized in hydrosystem operation requests for fish passage and to support operations analysis. Project staff will provide internet access to all data stored in the SQL server, raw files, and metadata documentation, via HTTP or FTP protocols. Project staff will provide routine archiving and data backup on tape, of the entire SQL data base and web site, source codes. Tape back up will occur daily and weekly. Tapes will be stored off site. Mirror servers will be maintained to avoid catastrophic loss. The Project will report other data as requested, including resident fish data such as Bull Trout passage data, lamprey data or other specific data, smolt survival and smolt to adult return data.

Provide coordination, web assembly and maintenance of a hatchery database. This requires weekly contact with the hatchery personnel throughout the basin to discuss production and release plans, modifications and updates and entering these data into the web interface database. These data will be provided to river and fish managers to aid real-time river management.

Work Element – Disseminate Raw/Summary Data and Results

Maintain FPTS web site for regional data distribution including daily updates of smolt monitoring data. Provide web-based queries and reports of smolt passage indices. Maintain the web based presentation and distribution of the Smolt Monitoring Program by species in the present daily format with daily automatic updates to the SQL data system concurrently with presentation on the web utilizing the data protocols described in the FPC32 Smolt Monitoring Program Remote Sites Data Entry Program. Provide web-based queries and reports of GBT sampling results. Provide web-based queries and reports of water conditions. Water condition, flow, temperature, spill and dissolved gas, ie. river condition data, will be made available in web based format in the same methods identified for all other SQL based data. Daily and historical data will be made available utilizing SQL based queries, including passage index and flow

data. Downloadable csv and excel files will be provided based upon SQL web queries.

Consolidate, summarize and distribute fish passage, reservoir and other data as directed by the fishery agencies and tribes. Track river conditions and FCRPS operations. Provide weekly update summaries of reservoir operations, reservoir elevations, flow and spill, consistent with the F&W Program requirements. Provide web site support for real time coordination, consolidation and web publication of spawning ground survey data for chum, fall Chinook and other salmon species for Ives and Pierce Islands, Hamilton Creek, Hardy Creek, lower Columbia River Washington tributaries and Multnomah Falls, data collected and provided by US Fish and Wildlife Service, and PSMFC. Provide daily and historical web publication of Adult Dam Count data summaries.

Provide real time and historical data and analysis to the agencies and tribes to provide technical support in their development of System Operations Requests, including analyses of alternative hydrosystem operations. The FPTS will provide information as requested to inform entities developing system operation requests, but will not coordinate or facilitate the development of system operation requests. Respond to data requests from state and federal agencies, tribes, private and public utilities, interests groups, and the public-at-large. Prepare and distribute a weekly report providing real time weekly summary of passage conditions, river conditions, stream flow, spill, precipitation, smolt transportation, adult passage counts, past and future bi-weekly hatchery release reports, dissolved gas, smolt monitoring, and daily passage indices by species and site. Weekly reports are provided to any entity making a request. Provide technical assistance, analysis, and data as requested for ESA processes, F&W Program issues and processes, the state water quality agencies relative to mainstem fish passage. These include the System Configuration Team (SCT) the Technical Management Team (TMT), and the Implementation Team (IT). Maintain a Fish Passage Technical Services Project Internet site. Prepare data summaries and annual reports for SMP and CSS.

Work Element – Analyze/Interpret Data

Under the auspices of the Comparative Survival Study Oversight Committee, continue statistical analysis, development of analytical tools, maintain responsibility for planning, implementing, data management, analysis and reporting for the Comparative Survival Study (CSS) as directed by the CSS Oversight Committee of the fishery management agencies and tribes.

Review research proposals, analysis and results applicable to fish passage management issues as requested by the agencies and tribes. Advise agencies and tribes regarding the relationship and application of research to fish passage management issues.

Maintain current knowledge of proposed and on-going studies and their results and applications to fish passage management and hydrosytem operation issues.

Provide technical services on water quality. Consistent with the present FPC work statement, attend and provide technical assistance to the agencies and tribes in the water quality technical committee, including the annual water quality report for NOAA, the US Army Corps of Engineers and the state water quality agencies.

Provide technical support to sovereigns as necessary for the collaborative development and implementation of a new FCRPS BiOp. The framework and schedule for development of a new FCRPS BiOp require rigorous and uninterrupted technical support to the state and tribal sovereigns for effective collaboration with their federal partners. The states and tribes do not have the technical resources to meet these demands internally, and have relied on the FPC for this type of technical support in the past and these services need to be provided without interruption or fragmentation, particularly during the critical period of the ongoing FCRPS BiOp remand. State and tribal technical support functions necessary to support ongoing collaboration on the new FCRPS BiOp include, but are not limited to: analysis of juvenile and adult migration timing, composition and survival by route of dam passage; proportion of inriver and

transported smolts under various FCRPS operations; effects of various FCRPS operations on water temperature, flow and fish migration and survival; and the statistical rigor of potential experimental designs associated with research, monitoring and evaluation necessary for adaptive management.

Relative Abundance.

In the March through October weekly reports prepared by the Fish Passage Center, a daily passage index is presented for each species and rearing type available in the run-at-large. As long as these daily passage indices remain highly correlated with daily population abundance existing at a given monitoring site, the fishery managers may use the daily passage indices to effectively determine significant shifts in passage at that monitoring site. The actual value of fish guidance efficiency of the screens or effectiveness of spill is not required, only the existence of seasonal stability of these factors is required. The daily passage indices adjust for daily changes in spill proportion under the conservative assumption that the proportion of fish passing through spill will be close to the proportion of water being spilled. For these reasons, when the Smolt Monitoring Program began in 1984, the use of daily passage indices was chosen over attempts to estimate daily absolute population sizes. The daily passage index is computed by dividing the daily collection by the proportion of water passing through the powerhouse where the sampling takes place (Table 2). Since 1998, sampling at John Day Dam has been with a timed sample from the entire powerhouse bypass system instead of only one gatewell slot as in prior years. Since 2000, the index sampling at Bonneville Dam is with a timed sample at the Powerhouse II bypass system (prior years used timed trap samples from Powerhouse I ' s bypass system). Sampling at Powerhouse I is now limited to 2-3 days per week for fish condition and gas bubble trauma observations.

At monitoring sites where a sample timer is used to systematically divert a fixed proportion of fish into a sample tank for processing, the resulting sample number is divided by the sample rate to arrive at the estimated collection number. Post-season the daily passage indices are summed for the season at a

given site to provide an annual passage index for each species and rearing type available. This annual passage index reflects the strength of the particular run for the given year. The passage index is not applicable to the trap sites; therefore, only collection counts are reported at the four traps.

Table 2. Formulas to compute passage indices (collection/flow expansion factor).

Sampling Site	**Collection**	**Flow expansion factor**
Lower Granite Dam Little Goose Dam Lower Monumental Dam McNary Dam John Day Dam	24-hr catch / sample rate	PH/(PH+SP)
Bonneville Dam (PH 2)	24-hr catch / sample rate	PH2/(PH1+PH2+SP)
Rock Island Dam (PH 2)	24-hr catch / 1	PH2/(PH1+PH2+SP)

Legend: PH=powerhouse flow; PH2=second powerhouse flow; and SP=spill flow.
Note: all flows are 24-hr averages over the site-specific sample interval.

Migration Timing.

The distribution of the daily passage indices at the dams provides a measure of migration timing at a given site. From the passage distributions at Lower Granite, Rock Island, McNary, and Bonneville dams, the dates of passage at the key cumulative percentiles of 10%, 50%, and 90% are reported for each species the FPC Annual Reports, along with passage timing plots for the run-at-large.

Travel Time.

The PIT tag provides a unique alphanumeric code for individual fish that allows determination of date and time of passage of these fish at dams with PIT tag detection equipment in place. From these data, travel times of individual fish within reaches of interest may be computed. Travel time is estimated from release to first detection site, and between series of dams, by subtracting the upstream detection date and time from the downstream detection date and time for PIT tagged fish. From the distribution of travel times for each group of PIT

tagged fish, minimum, maximum, and median travel time with associated 95% confidence interval are computed. Associated with the travel time data are flow and river temperature averages. These environmental parameters are computed at a key dam within the reach of interest as the average across a series of days equal to the number of days estimated as the median travel time. This series of days begin with the date of release for travel times estimated from release to first monitoring site (*e.g.*, Snake River basin sites to Lower Granite Dam or Mid-Columbia River basin sites to McNary Dam), and they begin with the date of re-release at the upstream dam for travel times estimated between two dams (*e.g.*, Lower Granite Dam to McNary Dam, Rock Island to McNary Dam, and McNary Dam to Bonneville Dam). The detailed travel time data for groups of PIT tagged fish released from the four traps, selected hatcheries, and Rock Island Dam or re-released from Lower Granite and McNary dams are presented each year in the FPC (FPTS) Annual Report.

Survival Estimates.

Survival is estimated from release to first detection site, and between series of dams, by the Cormack-Jolly-Seber release-recapture method outlined in American Fisheries Society Monograph 5, *Design and analysis methods for fish survival experiments based on release-recapture*, by K.P. Burnham, D.R. Anderson, G.C. White, C. Brownie, and K.H. Pollock, 1987. For a specified group of fish, this methodology provides a group estimate of survival through a series of reservoirs and dams, as well as a group estimate of collection efficiency at the dams. For the group of PIT tagged fish of interest, this method uses the subsequent detection information on the known number of fish re-released at a particular dam to estimate the number of fish that past that particular dam alive but undetected. By adding the number of fish detected at the dam and the estimated number of fish alive but undetected passing the dam, we have an estimate of the total number of fish from the group of interest at that particular site. Dividing that estimated total by the estimated total of an upstream dam, we

arrived at the survival estimate from the tailrace of the upstream dam to the tailrace of the downstream dam. If one divides by the release number, then an estimate of survival from release to the tailrace of the downstream dam of interest is obtained. The software program MARK (White and Burnham 1999) was used to perform the survival estimates with the " identity " design matrix and " identity" link function set.

Estimates of survival from release site to tailrace of Lower Monumental Dam were attempted for weekly releases of wild and hatchery Chinook and steelhead from the daily releases of PIT tagged fish at four SMP traps above Lower Granite Dam. The weekly tagging goal for survival estimation was set at 600 fish, but this number of fish per week was not always possible. Therefore, a release period of up to 15 consecutive days may be used in some instances to try to active the target release size. Estimates of survival from release site to Lower Monumental Dam tailrace and for the three shorter reaches that make up this longer reach is presented in the FPC (FPTS) Annual Reports. The extended multi-dam reach survival estimate is the product of three shorter reach estimates. The associated variance for the extended reach estimate is computed using formulas for propagation of error in products of non-independent estimates. For each release location, species, rearing type of fish (hatchery or wild), and release period, we obtain an extended reach survival estimate with associated 95% confidence interval.

Estimates of survival from release at Rock Island Dam to tailrace of McNary Dam were attempted for bi-weekly releases of yearling and subyearling Chinook, steelhead, and sockeye (all mixtures of hatchery and wild fish) from the daily releases at Rock Island Dam. Pooling of longer than weekly release blocks were necessary because there are fewer downstream PIT tag detection sites for Mid-Columbia River released fish. The estimated survival of smolts released from Rock Island Dam to McNary Dam tailrace is presented in the FPC (FPTS) Annual Reports

Survival estimates were also obtained for hatchery yearling Chinook and steelhead from key hatcheries in the Snake River drainage and for hatchery yearling and subyearling Chinook from key hatcheries in the Mid-Columbia River drainage. Data for the Snake River hatcheries show survival estimates from release site to Lower Monumental Dam tailrace (product of three reach survival estimates) and from release site to John Day Dam tailrace (product of five reach survival estimates). Data from the Mid-Columbia River hatcheries show survival estimates from release site to McNary Dam only. Data for the reaches in the Snake and Mid-Columbia River basins are presented in the FPC (FPTS) Annual Reports.

For each species and rearing type, a seasonal average was obtained for releases from the four traps and Rock Island Dam whenever the survival estimates of the groups released over time did not significantly differ. To determine any significant differences occurred within a year, a test of whether the " between group" variance component was significantly greater than zero (Burnham 1987 *et al.*, Chapter 4). This is a chi-square test equal to [empirical variance of mean survival*(1-degrees of freedom)]/ [theoretical variance of mean survival]. In cases where the chi-square test was not significant at the 95% confidence level, then the average was computed for the season, along with the average theoretical variance. In cases where the chi-square test was significant, then the season was split into periods showing the different survival levels.

Work Element - Provide Technical Review

As requested will provide technical reviews of research designs, research results, reports and proposed actions, by any regional party. This includes reviewing research proposals, analysis and results applicable to fish passage management issues and providing technical assistance, analysis, and data as requested by the agencies and tribes. This also includes answering specific questions regarding fish passage, alternative operations scenarios, the impacts of alternative reservoir operations, historical and real time analysis, coordinate

comments recommendations and discussions and will facilitate the discussions of the technical basis and justification of operations requests. As specifically stated in the F&W Program CBFWA will provide technical information as requested for use by the fish and wildlife agencies and tribes and others in developing and evaluating in-season flow and spill requests.

Work Element – Administration

Provide project administrative support. Consistent with the F&W Program and the FPC (FPTS) statement of work, provide administrative support including development of SMP work statements, study design, budgets and submittals through the project selection process. Include compliance with all BPA Pisces reporting and system maintenance requirements for the Smolt Monitoring Program and the Comparative Survival Study.

Coordinate within CBFWA in the mainstem/systemwide review process and prepare the annual funding proposals and submit to BPA. Prepare the annual Fish Passage Technical Services Project budget and submit to CBFWA. Coordinate with CBFWA regarding all accounting and budgeting pertaining to the FPTS contract; review the monthly budget status reports provided by CBFWA for accuracy and to make sure expenditures are within the approved budget numbers. Submit purchase orders to CBFWA for all purchases, maintenance work, leases, and contracts. Provide liaison between American Property Management and CBFWA regarding leasing and maintenance of FPTS office space, other building maintenance and safety issues, and parking. Coordinate with CBFWA regarding FPTS personnel, such as hiring, grading of positions, pay schedules, benefits, personnel concerns, performance evaluations, time schedules and timesheets, travel arrangements and any other personnel issues as needed. Coordinate travel and training of staff as necessary. Maintain comprehensive filing system for correspondence, reports, budgets, historical data, personnel and benefit information and forms, data collection. Maintain & update FPTS procedural manuals.

Maintain FPTS library including subscription to periodicals for data management system, such as training manuals and technical references and resource materials specifically related to FPTS work.

Work Element – Coordination - Fish Facility Inspections

Implement the Adult and Juvenile Fish Facilities Inspection Program. Coordinate, train and schedule individual agencies inspectors. Develop an inspection and reporting schedule. Accompany inspectors from time-to-time. Review and consolidate monthly reports. Discuss problems, pursue resolution with the project operators. Prepare annual budget, coordinate agencies funding and work statement. Prepare and distribute an annual report.

G. Facilities and equipment

The CBFWA is centrally located in downtown Portland at 851 SW Sixth Avenue, Suite 260, Portland, OR 97204. Meeting facilities include three conference rooms with teleconferencing and network capabilities, onsite parking, and reception/clerical services. Office equipment includes a high-speed copier/scanner, networked computers with up-to-date software, broadcast faxing, email services, telephone system with web conferencing, printers, Xerox copier, and recording equipment. The CBFWA maintains a comprehensive filing system for outgoing and incoming documents, archives, and a library. In addition, a fully-equipped office is available for manager or meeting participant use.

In order to control costs, this proposal would rely on the existing hardware and software for data collection and analysis as well as coordination and plans that have been developed and agreed upon by CBFWA members through discussion with the Fish Passage Advisory Committee and state and tribal fishery management staff. This proposal is designed to be consistent with the existing FPC infrastructure (computers, offices, administrative support). Geographic location, moving decisions will be arrived at collaboratively with CBFWA members and will be based on cost effectiveness, efficiency and avoidance of disruption to the state, tribal and federal fishery managers depending on data,

and analysis relative to fish passage, in hydrosystem management discussions and Biological Opinion remand forums.

The present FPC hardware software infrastructure is comprised of SQL architecture running on a Microsoft platform.

Ability to incorporate methods into work previously approved

The CBFWA currently has a grant agreement with BPA to facilitate collaboration among the fish and wildlife managers and tribes on the many issues surrounding the restoration of the Columbia River Basin' s fish and wildlife. It is appropriate for the fish and wildlife managers and tribes within CBFWA to provide this technical information to the region. The CBFWA members have utilized, developed, and participated in the collection and analysis of these data and have worked collaboratively on a daily and weekly basis through all stages of the development of the SMP, data collection, and analysis. Because CBFWA members have maintained extensive participation in these activities in the past, have detailed knowledge of the SMP, it' s design, analysis, reporting and application of the data and the continuation of approved methods and protocols, there will be a smooth continuation of data collection, analysis and reporting.

Efficiencies to BPA in awarding the work to CBFWA

By awarding this project to CBFWA, BPA will realize efficiencies in the oversight, management and day-to-day administration of the program and staff. The current separate contract used to fund the program will be discontinued, and the deliverables included as an addendum to the existing CBFWA contract. The existing CBFWA support structure will be used for the administration of the additional tasks. Additionally, because the CBFWA is an organization that performs work that benefits BPA and the NPCC Program, all overhead associated with this project will be reinvested directly into the performance of this work.

In addition, CBFWA has an experienced, efficient and cost-effective contract management process, which has a proven record for meeting deliverables and timelines.

H. References

FPC Website, http://www.fpc.org

Burnham, K.P., D.R. Anderson, G.C. White, C. Brownie, and K.H. Pollock. 1987. Design and analysis methods for fish survival experiments based on release-recapture. American Fisheries Society Monograph 5. ISSN 0362-1715. Bethesda, MD. 437 pp.

White, G.C., and K.P. Burnham. 1999. Program MARK: survival estimation from populations of marked animals. Bird Study 46 Supplement: 120-138.

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I. Key personnel

Michele DeHart – Project leader

Biologist -27 years experience in Columbia Basin fish passage and management issues, specifically related to hydrosystem fish passage.

Margaret Filardo. Ph.D.

Biologist- 21 years experience in Columbia River fish passage, data analysis, research and hydrosystem fish passage management. Experience with the development of Section 10 applications, and reporting requirements for the Smolt Monitoring Program.

Jerome McCann

Biologist – 15 years experience with Columbia River fish passage, research and analysis, smolt monitoring program design and implementation, gas bubble trauma monitoring, passage characteristics analysis.

David Benner

Natural Resource Analyst - 5 years experience, with Columbia River fish passage, reservoir and river operations, civil engineer, fish passage facilities, reservoir operations.

Tom Berggren

Biometrician - 24 years experience with Columbia River fish passage studies and analysis, fish survival, smolt to adult returns, passage characteristics.

Data System Manager (Vacant)

Computer programming, data management – 10 years experience in Columbia River Basin data collection, development of data collection and analysis custom software for fish survival, smolt to adult return and passage analysis. He also has another 20 years in software programming and development.

Sergei Rassk

Computer Programmer – 8 years experience in the development of computer programs for analysis of PIT tag fish passage data, development of data base structure for fish passage and hatchery data, development of custom software for Smolt Monitoring Program data entry software and smolt monitoring program data storage and public web access programs for SMP data. Also has another 20 plus years experience in software programming and development.

Chris McCarty

Computer hardware and network specialist – 5 years experience with Smolt Monitoring Program data collection and data storage and maintenance hardware. Network maintenance for central SMP data and hardware support for remote sites. Fabrication of computer hardware for central Smolt Monitoring Program data, web site access and remote sites.

Peter McHugh

Fishery Biologist: Ph.D. Aquatic Ecology, M.S. Fish Biology, Utah State University. 7 years of experience with field and model-based studies of imperiled species' population performance; recent research emphasized understanding the effects of exotic species and habitat effects on native salmonid performance at the individual (growth, condition) and population (survival, migration) levels; trained and experienced in the application of a variety of field survey and quantitative analytical approaches.

Brandon Chockley

Data Analyst – M.S. Zoology, University of Florida. 5 years experience in population dynamics, ecological modeling, and data analysis with freshwater and marine fishes. Experienced in using survival analysis of right censored data in the development and implementation of demographic models.

Resident Fish Biologist – (vacant)

Experience with resident fish impacts of reservoir operations, reservoir and riverine ecology, and monitoring and evaluation study designs.

Dona Watson

Executive Assistant-9 years experience with the development of Smolt Monitoring Program, work plans and budgets, coordination with remote site project leaders, assisting remote site project leaders in developing budgets and work statements in accordance with the design and implementation plan developed by CBFWA members. Develops responses to BPA Pisces requirements for the SMP including maintenance, reporting, and budget reporting. Coordinates with remote site personnel to meet budget limitations and requirements for the entire SMP. Also has 20 plus years experience in other administrative, budgeting and management responsibilities.

Resumes following:

MICHELE DEHART

PROFESSIONAL EXPERIENCE

1984 - Present Fish Passage Center/Pacific Marine Fisheries Commission

Fish Passage Center Manager 1986-Present, Biologist Analyst 1984-1986

- Supervise all of FPC activities and staff
- Develop recommendations, and analysis as required by the Columbia Basin Fish and Wildlife Agencies and Tribes
- Oversee the design, development implementation and analysis of the Smolt Monitoring Program and the Comparative Survival Study.

1980 – 1983 National Marine Fisheries Service

Biologist

- *Mid-Columbia River FERC licensed projects*

1978 –1979 Pacific Northwest River Basins Commission

Biologist

- *Multipurpose river use, tradeoff analysis*

1977 – 1978 Columbia River Inter-tribal Fish Commission

Biologist

- Technical representative for treaty tribes in Columbia River habitat and harvest issues.

1975 – 1976 Northwest Indian Fish Commission

Biologist

- US v Washington Environmental Issues
- Metlakatla, Alaska, Indian Community consultant, Herring Roe Fishery

1972 – 1975 US Fish and Wildlife Service

Biologist

- Technical assistance NWIFC tribes, stream surveys
- Logging unit permits and stream activities hydraulic permit

EDUCATION

BS Fishery Biology University of Washington Seattle, Washington

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Education:
B.S., Biology, York College of the City University of New York (1974)
M.A., Biology, City College of the City University of New York (1977)
Ph. D. Oceanography (Biological), Old Dominion University, Norfolk, VA (1984)
Education includes pertinent courses in: Biology, Ecology, Fisheries Management, Geology, Limnology, Oceanography and Ichthyology.

Work Experience:

Fisheries Biologist. Fish Passage Center, 2501 SW First Avenue, Portland, OR. 97201. February 1987 to present. Supervisor: Michele DeHart (503) 230-4288. The Fish Passage Center is a technical support group, which serves the federal, state and tribal members of the Columbia Basin Fish and Wildlife Authority.

Fisheries Biologist, Columbia River Inter Tribal Fish Commission, Portland, OR. September 1985 to February 1987. Primary duties included the implementation of a computer simulation model for the development of a biologically sound spill program in the Columbia and Snake federal hydrosystem and the coordination of a graduate student program with Oregon State University and the University of Washington.

Selected Publications:

Filardo, Margaret J. 1977. Phytoplankton growth in the waterways around Manhattan, New York. Masters Thesis, City College of the City University of New York.

Filardo, Margaret J. 1984. Phytoplankton ecology and dynamics in the James River Estuary, Virginia, U.S.A. Ph.D. dissertation, Old Dominion University.

Filardo, M.J. and W.M. Dunstan, 1985. Phytoplankton biomass and productivity in the low salinity waters of the James River estuary, Virginia, U.S.A. Estuarine, Coastal and Shelf Sciences, **21**: 653-667.

Takayanagi, K, G.T.F. Wong and M.J. Filardo, 1989. Nitrate reductase activity and the speciation of selenium at the mouth of the Chesapeake Bay. Journal of the Oceanological Society of Japan, **45** (2): 129-133.

Berggren, T.J. and M.J. Filardo, 1993. An analysis of Variables Influencing the Migration of Juvenile Salmonids in the Columbia River Basin. North American Journal of Fisheries Management, **13:** 48-63.
Filardo, M.J. 1995-2005. Editor and major contributor. National Marine Fisheries Service Annual Report to the Oregon Department of Environmental Quality on the biological effects of total dissolved gas in the Columbia River.

Filardo, M.J. 1987 –2005. Fish Passage Center Annual Report of the fish migration. Major Contributor.

Honors, Awards, Special Accomplishments

Phi Kappa Phi
Sigma Xi, Tidewater Chapter, Best Student Paper 1983.
National Dean's List of Graduate Scholars

Thomas J. Berggren
4921 SE 43 Ave
Portland, OR 97206
(503) 774-2016

Title: Biometrician

FTE: 1 (40 hrs/week)

Description of duties:
Participates in the planning, implementation, and analysis of the Comparative Survival Rate Study (CSS). Participates with FWS staff and members of the CSS Oversight and Analysis Committee in the estimation of smolt-to-adult survival rates (SARs) for Chinook and steelhead that migrate in-river versus those that are transported. Participates in the preparation of the annual status report for the CSS program.

Work Experience:
• Fish Passage Center, Portland OR – February 1986 to March 2006. Biometrician. Contributes to Smolt Monitoring Program and Comparative Survival Study.

• Bonneville Power Administration, Portland OR – March 1982 to February 1986. Fishery Biologist in Fish and Wildlife Division and Statistician in Forecasting Division.

• Beak Consultants, Portland OR – October 1979 to March 1982. Fishery Biologist/Analyst providing statistical support.

• Texas Instruments, Buchanan NY – March 1974 to January 1978. Fishery Biologist/Analyst providing operational and analytical oversight on stripped bass demographics study.

Education:
• Master of Science, May 1981 from Cornell University in Department of Plant Breeding and Biometry, Ithaca NY. Coursework emphasized statistics and biometry.

• Master of Science, March 1974 from University of Washington in College of Fisheries, Seattle WA. Coursework emphasized fishery population dynamics and statistics.

• Bachelor of Science, June 1971 from University of Washington in College of Fisheries, Seattle WA. Coursework emphasized quantitative science and mathematics.

Publication:
• Berggren, TJ and MJ Filardo, 1993. An analysis of variables influencing the migration of juvenile salmonids in the Columbia River basin. North American Journal of Fisheries Management, Vol 13 (1): 48-63.

Jerry McCann
1025 SE Lexington Street
Portland, Oregon 97202
(503) 230-4291

WORK EXPERIENCE

Biologist/Analyst, Fish Passage Center -- February 1995 to March 2006
Assisted in the management of the Smolt Monitoring Program. Analyzed various data sets (smolt counts at dams and PIT-tag data) to provide managers information on juvenile salmonid timing, travel-time, and survival rate estimates for use in hydrosystem operation requests in the Columbia River basin. Provided analyses and comments on various research proposals and ongoing studies as part of a regional research review process. Worked on team that developed and implemented a Gas Bubble Trauma monitoring program to assess effects of spill on migrating juvenile salmonids in the Columbia River basin. Participated in regional groups regarding water quality issues including the NOAA Fisheries Water Quality Team.

Research Fisheries Biologist, US Fish and Wildlife Service, Columbia River Research Center, Cook, WA -- March 1991 to August 1993
Supervised field studies and laboratory experiments related to juvenile fall Chinook habitat use in the lower Columbia and Snake rivers. This included designing and implementing beach seine sampling, hydroacoustic surveys, plankton sampling, and conducting laboratory tests to determine the minimum size for PIT-tagging of subyearling fall Chinook. Tested the fish-size effects of tagging on predation vulnerability, swim performance, growth and survival of juvenile fall Chinook salmon.

Graduate Research Assistant, Colorado State University Coop Unit – September 1989 to March 1991
Completed a MS Degree in Fishery Science while evaluating the use of a mobile popnet to estimate fish populations in lakes as thesis project. Worked with Dr. Kurt Fausch capturing warm water fish species in Cache La Poudre R. to monitor disease incidence as an indicator of fish exposure to toxicants from various industries located along the river. Assisted in electrofishing stream surveys of Dr. Stephen Riley, related to the evaluation of habitat improvements in small mountain streams in Northern Colorado.

Creel Census Clerk, Colorado Division of Wildlife – October 1988 to August 1989
Carried out creel census at various lakes in Denver Metro area to document angler usage of urban lakes. Conducted a summer-long survey on the Frying Pan River to document the economic value of a world-class trout stream to local communities.

EDUCATION

Colorado State University, Fort Collins, CO, M.S. Fisheries Science Completed 1992
Saint John's University, Collegeville, Minnesota, B.S. Biology, Graduated 1983