

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

**Section 1. General administrative information**

**PIT Tag System Transition**

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**Bonneville project number, if an ongoing project**    9701000

**Business name of agency, institution or organization requesting funding**  
Bonneville Power Administration

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**Business acronym (if appropriate)**    BPA

**Proposal contact person or principal investigator:**

**Name**                                    John H. Rowan - EWI-4  
**Mailing Address**                    P.O. Box 3621  
**City, ST Zip**                            Portland, OR 97208-3621  
**Phone**                                     503-230-4238  
**Fax**                                         503-230-4564  
**Email address**                         jhrowan@bpa.gov

**Subcontractors.**

<b>Organization</b>	<b>Mailing Address</b>	<b>City, ST Zip</b>	<b>Contact Name</b>
Destron Fearing	490 Villaume Ave.	South St. Paul, MN 55075-2445	Randy Geissler/Sean Casey
PSMFC	45 S.E. 82nd Drive, Suite 100	Gladstone, OR 97027-2522	Carter Stein
U.S. Army Corps of Engineers	201 Third Avenue	Walla Walla, WA 99362-1876	Dave Hurson
NMFS-CZES Division	2725 Montlake Boulevard East	Seattle, WA 98112	Earl Prentice/Brad Peterson/Sandy Downing

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

5.0F.9, 5.0F.10, 5.0F.11, 5.0F.12, 5.0F.13

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

The ITS, No. 14, of NMFS' 1995 BiOp refers to completion of the design and development of adult PIT-tag detectors in mainstem dams, followed by immediate installation; these systems will likely rely on the new 134.2 kHz frequency.

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**Other planning document references.**

N/A

**Subbasin.**

Columbia/Snake River Basin-Wide

**Short description.**

Replaces existing 400 kHz PIT tag detection system for juvenile salmonids with 134.2 kHz, ISO-based system for use within the Columbia River Basin; facilitates development and installation of 134.2 kHz adult salmonid detection equipment at mainstem dams.

**Section 2. Key words**

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

**Other keywords.**

PIT tags

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

Project #	Project title/description	Nature of relationship
9008000	PTAGIS	Project operates and maintains the PIT tag interrogation system in the Basin.
8331900	New Marking and Monitoring Techniques for Fish	Project is investigating PIT tag detection of adult salmonids based on the ISO frequency of 134.2 kHz.
0	XXXXXX	Many projects use PIT tags and the PIT tag detection system in the Basin for their research.
9008001	PIT Tag Purchase	Project purchases 400 kHz tags and will purchase 134.2 kHz ISO tags for use by researchers in the Columbia River Basin.

## Section 4. Objectives, tasks and schedules

### *Objectives and tasks*

<b>Obj 1,2,3</b>	<b>Objective</b>	<b>Task a,b,c</b>	<b>Task</b>
1	Ensure that infrastructure is in place to accommodate replacement of 400 kHz PIT tag juvenile salmonid detection system with 134.2 kHz, ISO-based system in the Columbia River Basin.	a	Construct access structures for PIT tag monitoring equipment at Little Goose (GOJ) and Lower Monumental (LMJ) Juvenile Salmonid Collection Facilities.
		b	Install fiber optic and electrical lines and conduits and NEMA 4 boxes at Lower Granite (GRJ), GOJ, LMJ and the balance of McNary (MCJ) Juvenile Salmonid Collection Facilities.
		c	Repair or replace 30 shields: GRJ (5); GOJ (6); LMJ (19).
		d	Purchase 50 portable readers for use in the field.

### *Objective schedules and costs*

<b>Objective #</b>	<b>Start Date mm/yyyy</b>	<b>End Date mm/yyyy</b>	<b>Cost %</b>
1	10/1998	10/1999	1.0
			TOTAL 100.00%

### **Schedule constraints.**

Adverse weather conditions could delay some of the on-site work at the projects. Inability of manufacturer to produce portable reader would affect schedule; this is not anticipated.

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### **Completion date.**

FY2000

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## Section 5. Budget

### *FY99 budget by line item*

Item	Note	FY99
Personnel		
Fringe benefits		
Supplies, materials, non-expendable property		
Operations & maintenance		
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	access structures; fiber optics and electrical repair/replace shields; portable readers	\$800,000
PIT tags	# of tags:	
Travel		
Indirect costs		
Subcontracts		
Other		
<b>TOTAL</b>		\$800,000

### *Outyear costs*

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$500,000	\$ 0	\$ 0	\$ 0
O&M as % of total	0.00%	0.00%	0.00%	0.00%

## Section 6. Abstract

The Transition Project is part of the Columbia River Basin-wide replacement of the 400 kHz PIT tag interrogation system for juvenile salmonids with a 134.2 kHz ISO-based system. The existing 400 kHz system is based on 15-year-old technology and is becoming obsolete as critical replacement parts are increasingly difficult to locate, if they can be found at all. Converting to the new ISO-based system should provide significant benefits in read/detection distances with less power input and lower FCC restrictions on RF emissions. In addition, the diagnostic capabilities will significantly improve the ease with which the system is operated and maintained. Adopting the ISO standards should lead to cost savings as expanded participation from multiple manufacturers and vendors occurs. The new system should also move the region closer to being able to detect adult salmonids under more natural conditions than is currently possible with the 400 kHz system.

A Transition Team has been established to guide the transition process. The Transition Team has representatives from PSMFC, NMFS, BPA, WDFW, IDFG, FPC and the U.S. Army Corps of Engineers. The current plan is to have 134.2 kHz stationary transceivers installed at the mainstem Federal hydroelectric projects in time to detect the juvenile salmonid outmigration during spring 2000. In addition, Tribal, state and Federal anadromous fish managers will need a limited number of 134.2 kHz portable (hand-held) transceivers available to use for tagging juveniles as early as summer/fall of 1998.

The following activities are scheduled for FY98:

- 1) Evaluation of Destron-Fearing 134.2 kHz stationary transceivers installed in 1997 at McNary Dam, and additional stationary transceivers installed in 1998 at McNary Dam and John Day Dam, will continue. This field test is designed to measure, among other things, the reliability of the PIT-tag detection equipment while installed at a juvenile salmonid collection facility. Fish tests will be conducted to examine the system's ability to read tags under normal operating conditions.
- 2) Procurement of portable ISO-based readers for use while tagging juvenile salmonids.
- 3), Evaluation of ISO tags (tag construction will be based on technical transponder requirements currently being developed by PSMFC).
- 4) Identification of infrastructure modifications at Corps' facilities necessary to support the new frequency system.

Most of FY99 will involve the infrastructure modifications required at each project to replace the 400 kHz system with the new Destron-Fearing 134.2 kHz system.

## **Section 7. Project description**

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

There are two basic reasons for changing from an interrogation system based on 400 kHz frequency to one based on 134.2 kHz frequency. The first is the improved performance gained by using the lower frequency. The 134.2 kHz frequency will yield a system with greater read range and one less affected by fluctuating water levels in the flumes of the juvenile fish collection facilities. In addition, FCC requirements for RF emissions are less strict. The second basic reason is that the existing 400 kHz system is aging and replacement parts are difficult to find; in some cases, parts are not being manufactured any more. One of the advantages in using the latest technology is that the 134.2 kHz system can include remote and local diagnostics, which will make it easier to operate and maintain. All of these are items that not only enhance the juvenile salmonid PIT tag detection system, but also should make adult salmonid detection under more natural conditions more feasible.

**b. Proposal objectives.**

The objective of this project is to install an updated PIT tag interrogation system for juvenile salmonids that provides for the same or better reading efficiency as the existing 400 kHz interrogation system. The ISO-based interrogation system will be installed at the six mainstem Columbia and Snake River Dams that have or will have juvenile bypass and sampling facilities, (i.e., Lower Granite, Little Goose, Lower Monumental, McNary, John Day and Bonneville dams).

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

The following provides a comparison between the PIT tag interrogation technology for the existing 400 kHz system and the new 134.2 kHz, ISO-based system.

**Tags**

400 - 400 kHz energizing signal. Takes almost 10 times more energy to activate tag than 134.2 kHz tags.

134.2 - FDX-B signaling. Takes less power to energize the tag. Therefore, the tags can read at longer ranges which will be important for the development of adult detection and flat-plate transceiver technology. Also, a smaller power requirement will translate to a longer transceiver life cycle - less maintenance and higher reliability.

**Transceivers**

**Diagnostics**

400 - Has virtually no built-in diagnostics. Troubleshooting is difficult and can be self-destructive (attempting to diagnose a problem just causes more problems).

134.2 - Has good built-in diagnostic capabilities that can be run on-site or remotely. This will save considerable time in troubleshooting and repairing faulty units. In all likelihood, this will help make this a more reliable system. Hiring more staff to maintain new facilities (i.e., John Day and Bonneville Dams) may not be necessary with the 134.2 kHz system, but will be absolutely necessary if 400 kHz equipment is used.

**Technology**

400 - Uses old components, some of which are very difficult to purchase and some are hand made. This system could be redesigned using modern, readily available components. No new diagnostics would be added, but the reliability and maintainability could be improved.

134.2 - Uses state-of-the-art components and design which equates to higher reliability and less required maintenance.

### **Susceptibility to changes in water depth/surging**

400 - Very susceptible to changes in water depth, splashing and surging. This directly affects the reading efficiency and has been identified as a problem at a number of current monitor locations.

134.2 - Unaffected by changes in water depth, splashing and surging. This will significantly raise the reading efficiency of some monitor locations and will reduce the required maintenance for the system.

### **FCC Compliance**

400 - Allowed only 6uV/M at 100 meters.

134.2 - Allowed 17.9uV/M at 100 meters.

Given equal shielding, the 134.2 systems can operate at higher power levels. This could be important in adult salmonid detection and flat plate applications.

### **Other**

The 134.2 kHz system should be less susceptible to external noise than the 400 kHz system.

### **Summary:**

From a technical standpoint, moving to 134.2 kHz system is the favored choice. The 134.2 kHz system will be more reliable, require less maintenance, and have better reading efficiency on a per-coil basis. The 134.2 kHz system should allow for anadromous fish detection in locations where it is currently impossible with the 400 kHz system.

### **d. Project history**

The Transition Project began officially in Fall 1995 with an RFP to potential vendors of new PIT tag interrogation technology based on the 134.2 kHz frequency. In January 1997, as a result of a competitive procurement process, Destron-Fearing was selected to build stationary transceivers for installation in the Columbia/Snake River Basin at selected Corps of Engineers dams. An RFP for portable (hand-held) transceivers was issued by Pacific States Marine Fisheries Commission in spring 1997. As a result of that competitive procurement process, Destron-Fearing was selected to produce two prototype readers for evaluation by a technical team. That evaluation is going on at the time of this writing.

**e. Methods.**

FY99 tasks to be performed to meet the Project's objectives:

- 1) BPA will let a contract to install the permanent access structures at GOJ and LMJ once it has received plans and specifications from the U.S. Army Corps of Engineers.
- 2) BPA will let a contract to install stainless steel NEMA-4 boxes, electrical and fiber optics conduits and lines at GRJ, GOJ, LMJ and the remainder of MCJ.
- 3) BPA will let a contract to repair or replace the 30 aluminum EMI shields at GRJ, LGJ and LMJ.
- 4) BPA will likely contract with Destron-Fearing to produce 50 portable readers.

**f. Facilities and equipment.**

In FY99, infrastructure work will be performed at the Juvenile Fish Monitoring Facilities located at Lower Granite, Little Goose, Lower Monumental, and McNary Dams to prepare the sites for FY00 installation of the new ISO stationary transceivers. Work will include repair or replacement of aluminum RF shields, installation of access structures at GOJ and LMJ, installation of stainless steel NEMA-4 boxes to house the stationary transceivers and running of electrical and fiber optics conduit and cable. In FY99, 50 portable ISO transceivers will be purchased for distribution to regional F&W agency staff for tagging in the field. The contract price for the portable readers is \$1470 each.

**g. References.**

No publications were referenced.

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

In FY98, there were approximately 24 projects under the direct Fish and Wildlife Program that used PIT tags. In addition, the Corps of Engineers Anadromous Fish Evaluation Program and the Mid-Columbia PUDs use PIT tags in their research studies. All of these projects and their project sponsors rely heavily on the availability of PIT tag detectors at the mainstem dams and the availability of hand-held or portable detectors for use at hatcheries or tagging stations in the field. The Transition Project, when completed, will ensure the availability of the most up-to-date PIT tag detection technology to aid in carrying out important anadromous fish research taking place in the Columbia River Basin.

## **Section 9. Key personnel**

1. Brad Peterson - NMFS
2. Ed Buettner - IDFG
3. Don Warf - PSMFC
4. Carter Stein - PSMFC
5. Dr. Sandy Downing - NMFS
6. Bruce Jonasson - NMFS
7. Charles Morrill - WDFW
8. Sean Casey - Destron-Fearing
9. Dave Marvin - FPC
10. Dave Wills - USFW
11. Dave Hurson - USACOE
12. Blaine Ebberts - USACOE
13. Scott Livingston - PSMFC

RESUMES FOLLOW:

### **Bradley W. Peterson - National Marine Fisheries Service**

Title: Group Leader, Electronic Engineering

Education: 1984 Bachelor of Science in Electrical Engineering University of Kentucky

Current Employer: National Marine Fisheries Service (NMFS)

Current Responsibilities: Oversee and participate in all PIT tag and radio tracking-related electronic development, integration, and installations for NMFS.

Employment History:

1984 - 1989: U.S. Department of Defense Naval Electronic Systems Engineering Center  
4297 Pacific Hwy.  
San Diego, CA 92110

1989- Present: U.S. Department of Commerce  
National Marine Fisheries Service  
Sand Point Way NE, Bldg. #4  
Seattle, WA 98115

Expertise: Thirteen years of experience developing, modifying, purchasing, and installing microprocessor-based signal acquisition systems for U.S. government. Seven years of experience designing, developing, modifying, and installing PIT tag and radio telemetry systems and equipment for fisheries research in the Columbia River Basin. Specific areas of expertise include microprocessor-based systems design utilizing Zilog, Motorola, and Intel microprocessors that interface with existing or customized analog signal detection

circuits. Assumed supervisory responsibility of the Electronic Engineering Group in 1993 after the retirement of the previous supervisor.

**Job Completions:**

Development of dry (lab) test procedures and test equipment for BPA procurement of ISO based 134.2 kHz PIT-tag stationary reader systems.

Design and development of a high speed controller for 400 kHz PIT-tag diversion systems.

Modification a 400 kHz juvenile PIT-tag detector for use in a towed array detection system.

Design and development of a multichannel 30MHz radio telemetry monitor for fisheries research.

**Publications:**

“Use of Global Positioning System for Locating Radio-Tagged Fish from Aircraft”  
North American Journal of Fisheries Management 17:457-460, 1997. America Fisheries Society 1997.

**EDWIN BUETTNER - Idaho Department of Fish and Game**

**Senior Fisheries Research Biologist**  
Idaho Department of Fish and Game  
1540 Warner Ave  
Lewiston, Idaho 83501

**Education:**

Bachelor of Science, University of Idaho, Moscow , Idaho. General Biology, 1975  
Masters of Science, University of Idaho, Moscow, Idaho. Fisheries Resources, 1987

**Current Responsibilities:**

Program leader for the 'Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam' project. Responsibilities include project administration, personnel supervision and overseeing field operations and equipment maintenance. Other duties include the IDFG representative to the PIT Tag Steering Committee and to the ISO Transition Planning team.

**Recent Previous Employment:**

IDFG employment since 1984.

**Expertise:**

Operation of large anadromous smolt traps on large rivers during spring runoff. Also used purse seine equipment to capture smolts. Capture, handle and examine large numbers of anadromous smolts and mark with PIT tags, freeze brands or fin clips.

Familiar with the PIT tag data repository, PTAGIS, and high degree of knowledge and experience PIT tagging fish.

**Recent Publication:**

Buettner, E.W. and A.F. Brimmer. 1992. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. 1993. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. 1994. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. 1995. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. In Press. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

**DONALD LEE WARF - Pacific States Marine Fisheries Commission**

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KENNEWICK WASHINGTON 99337  
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**ELECTRICAL ADMINISTRATOR**  
**WASHINGTON STATE LICENSE # WARF\*DL110CD**  
**WASHINGTON STATE LICENSE # WARF\*DLO88CA**

**EDUCATION AND TRAINING**

1991 TO 1995: **COLUMBIA BASIN COLLEGE**, PASCO WASHINGTON, BASIC ELECTRONICS TO DIGITAL THEORY, LEADING TO A CERTIFICATE OF COMPLETION IN OCCUPATIONAL ELECTRONICS.

1985 TO 1987 **ICS SCRANTON PA**, COURSES LEADING TO A DIPLOMA IN ELECTRICAL TECHNOLOGIES.

1971 TO 1973 **PASCO HIGH SCHOOL**, PASCO WASHINGTON, DIPLOMA.

## **WORK HISTORY**

1993 TO PRESENT: **PACIFIC STATES MARINE FISHERIES COMMISSION,**  
KENNEWICK WA.

**TITLE:** FIELD SYSTEMS ENGINEER

**DUTIES:** MANAGER OF THE KENNEWICK **PSMFC** OFFICE. MANAGE MAINTENANCE OF ALL MAJOR PIT TAG INTERROGATION SITES ON THE SNAKE, YAKIMA AND COLUMBIA RIVERS. SUPERVISE CONSTRUCTION AND INSTALLATION OF ANY SYSTEM RELATED TO PIT TAG INTERROGATION AT **PSMFC**-MAINTAINED SITES. DESIGN INSTRUMENTATION AND CONTROLS FOR AUTOMATED FISH COLLECTION AND DIVERSION UNITS AT U.S. CORPS OF ENGINEERS' SITES. MAKE MAINTENANCE RECOMMENDATIONS TO INVOLVED AGENCIES.

1975 TO 1993: **LAMB WESTON** RICHLAND WA.

**TITLE:** MASTER TECHNICIAN, BACKUP ELECTRICAL LEAD MAN

**DUTIES:** WORKED AS AN INDUSTRIAL AUTOMATION SPECIALIST RESPONSIBLE FOR THE DESIGN, CONSTRUCTION AND MAINTENANCE OF ALL ELECTRICAL SYSTEMS THROUGHOUT AN AUTOMATED PROCESSING PLANT.

### **RELEVANT EXPERIENCE & JOB COMPLETIONS**

- MEMBER OF THE ISO TRANSITION TECHNICAL TEAM SINCE INCEPTION.
- OVER 15 YEARS EXPERIENCE IN INDUSTRIAL ELECTRICAL AND ELECTRONIC SYSTEMS MAINTENANCE MANAGEMENT.
- SUPERVISED INSTALLATION OF ALL PIT TAG GEAR AT MCNARY, JOHN DAY, LOWER GRANITE ADULT AND CHANDLER CANAL.
- DESIGNED CONTROLS USED FOR DIVERSION GATES AT THE MAJOR SNAKE AND COLUMBIA RIVER JUVENILE BYPASSES.
- DESIGNED CONTROLS AND WROTE CODE FOR THE AUTOMATED SUB-SAMPLING SYSTEM AT JOHN DAY JUVENILE.
- FAMILIAR WITH MOST PROGRAMMABLE LOGIC CONTROLLERS, INCLUDING WRITING PROGRAMS, DRAWING SCHEMATICS AND WRITING RELATED DOCUMENTATION.
- EXPERIENCED IN COMPUTER NETWORKING.
- CERTIFIED FIBER OPTICS INSTALLER..
- PROCUREMENT MANAGEMENT WITH FIVE YEARS EXPERIENCE.

## **Carter Stein - Pacific States Marine Fisheries Commission**

Title: Program Manager

Duties:

- Develop PTAGIS annual work plan and budgets;
- Prepare quarterly and annual reports;
- Manage system development life cycle for PTAGIS software;
- Investigate new technical capabilities related to software engineering techniques, new hardware and software and applicability to PTAGIS;
- Work with PTSC to develop and update Basin wide standards for PIT tag information processing;
- Develop production supportable implementations of new PIT tag technologies in cooperation with National Marine Fisheries Service;
- Supervise four full time positions, two Field Systems Engineers and two Programmer Analysts.

Degrees Earned:

Master of Business Administration, University of Portland, 1992

Bachelor of Science, Computer Science, Portland State University, 1985

Current Employer:

Pacific States Marine Fisheries Commission since September, 1992

Accomplishments:

- Conversion of PTAGIS prototype database into stable production environment.
- Established PIT tag Operations and Maintenance Field Office in Kennewick, WA.
- Managed installation of PIT interrogation systems at Lower Monumental and McNary Dams.
- Lead development of technical specifications for ISO based stationary transceiver system for deployment in Columbia River Basin.
- Lead development of technical specification for ISO based portable transceiver system for deployment in Columbia River Basin.

Recent Employer:

Tektronix, Inc. 1978-1992

Senior Software Engineer; CAX Data Management

Systems Development Project Leader

Publications:

Monitoring Endangered Salmon in the Columbia River Basin, Stein, Clough, Apr. 1995,  
Presented to Computer Associates / Ingres World Conference, July 1995.

**SANDRA L. DOWNING - National Marine Fisheries Service**  
**Contractor**

School of Fisheries  
Box 357980  
University of Washington  
Seattle, Washington 98195  
sandy.downing@.noaa.gov

**EDUCATION**

Graduate: University of Washington, School of Fisheries - Molluscan Genetics

1993 Doctor of Philosophy  
1987 Master of Science

Honors: •1988 Best Student Paper for World Aquaculture Society  
•1986 Honorable mention for Best Paper Award for National Shellfisheries Association  
•1985 Best Student Paper for Pacific Coast Oysters Growers Assn.

College: University of California at Santa Barbara - Aquatic Biology  
1981 Bachelor of Arts

Honors: •Phi Beta Kappa, Magna Cum Laude, Alpha Lambda Delta

**EMPLOYMENT HISTORY**

1993 - Present: Fisheries Biologist for the University of Washington  
1991 - 1993: Fisheries Biologist for the National Marine Fisheries Service  
1988 - Present: Shellfish Hatchery Research Coordinator for the University of Washington  
1983 - 1988: Research Assistant and Research Associate for the University of Washington

**PUBLICATIONS**

Prentice, E. F., S. L. Downing, E. P. Nunnallee, B. W. Peterson, and B. F. Jonasson. *In press*. Development of an Extended-range PIT-tag Interrogation System. Annual Report 1995-96. xx p. plus Appendixes. Report to Bonneville Power Administration, Contract DE-179-83BP11982, Project 83-19.

Prentice, E. F., D. Maynard, S. L. Downing, D. A. Frost, M. S. Kellett, D. A. Bruland,

P. Sparks-McConkey, F. W. Waknitz, R. N. Iwamoto, K. McIntyre, and N. Paasch. 1994. A study to determine the biological feasibility of a new fish tagging system (1990-93). 131 p. plus Appendixes. Report to Bonneville Power Administration, Contract DE-179-83BP11982, Project 83-19.

Prentice, E. F., D. J. Maynard, P. Sparks-McConky, C. S. McCutcheon, D. Neff, W. Steffens, F. W. Waknitz, A. L. Jenson, L. C. Stuehrenberg, S. L. Downing, B. Sanford, T. W. Newcomb, 1993. A study to determine the biological feasibility of a new fish tagging system (1989). 209 p. plus Appendices. Report to Bonneville Power Administration, Contract DE-I79-84BP11982, Project 83-19.

Santos JM, Downing SL, and KK Chew. 1993. The effects of water temperature on the sexual development of adult Olympia oysters, *Ostrea lurida*. World Aquaculture Magazine 24:43-46.

Allen, SK, Jr. and Downing, SL. 1991. Consumers and "experts" alike prefer the taste of sterile triploid over gravid diploid Pacific oysters (*Crassostrea gigas* Thunberg, 1793). Journal of Shellfish Research 10: 19-22.

Allen, SK, Jr. and Downing, SL. 1990. Performance of triploid Pacific oysters, *Crassostrea gigas*. II. Gametogenesis. Canadian Journal of Fisheries and Aquatic Sciences 47: 1213-1222.

Allen, SK, Jr., Downing, SL, and Chew, KK. 1989. Hatchery manual for producing triploid oysters. Washington Sea Grant Publication.

Beattie, JH, Davis JP, Downing, SL and Chew KK. 1989. "Pacific oyster summer mortality." Chapter in Disease Processes in Marine Bivalve Mollusks edited by WS Fisher. AFS Special Publication 18.

Downing, SL and Allen, SK. 1987. Optimum treatment parameters for induction of triploidy in the Pacific oyster, *Crassostrea gigas*, using cytochalasin B. Aquaculture 63: 1-21.

Allen, SK, Jr. and Downing, SL. 1986. Performance of triploid Pacific oysters, *Crassostrea gigas*. I. Survival, growth, glycogen content, and sexual maturation in yearlings. J. Exp. Mar. Biol. Ecol. 102: 197-208.

## OTHER

### 1989 VIDEO

Strickland, R. and Downing, S.L. (Producers). 1989. "Triploid Oysters." Video. University of Washington Press.

1988 U.S. PATENT

U.S. Patent #647,963 granted to Allen, Jr., S.K., J.A. Chaiton, and S.L. Downing for INDUCING POLYPLOIDY IN OYSTERS.

**Bruce F. Jonasson - National Marine Fisheries Service**

Title: Electronic Engineer

Education: 1987 Bachelor of Science in Electrical Engineering  
Northern Arizona University

Current Employer: National Marine Fisheries Service (NMFS)

Current Responsibilities: Participate in all PIT tag related electronic development, integration, and installations for NMFS.

Employment History: 1981 - 1990 U.S. Air Force  
485<sup>th</sup> Engineering Installation Group  
Griffiss Air Force Base, NY

1991 Student, Portland State University

1992- Present U.S. Department of Commerce  
National Marine Fisheries Service, Seattle

Expertise:

Thirteen years of experience maintaining, developing, modifying, purchasing, and installing RF communications systems for U.S. government. Five years of experience testing, maintaining, designing, developing, modifying, and installing PIT tag systems and equipment for fisheries research in the Columbia River Basin. Specific areas of expertise include analog circuit design, computer/mechanical device interfacing, Programmable Logic Controller applications, stationary PIT-tag transceiver installation design.

Job Completions:

- Designed, coordinated and supervised the installation of stationary PIT-tag detection systems at Little Goose, Lower Monumental, and Lower Granite dams.

- Designed and developed a fixed reference tag to be used as a system check for the stationary PIT-tag detection systems.
- Developed the code for the Programmable Logic Controllers that control the slide gates at juvenile fish facilities.
- Designed key electronic circuits for the 400 kHz flat-plate detection system at Bonneville Dam Powerhouse 1. Designed a submersible fixed reference tag for the flat-plate.

Publications:

Edmund P. Nunnallee, E. F. Prentice, and B. Jonasson

In Press. A Flat-plate PIT-tag Interrogation System. J. Aquiculture Engineering.

**Charles Morrill - Washington Department of Fish and Wildlife**

Fish Biologist - Washington State Department of Fish and Wildlife

Education:

M.S. in Fisheries, University of Idaho, 1972

B.S. in Wildlife Management, University of Maine, 1969

Mr. Morrill has over 20 years of professional experience working with Anadromous Salmonids in Washington. Since the early 1980's he has worked on and led a variety of projects within the Columbia River Basin including Coded-Wire tag recovery programs, Smolt Monitoring Programs at Lower Monumental and Lower Granite Dam, and for the last three years, the Fish Passage/Facility component of the Cowlitz Falls Anadromous Fish Reintroduction Program.

Currently Mr. Morrill:

Leads and supervises WDFW work at the Cowlitz Falls Fish Facility as part of the Cowlitz Falls Anadromous Fish Reintroduction Program

Supervises WDFW Smolt Monitoring work at Lower Granite Dam (LGR) under the Northwest Power Planning Councils Fish and Wildlife Water Budget Measures Program under the oversight of the Fish Passage Center (FPC).

Supervises WDFW work at Lower Granite Dam as part of the Corps Walla Walla District annual Juvenile Fish Facility Operation Program.

Represents the agency as a technical member on the PIT Tag Steering Committee (PTSC), serves as a co-chair, provides technical direction and guidance for the continued development and use of PIT tags and the PIT tag data base (PTAGIS) within the Columbia Basin. The PTSC is a standing subcommittee under the Fish Passage Advisory Commission (FPAC) and Columbia Fish and Wildlife Authority (CBFWA). The Pacific States Marine Fisheries Commission's (PSMFC) Pit Tag Operations Center (PTOC) handles the day to day management and system operation for system hardware and software.

Represents the agency as technical Co-chair of the PIT Tag Transition Team that is overseeing BPA's project to replace the current 400 KHz PIT Tag system in the

Columbia River Basin with a new standard ISO system in time for the year 2000 smolt migration.

Publications:

Verhey P., Morrill C., Witalis S. and Ross D. 1997 Lower Granite Dam Smolt Monitoring Program. Annual Report. Washington State Department of Fish and Wildlife. DRAFT. Prepared for United States Department of Energy. Bonneville Power Administration. Division of Fish and Wildlife. Project Number 87-127. Contract Number 88-FC38906.

Verhey P., Morrill C. and Ross D. 1996 Lower Granite Dam Smolt Monitoring Program. Annual Report. Washington State Department of Fish and Wildlife. Prepared for United States Department of Energy. Bonneville Power Administration. Division of Fish and Wildlife. Project Number 87-127. Contract Number 88-FC38906. 26 pages

Verhey P., Morrill C. and Goffredo T. 1995 Lower Granite Dam Smolt Monitoring Program. Annual Report. Washington State Department of Fish and Wildlife. DRAFT. Prepared for United States Department of Energy. Bonneville Power Administration. Division of Fish and Wildlife. Project Number 87-127. Contract Number 88-FC38906.

Verhey P., Morrill C., Goffredo T. and Ross D. 1994 Lower Granite Dam Smolt Monitoring Program. Annual Report. Washington State Department of Fish and Wildlife. Prepared for United States Department of Energy. Bonneville Power Administration. Division of Fish and Wildlife. Project Number 87-127. Contract Number 88-FC38906. 40 pages.

Verhey P., Morrill C. and Kuras J. 1993 Lower Granite Dam Smolt Monitoring Program. Annual Report. Washington State Department of Fish and Wildlife. Prepared for United States Department of Energy. Bonneville Power Administration. Division of Fish and Wildlife. Project Number 87-127. Contract Number 88FC38906.

## Sean Casey - Destron Fearing

### CURRENT JOB ACTIVITIES

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Serve on the following committees:

Portable fish reader system contracted by PSMFC.

Stationary fish reader contracted by BPA.

PIT tag committee.

Current projects:

Stationary reader FS1000b

Portable reader 2001f

PIT tag development

### WORK HISTORY

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1997-1998: Destron-Fearing So. St.  
Paul, MN

*Fisheries Project Manager/Design Engineering*

- Manage U.S. Fisheries production and development projects.
- Support electronics installation activities at monitoring sites.
- Applications Engineering

1985–1997: Alliant Techsystems (Formally Honeywell)  
Hopkins, MN

*Engineering Aide*

- Perform Hardware/Software integration of Processor subsystems.
- Develop test equipment and procedures for design verification testing of electronic subsystems and integrated systems.
- Design environmental test vehicle telemetry system.

### AWARDS

- Special Achievement Award for business achievement 1996.

### EDUCATION

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Graduation: 9/84     ITT Educational Services  
Southridge, SC

- A.A., Electronics Engineering Technology
- Honor Graduate.

Graduation: 3/81     Inver Hills Community College  
A.A., Liberal Arts (Business Emphasis)

## **Section 10. Information/technology transfer**

This project is not intended, in and of itself, to provide technical information. If successful, the project will be the vehicle by which technical and biological information is obtained through other research projects such as the Smolt Monitoring Program and other reach and system survival studies. Any technical information obtained during the Transition Project is being used immediately by the project to improve the products used by the anadromous fisheries community.