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## PART I - ADMINISTRATIVE

### Section 1. General administrative information

#### Title of project

P.I.T. Tag System Transition

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**BPA project number:** 9701000

**Contract renewal date (mm/yyyy):** 10/1999  **Multiple actions?**

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

U.S. Army Corps of Engineers; Pacific States Marine Fisheries Commission; Destron-Fearing; National Marine Fisheries Service and their subcontractors

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**Business acronym (if appropriate)** COE; PSMFC; NMFS-CZES

#### **Proposal contact person or principal investigator:**

**Name** John H. Rowan - Ewi - 4

**Mailing Address** P.O. Box 3621

**City, ST Zip** Portland, OR 97208

**Phone** 503-230-4238

**Fax** 503-230-4564

**Email address** jhrowan@bpa.gov

#### **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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#### **FWS/NMFS Biological Opinion Number(s) which this project addresses**

The ITS, No. 14, of NMFS' 1995 BiOp and ITS, No. 3e, of NMFS' 1998 BiOp refer to installation of adult PIT-tag detectors in mainstem dams; these systems will use the 134.2 kHz frequency.

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#### **Other planning document references**

N/A

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#### **Short description**

Replaces existing 400 kHz PIT tag interrogation system for juvenile salmonids with a 134.2 kHz frequency, ISO-based system for use within the Columbia River Basin.

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#### **Target species**

Juvenile salmonids

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## Section 2. Sorting and evaluation

### Subbasin

Mainstem Columbia/Snake River Basin-Wide

#### ***Evaluation Process Sort***

<b>CBFWA caucus</b>	<b>Special evaluation process</b>	<b>ISRP project type</b>
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input checked="" type="checkbox"/> Operation & maintenance <input checked="" type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

## Section 3. Relationships to other Bonneville projects

***Umbrella / sub-proposal relationships.*** List umbrella project first.

<b>Project #</b>	<b>Project title/description</b>

#### ***Other dependent or critically-related projects***

<b>Project #</b>	<b>Project title/description</b>	<b>Nature of relationship</b>
8712700	Non-Fed Smolt Monitoring Program	Relies on existence of PIT tag interrogation system
9701501	Imnaha River Smolt Monitoring	Relies on existence of PIT tag interrogation system
8332300	Monitor smolts at the Head of Lower Granite Reservoir and at LGR dam	Relies on existence of PIT tag interrogation system
8401400	Smolt Monitoring at Federal dams	Relies on existence of PIT tag interrogation system
9302900	Survival Estimates for Passage of Juvenile Salmonids through dam/reservoirs	Relies on existence of PIT tag interrogation system
9602000	Comparative Survival Study	Relies on existence of PIT tag interrogation system
	Various	Many other projects in the F&W

		Program rely on the PIT tag interrogation system
8331900	New Fish Tagging System	was in umbrella table
9008000	Columbia Basin PIT Tag Information System	was in umbrella table
9008001	PIT Tag Purchase and Distribution	was in umbrella table

## Section 4. Objectives, tasks and schedules

### *Past accomplishments*

Year	Accomplishment	Met biological objectives?
1998	Developed and purchased new ISO-based stationary PIT tag detectors.	N/A
1998	Developed and purchased new ISO-based portable PIT tag detectors.	N/A
1998	Fiber optics and electrical upgrade made at JDA and MCN; upgrade of interrogation platforms	N/A
1998	Developed and purchased new 12 mm ISO-based PIT tags for initial testing.	N/A

### *Objectives and tasks*

Obj 1,2,3	Objective	Task a,b,c	Task
1	Complete installation of all required electrical and fiber optics infrastructure at LGR, LGO, LMO, MCN and JDA juvenile fish monitoring facilities.		
2	Complete the replacement of RF shields at GRJ, GOJ and LMJ.		
3	Install new transceivers at LGR, LGO, LMO, MCN, JDA and BON dams.		

### *Objective schedules and costs*

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	10/1999	1/2000	N/A		66.00%
2	10/1999	12/1999	N/A		11.00%
3	1/2000	4/2000	N/A		23.00%

				<b>Total</b>	100.00%

**Schedule constraints**

Adverse weather conditions could delay some of the on-site work at the projects.

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**Completion date**

FY00

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**Section 5. Budget**

**FY99 project budget (BPA obligated):** \$800,000

***FY2000 budget by line item***

<b>Item</b>	<b>Note</b>	<b>% of total</b>	<b>FY2000</b>
Personnel	See subcontractor	%0	
Fringe benefits	None	%0	
Supplies, materials, non-expendable property	See subcontractor	%0	
Operations & maintenance	None	%0	
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	None	%0	
NEPA costs	None	%0	
Construction-related support	None	%0	
PIT tags	# of tags: 5000	%2	14,500
Travel	See subcontractor	%0	
Indirect costs	See subcontractor	%0	
Subcontractor	PSMFC will likely do much of the transceiver installation work but may subcontract some.	%31	261,239
Subcontractor	Corps of Engineers, Walla Walla District, will subcontract electrical/fiber optic installation.	%59	500,000
Other	Construction Contingency Fund	%9	77,574
<b>TOTAL BPA FY2000 BUDGET REQUEST</b>			<b>\$853,313</b>

**Cost sharing**

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
		%0	
		%0	
		%0	
		%0	
<b>Total project cost (including BPA portion)</b>			<b>\$853,313</b>

**Outyear costs**

	FY2001	FY02	FY03	FY04
<b>Total budget</b>				

**Section 6. References**

Watershed?	Reference
<input type="checkbox"/>	

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**PART II - NARRATIVE**

**Section 7. 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 representation from Pacific States Marine Fisheries Commission, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bonneville Power Administration, Washington Department of Fish and Wildlife, Idaho Department of Fish

and Game, Fish Passage Center 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. These projects include Lower Granite, Little Goose, Lower Monumental, McNary, John Day and Bonneville dams. In addition, Tribal, state and Federal anadromous fish managers will need 134.2 kHz portable (hand-held) transceivers for use at hatcheries and tagging stations in the field. These portable readers are scheduled for delivery in spring of 1999.

## **Section 8. 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. 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.

**c. Relationships to other projects**

In FY99, there are approximately 37 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.

**d. Project history (for ongoing projects)**

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 August 1997, as a result of a competitive procurement process, Destron-Fearing was awarded a contract by BPA to build a minimum of 140 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 awarded a contract to produce 250 portable readers for use in the Columbia River Basin in conjunction with the spring 2000 switch to the ISO-based juvenile salmonid PIT tag interrogation frequency.

**e. Proposal objectives**

The objective of the Transition Project this year (FY00) is to complete the installation of an updated PIT tag interrogation system for juvenile salmonids that provides for the same or better reading efficiency as the 400 kHz interrogation system it is replacing. 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).

**f. Methods**

FY00 tasks to be performed to meet the Project's objectives:

- 1) BPA will let a contract for the installation of the required electrical and fiber optics infrastructure at LGR, LGO, LMO, MCN and JDA dams.

- 2) BPA will let a contract for the replacement of 30 aluminum RF shields at GRJ, LGJ and LMJ.
- 3) BPA will let a contract to install all required stationary transceivers at LGR, LGO, LMO, MCN, JDA and BON juvenile fish monitoring facilities.

**g. Facilities and equipment**

Approximately 189 stationary transceivers will be installed at mainstem juvenile fish monitoring facilities. These units cost \$8,482.50 each and most were paid for out of FY98 and FY99 Direct Fish and Wildlife Program funds.

Approximately 250 portable transceivers will be available for distribution or will have been distributed to regional state, Tribal and Federal fisheries managers and researchers for use in conjunction with the new ISO-based PIT tag interrogation system. These portable readers cost \$1,765.95 each and were paid for out of FY98 and FY99 Direct Fish and Wildlife Program funds.

**h. Budget**

1. The cost estimate for objective 1 (\$500,000) is based upon an 11/19/98 telephone conversation with staff from the Walla Walla District Corps of Engineers. As of this writing, they are under contract to BPA to design the necessary electrical and fiber optic infrastructure and to prepare an official cost estimate. That cost estimate was not available in time for submission of this proposal to BPA.
2. The cost estimate for objective 2 (\$120,000) is based on a 11/25/98 price quote from Apollo based in Kennewick, WA.
3. The cost estimate for objective 3 (\$155,739) is based on the following:

A. Installation of 189 Mainstem Stationary Transceivers

		Hours	No. of Coils	Hourly Rate	Cost
Cabling Transceivers/Initial Tuning		5.85	189	\$60	\$66,339
Wrap Coils/Mount Transceivers		3	189	\$60	\$34,020
Phase I Certification		48	N/A	\$60	\$2,880
				Sub Total	\$103,239
Per Diem	Total Days	No. of Persons	Total Person/ Days	Tri Cities Per Diem Rate	
	54	4	216	\$80	
				Sub Total	\$17,280
Travel Costs	Weeks of Work	Trips per Week	No. of Persons	Miles Per Trip	Mileage Allowance
	11	2	4	200	\$0.325
				Sub Total	\$5,720
<b>TOTAL LABOR COST ESTIMATE</b>					<b>\$126,239</b>
Non-expendable supplies and materials					\$10,000
4000 test PIT tags					\$11,600

1000 timer PIT tags	\$2,900
Misc. installation materials (special wrapping tape, solder splices, etc.)	\$5,000
TOTAL MATERIALS AND EQUIPMENT ESTIMATE	<b><u>\$29,500</u></b>
TOTAL FOR OBJECTIVE 3	<b>\$155,739</b>

## 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 - PSMFC
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 Appendixes. 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 Powerhouse1. 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.

## Congratulations!