
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Columbia River Basin Pit Tag Information System

BPA project number: 9008000
Contract renewal date (mm/yyyy): 3/1999 **Multiple actions?**

Business name of agency, institution or organization requesting funding
Pacific States Marine Fisheries Commission

Business acronym (if appropriate) PSMFC

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NPPC Program Measure Number(s) which this project addresses
5.0F.9; 5.0F.10; 5.0F.11; 5.0F.12; 5.0F.13

FWS/NMFS Biological Opinion Number(s) which this project addresses
NMFS BO RPA Sec. 13;

The ITS No. 14 of NMFS' 1995 BiOp refers to the completion of the design and development of PIT tag detectors in the main stem dams. This projects provides the maintenance and operations of this hardware and data system.

Other planning document references

NMFS Snake River Salmon Recovery Plan: 2.1.d.5
Supplemental Biological Assessment on Federal Columbia River Power Operations, Submitted to NMFS and USFWS by U.S. Army Corps of Engineers, U.S. Bureau of Reclaimation, Bonneville Power Administration, December, 1994: Section 4.7

Short description

Develop, operate, maintain and enhance a long-term Columbia River Basin database on PIT tag information and provide operations and maintenance support for the collection of PIT tag information at PIT tag interrogation sites.

Target species

Chinook, Steelhead, Sockeye, Coho Salmon;

Section 2. Sorting and evaluation

Subbasin

Columbia / Snake River Basin - Region-wide.

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
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 checked="" type="checkbox"/> Information dissemination <input checked="" type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input checked="" 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.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9011	Characterize & Quantify Residual Steelhead in Clearwater River, Idaho	PIT Tagging Project
9104	Conduct Baseline Habitat and Pop. Dynamics Studies on Lampreys in Cedar Cr.	PIT Tagging Project
9105	Determine if Salmon are Successfully Spawning Below Lower Columbia MS Dams	PIT Tagging Project
9144	Monitor Natural Escapement & Productivity of John Day Basin	PIT Tagging Project

	Spring Chinook	
8331900	Monitor Natural Escapement & Productivity of John Day Basin Spring Chinook	PIT Tagging Project
8332300	Monitor Smolts at the Head of Lower Granite Reservoir and Lower Granite Dam	PIT Tagging Project
8335000	Nez Perce Tribal Hatchery	PIT Tagging Project
8605000	White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers	PIT Tagging Project
8712700	Smolt Monitoring By Non-Federal Agencies	PIT tagging project
8712702	Comparative Survival Rate Study (CSS) of Hatchery Pit Tagged Chinook	PIT tagging project
8712703	Imnaha River Smolt Monitoring Program Project	PIT tagging project
8806400	Kootenai River White Sturgeon Studies and Conservation Aquaculture	PIT tagging project
8902401	Evaluate Juvenile Salmonid Outmigration and Survival in the Lower Umatilla	PIT tagging project
8906500	Annual Fish Marking - Missing Hatchery Production Groups	PIT tagging project
8909800	Salmon Supplementation Studies in Idaho Rivers	PIT tagging project
8909801	Salmon Supplementation Studies in Idaho Rivers	PIT tagging project
8909802	Salmon Supplementation Studies in Idaho Rivers	PIT tagging project
8909803	Salmon Supplementation Studies in Idaho Rivers	PIT tagging project
9000500	Umatilla Hatchery Monitoring and Evaluation	PIT tagging project
9000501	Umatilla and Walla Walla Basin Natural Production M&E Project	PIT tagging project
9005500	Steelhead Supplementation Studies in Idaho Rivers	PIT tagging project
9008000	Columbia Basin PIT Tag Information System	PIT tagging project
9102800	Monitoring Smolt Migration of Wild Snake River Spring/Summer Chinook	PIT tagging project

9102900	Life History and Survival of Fall Chinook Salmon in Columbia River Basin	PIT tagging project
9105500	Supplementation Fish Quality (Yakima)	PIT tagging project
9105500	Supplementation Fish Quality (Yakima)	PIT tagging project
9107100	Snake River Sockeye Salmon Habitat and Limnological Research	PIT tagging project
9107200	Redfish Lake Sockeye Salmon Captive Broodstock Program	PIT tagging project
9107300	Idaho Natural Production Monitoring and Evaluation Program (INPMEP)	PIT tagging project
9202604	Spring Chinook Salmon Early Life History	PIT tagging project
9302900	Survival Estimates for Passage of Juvenile Salmonids Through Dams & Res.	PIT tagging project
9401001	Mitigation for Excessive Drawdowns at Hungry Horse & Libby Reservoirs - Lib	PIT tagging project
9403400	9403400	PIT tagging project
9506300	Yakima/Klickitat Monitoring and Evaluation Program	PIT tagging project
9603201	Begin Implementation of Year 1 of the K Pool Master Plan Program	PIT tagging project
9604000	Evaluate the Feasibility and Risks of Coho Reintroduction in Mid-Columbia	PIT tagging project
9700100	PIT Tag System Transition	PIT tagging project
9800702	Grande Ronde Supplementation - O&M/M&E - Nez Perce Tribe Lostine	PIT tagging project
9800703	Conduct Satellite Facility O&M and Program M&E for Grand Ronde Spring Chino	PIT tagging project
9801001	Grande Ronde Basin Spring Chinook Captive Broodstock Program	PIT tagging project
9801002	Captive Rearing Initiative for Salmon River Chinook Salmon	PIT tagging project
9801004	Monitor and Evaluate Yearling Snake R Fall Chinook Upstream of Lwr Granite	PIT tagging project
9801006	9801006	PIT tagging project
9808001	PIT Tag Purchase and Distribution	PIT tagging project

	USACE - Evaluation of Juvenile Salmonid Transportation	PIT tagging project
	USACE - Estuarine Recovery of PIT-Tagged Juvenile Salmonids	PIT tagging project
	LSRCP - Lower Snake River Compensation Program	PIT tagging project
	USACE - Caspian Tern Predation on Juvenile Salmonids in the Columbia River	PIT tagging project
	USACE - Evaluation of the Effects of Multiple Dam Passage on the Physiologi	PIT tagging project
	USACE - Relative Survival of Juvenile Salmon Passing Through the Spillway o	PIT tagging project
	USACE - Evaluation oo the Effects of Homing in Adult Chinook	PIT tagging project
	USACE - Snake River Drawdown Modeling in CRISP	PIT tagging project

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1995	O&M of Columbia River Basin PIT Tag Information System. Developed 1st generation validation software for PIT tag data suppliers; Deployed prototype new interrogation platform at Lower Granit; Initiated development of ISO planning. Install McNary PIT syst	Yes
1996	O&M of Columbia River Basin PIT Tag Information System. Deployed new interrogation platform in production; Coordinated ISO stationary transciever evaluation. Sponsored and assisted CRITFC PIT tag recovery on Rice Island.	Yes
1997	O&M of Columbia River Basin PIT Tag Information System. Coordinated ISO stationary and portable transciever evaluations.	Yes

1998	O&M of Columbia River Basin PIT Tag Information System. Coordinated ISO field tests and transition system planning. Separated PIT tag procurement costs from PTAGIS.	Yes
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Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Operate, Maintain and enhance the PTAGIS Database system and data collection software	a	Acquire and process data from remote interrogation sites;
		b	Receive and process input files (tagging, release, mortality and interrogation)
		c	Update database in a timely manner. All files will be validated upon receipt by PTAGIS and immediate notification of errors made on-line. Valid data loaded to database within six hours of receipt.
		d	Perform system backup management and general operation services on the PSMFC computer in support of the PIT tag database. Develop Database Administration 'control panel' web based application.
		e	Train personnel to detect problems and perform initial response procedure at remote interrogation sites.
		f	Build new and enhanced PTAGIS reports as required by users: 1) implementation of "Final Disposition of PIT Tagged fish; 2) ISO Transceiver summary and exception report.
		g	Maintain, enhance and document PIT tag interrogation and tagging file loader system software. 1) develop input file audit system; 2) develop new generation data model for FY2002 deployment; 3) modify interrogation file pre-processor to support ISO.

		h	Maintain, enhance and document PIT tag interrogation and tagging file loader system software. 4) Modify PIT Tag Problem Annunciator Panel (PAP) to support ISO equipment; 5) modify PAP graphic displays; 6) implement performance mod to IDL.
		i	Maintain, enhance and document all PIT Tag applications and other PTAGIS related software: PITTAG.EXE, PITTAG2.EXE, MONITOR.EXE, CEA, IEA, IDL, FDL, others.
2	Operate and maintain Separation by Code System	a	Develop database management support model for Separation by Code.
		b	Gain training on SBC from NMFS.
		c	Manage and coordinate user requests for SBC support.
		d	Develop mechanism to measure 'SBC planned' versus 'SBC actual'.
3	Install, Operate and Maintain Interrogation Systems in Field Locations.	a	Operate and maintain interrogation equipment at established interrogation sites (LGR, LGO, LMN, MCN, JDA, BON, PRJ)
		b	Perform pre-season installation and post season removal of interrogation systems.
		c	Implement modifications to detection equipment and software as required to optimize data integrity and system operations. Seasonal system modifications shall be in place by March 15, of the out-migratrion year.
		d	Monitor interrogation systems for problems on a daily basis.
		e	Continue to implement the written preventativbe maintenance program for detection system equipment.
		f	Document maintenance activities performed at interrogation sites.
		g	Provide timely repair of defective equipment at interrogation sites.
		h	Operate and maintain interrogation

			system telephones, power backup equipment and network operations.
4	Administration, Management and Coordination	a	Coordinate and manage distribution of PIT tags to BPA F&W projects.
		b	Coordinate user and system requirements. Include NMFS Research & Development; Federal and State agency users of PTAGIS; TMT & Fisheries Managers; PIT Tag Steering Committee; Other liason support.
		c	Maintain the list of recommended PIT tagging equipment, documented in the PIT Tag Tagging Procedures Manual. Changes to this document must be approved by the PIT Tag Steering Committee.
		d	Update, automate and distribute tagging system documentation.
		e	Provide requested data to casual, ad-hoc users as needed.
		f	Provide training and informational pointers to users on tagging and validation system analysis software.
		g	Provide for the day-to-day management, supervision and administrative support for the PIT Tag Operations Center.
		h	Produce a newsletter for periodic, general distribution.
		i	Produce, manage and report the results of the PTAGIS semi-annual conference and workshop.
		j	Develop the annual work plan for the following out-migration year.
		k	Write and distribute quarterly and annual reports.
5	Additional Support Actions	a	Assist BPA in the planning, coordination, evaluation and management of the new, ISO tag frequency transition project as requested.
		b	Provide preliminary consulting for installation of a 24 coil juvenile PIT tag interrogatino system at Bonneville Powerhouse II by March

			1, 2000 and one or two other portable units as requested.
		c	Assist BPA in the planning, coordination, evaluation and management of the new, ISO tag frequency transition project as requested.
		d	Continue to develop a world wide web application interface to the ptagis database. Include construction of a robust data model and deployment of java or javascript based applications and/or applets that utilize a jdbc interface to the DBMS engine.
		e	Assist researchers working on avian predation. Provide tag readers, training, assistance in submitting and extracting PIT tag data from/to PTAGIS.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	3/1999	3/2000			20.00%
2	3/1999	3/2000			20.00%
3	3/1999	3/2000			20.00%
4	3/1999	3/2000			20.00%
5	3/1999	3/2000			20.00%
				Total	100.00%

Schedule constraints

Hydro-System operations activities. Hatchery marking activities.

Completion date

On-going project. Request multi-year funding.

Section 5. Budget

FY99 project budget (BPA obligated): \$1,041,221

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%27	371,850
Fringe benefits		%10	135,660
Supplies, materials, non-expendable property		%3	43,618
Operations & maintenance		%20	273,099
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%10	132,704
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags:	%0	0
Travel		%4	47,845
Indirect costs		%12	160,731
Subcontractor	Software developments anticipated for indirect coil efficiency calcs & reports for adult PIT system	%12	169,666
Other	Workshop	%2	29,803
TOTAL BPA FY2000 BUDGET REQUEST			\$1,364,976

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
		%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$1,364,976

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$1,419,575	\$1,476,358	\$1,535,412	\$1,596,828

Section 6. References

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

□	
□	

PART II - NARRATIVE

Section 7. Abstract

The Columbia River Basin Passive Integrated Transponder (PIT) Tag Information System (PTAGIS), provides for the operation and maintenance (O&M) of transponder interrogation systems located at juvenile fish bypass facilities located at hydro-electric dams on the Columbia and Snake Rivers. PTAGIS also provides data base systems management and operations for the collection and distribution of PIT data to all interested parties. The PTAGIS program supports the PIT Tag Operations Center (PTOC) which maintains software and documentation and provides user support and training for PTAGIS related tools. The PTOC works with the Columbia River Basin PIT Tag Steering Committee (PTSC) to establish data standards, system development priorities, and operational priorities related to the operations and maintenance of the PIT tag interrogation systems at juvenile fish bypass facilities. The PTSC also provides PTOC with input and advice related to the operations and maintenance of the central PTAGIS database. A PIT tag interrogation system is called for in NPPC planning documents. The PTAGIS O&M activities support the needs of the PIT tag research community represented by the PTSC. O&M activities are documented in the PTAGIS Database Administration Standard Operating Procedures Manual and the PTAGIS Field Interrogation System Standard Operating Procedures Manual. PTAGIS intends to provide 99.9% uptime of interrogation systems and data system as measured during the peak of the outmigration year. Target response time to problem situations is four hours from the time the problem is reported or detected.

Section 8. Project description

a. Technical and/or scientific background

In 1984 Bonneville Power Administration (BPA) contracted with the National Marine Fisheries Service (NMFS) to research and develop a passive integrated transponder (PIT) tag for use in the Columbia River Fish and Wildlife Program. With the PIT tag system, large amounts of data are produced with relatively few tags, in comparison to traditional tagging and marking systems. For NMFS to meet, in a timely manner, its contractual and verbal agreements involving PIT tag data, in 1988 and 1989, NMFS contracted PSMFC to develop and operate a prototype database system to meet the immediate needs and provide a framework for a formalized system for the Columbia River Basin PIT tag program.

In April, 1989, NMFS announced its intention to phase out the operation and management of the PIT tag system in the Columbia River Basin. Subsequently, BPA contracted with PSMFC because it was the only agency with experience in data management, had no vested interest in the interpretation of data generated from PIT tags, and was independent of water or fish and wildlife management responsibilities. The actions that PSMFC were to implement under the PTAGIS contract were the management of a long-term Columbia River Basin-wide database system accessible to all entities; maintenance and documentation of fish tagging and interrogation systems; operational and maintenance of equipment at remote interrogation sites; provision of technical support for the software and hardware required by the system and system users; provision of training to users and purchase of PIT tags and associated equipment. The PIT Tag Operations Center (PTOC) has been established at PSMFC office in Gladstone, OR to house PTAGIS and to utilize PSMFC data facilities.

b. Rationale and significance to Regional Programs

PTAGIS is an operations and maintenance action. As seen in Section 3 of this form, many PIT tagging projects continue to rely on the successful operation of interrogation systems located at juvenile and adult bypass systems in the Columbia River Basin and on the successful operation of the PTAGIS database system for the distribution of PTAGIS data. The success of these projects depend, to a great extent, upon the success of the PTAGIS O&M project and the PIT Tag Operations Center.

c. Relationships to other projects

PTAGIS maintains a continuous and cooperative relationship with the Columbia River Basin PIT Tag Steering Committee, the US Army Corps of Engineers (Portland and Walla Walla Districts), Bureau of Reclamation, US Fish and Wildlife Service, National Marine Fisheries Service, the States of Idaho, Oregon and Washington, Portland General Electric, Chelan PUD, Grant Co. PUD, the Direct Service Industries, University of Idaho, University of Washington, Oregon State University, other academic institutions and other agencies.

Last year, the ISRP included commentary on potential duplication among the Fish Passage Center Data System, StreamNet and PTAGIS. This concern was address in a joint letter (July 29, 1998) from the Project Managers of these projects to the Anadromous Fish Managers and Brian Allee of Columbia Basin Fish and Wildlife Authority.

The PIT Tag Information System project provides three very specific services for fish and wildlife agencies in the Columbia Basin. First, the project maintains the database for PIT tagged fish; second, it operates and maintains the interrogation system electronics located at the dams; and third, it provides user support, training and coordination for PIT tag system users. This system provides near real time detail on PIT tagged fish

throughout the migration season. In addition it provides all historical information on PIT tagged fish in the Columbia Basin since 1986.

PTAGIS collects and distributes 'raw' PIT tag information. PTAGIS does not perform analysis of PIT tag information except to determine coil and monitor efficiencies for PIT tag systems operation. Analysis of PIT tag information is left to research agencies and others. The responsibility of PTAGIS is to provide the best, most objective PIT tag information to all users.

The Fish Passage Center Data System is specifically designed to facilitate and support the daily, weekly, monthly and annual analysis which are the foundation of juvenile and adult fish management decisions made by fisheries agencies and tribes. FPC utilizes PIT tag information as part of these analyses.

StreamNet provides data for Fish and Wildlife Program Monitoring and Planning. StreamNet may provide links to PIT tag data, but the StreamNet dataset does not include any PIT tag information.

d. Project history (for ongoing projects)

The PTAGIS project number has not changed. However, the procurement and distribution of PIT tags activity has been removed from this project and established as a separate project (9008001). PIT tag data, collected through the PTAGIS program is utilized by fisheries and water budget managers as part of the adaptive management strategy of the NPPC program.

The PTAGIS project produces quarterly and annual reports for BPA. Also, the PTAGIS program updates and distributes three user documents: 1) The PIT Tag Source Data Input Specification; 2) The PIT Tag Tagging Procedures Document; 3) The PTAGIS Database Users Manual. The PTAGIS produces a periodic newsletter, the PTAGIS Newsletter, nearly once per month. In addition, various PTAGIS internal O&M documents are maintained. These include: 1) PTAGIS Database Administration Standard Operating Procedures; 2) PTAGIS Field Interrogation Systems Standard Operating Procedures manuals.

The PTAGIS project was initially contracted to PSMFC in 1990 so the O&M of PTAGIS has been underway for eight years as of January, 1999.

Major results achieved include: 1) establishment of database systems and systems management infrastructure to support this highly technical and complex data system; 2) establishment of a field office based in Kennewick, WA to maintain interrogation systems at juvenile fish facilities on the Snake and Columbia Rivers; 3) infrastructure to provide for efficient operations and maintenance of interrogation systems; 4) effective coordination and cooperation of various system users; 5) Coordination of regional efforts to upgrade the PIT Tag system based on International Standards Organization specifications.

e. Proposal objectives

1. Operate, maintain and enhance the PTAGIS database system and Data Collection Software:
 - 1.1. Acquire and process data from remote interrogation sites;
 - 1.2. Receive and process input files (tagging, monitored release, release information, recaptures and mortality files);
 - 1.3. Update database in a timely manner. All files will be validated upon receipt by PTAGIS and immediate notification of errors shall be made on-line. Valid data should be loaded to the database within the hour it is received;
 - 1.4. Perform backup system management and general operation services on the PSMFC computer in support of the PIT Tag database. Implement "DBA Control Panel" and improved checkpoint and recovery/rollback processes;
 - 1.5. Train personnel to detect problems and perform initial response procedure at remote interrogation sites;
 - 1.6. Build new and enhanced PTAGIS reports as required by users;
 - 1.6.1. Complete the implementation of the "Final Disposition" / "Last Observation" data structure to the PTAGIS database.
 - 1.6.2. Implement new ISO transceiver summary and exception status report;
 - 1.7. Maintain, enhance and document PIT tag interrogation and tagging file loader system software (see attached Gantt charts);
 - 1.7.1. Develop input file audit mechanism;
 - 1.7.2. Initiate development of the next generation PTAGIS data model for planned 2002 production deployment;
 - 1.7.3. Modify interrogation file pre-processor to support ISO equipment;
 - 1.7.4. Modify Problem Annunciator Panel (PAP) to support ISO equipment;
 - 1.7.5. Modify PAP graphic displays;
 - 1.7.6. Implement performance enhancements to Interrogation Data Loader (IDL) ;
 - 1.8. Maintain, enhance and document all PIT Tag application other related PTAGIS software.
2. Operate and Maintain Separation by Code System (SBC)
 - 2.1. Develop database management support model for Separation by Code;
 - 2.2. Gain training on SBC from NMFS;
 - 2.3. Manage and coordinate user requests for SBC support;

- 2.4. Develop mechanism to measure SBC 'planned' versus 'actual' dispositions;
3. Install, Operate and maintain interrogation systems in Field Locations:
 - 3.1. Operate and maintain interrogation equipment at established sites;
 - 3.2. Perform pre-season installation and post season removal of interrogation equipment;
 - 3.3. Implement modifications to detection equipment and software as required to optimize data integrity and systems operations. Seasonal system modifications shall be in place by March 15, of the out-migration year;
 - 3.4. Monitor interrogation systems for problems on a daily basis;
 - 3.5. Continue to implement the written preventative maintenance program for detection system equipment;
 - 3.6. Document maintenance activities performed at interrogation sites;
 - 3.7. Provide timely repair of defective equipment at interrogation sites;
 - 3.8. Operate and maintain interrogation system telephones, telephone lines and power backup equipment;
4. Administration, Management and Coordination:
 - 4.1. Coordinate purchase and distribution of PIT tags for BPA funded projects;
 - 4.2. Coordinate user and system requirements;
 - 4.2.1. Coordinate operational issues with facility operators and interested agencies;
 - 4.2.2. Coordinate the operational deployment of new PIT Tag Technologies with system users and the "technology innovators";
 - 4.2.3. Coordinate with BPA Technical Management Team development staff and contractors to improve network (Internet / World Wide Web) access to validated and loaded PIT Tag data;
 - 4.2.4. Coordinate with PIT Tag Steering Committee (PTSC) to update and distribute the PIT Tag Specifications Document by February 1st of the out-migration year;
 - 4.2.5. Act as central contact (liaison) between PTAGIS system users;
 - 4.3. Maintain the list of recommended PIT Tagging equipment, documented in the PIT Tag Tagging Procedures Document. Changes to this document shall be approved by the PTSC;
 - 4.4. Update, automate and distribute tagging system documentation;
 - 4.5. Provide requested data to casual, ad-hoc users as needed;
 - 4.6. Provide training and informational pointers to users on tagging and validation and system analysis software as needed;
 - 4.7. Provide the day-to-day management, supervision and administrative support for the PIT Tag Operations Center;

- 4.8. Produce a Newsletter for periodic, general distribution;
 - 4.9. Produce, manage and report the results of the PTAGIS Annual Workshop;
 - 4.10. Develop the Annual Work Plan for the following out-migration year;
 - 4.11. Write and distribute Quarterly and Annual reports within the fiscal year.
5. Additional Support Actions
- 5.1. New Tag Frequency
Assist BPA in the planning, coordination, evaluation and management of the New Tag Frequency Transition Project as requested.
 - 5.2. Provide preliminary consulting for installation of a 24 coil Juvenile PIT tag interrogation system at Bonneville Powerhouse II by March 1, 2000, and one or two other portable units as required.
 - 5.3. Separation by Code
Assume production management of Separation by Code System which has been developed by National Marine Fisheries Service, research and development (R&D).
 - 5.4. DBMS Architecture to Support WWW applications.
Continue the process of developing a world wide web application interface to the PTAGIS database. Includes construction of a robust data model and deployment of Java or JavaScript based applications and/or applets that utilize a JDBC interface to the database management system engine.
 - 5.5. Implement Predator Mark Recovery.
 - 5.5.1. Provide process and equipment to collect PIT Tags from smolt recovered from squaw fish collected as part of the Squaw Fish Bounty program funded by BPA.
 - 5.5.2. Provide process and equipment to collect PIT Tags from colonies of sea gulls and cormorants situated near hydro-power projects.

f. Methods

PTAGIS is an operations and maintenance project. Data system operations are performed by experienced professional data processing staff according to the PTAGIS Database Administration Standard Operating Procedures document. Operation and maintenance of interrogation systems in the field is performed by experienced field system engineers according to the PTAGIS Field Interrogation Systems Standard Operating Procedures document.

Tagging projects utilize methods described in the PIT Tag Marking Procedures document. Data is collated in the format documented in the PIT Tag Source Data Input Specification that is updated annually by the Columbia River Basin PIT Tag Steering committee and distributed by the PTAGIS project.

Interrogation system reading efficiency is monitored three to four times per day by way of the Cumulative Efficiency Report. This report calculates the probability of missing a tag at a coil within a monitor (collection of PIT tag interrogation coils) based upon "seeing" the tag at other coil(s) within the monitor. See NMFS 1989 Annual Report to BPA, "A Study to Determine the Biological Feasibility of a New Fish Tag System", Appendix B, "Statistical Method of Determining PIT Tag Coil Reading Efficiency", (pp 140-144) for details of this calculations performed by the Cumulative Efficiency Report. PIT separation efficiency is determined by comparing the number of PIT tagged fish at "river" exits compared to the number of PIT tagged fish at "transport/raceway" monitors. These data are provided by the "Disposition by Day" reports for each transport facility on a daily basis.

g. Facilities and equipment

The PTAGIS database is housed in the PSMFC data center located in Gladstone, OR. The database server computer is a Sun Enterprise 3000 with four SPARC processors, and 1GB of memory. In addition to six GB of system disk storage located on the E3000, the PTAGIS server utilizes a RAID 5 storage array configured with 60GB. The PSMFC data center utilizes a dedicated T1 link to the internet to allow high speed/high volume access for users with similar data communication capabilities.

The PTAGIS field office in Kennewick, WA, houses electronic test benches and equipment to facilitate the testing and repair of interrogation system electronics. The equipment includes test "tunnels" connected to a programmable logic controller (PLC) and frequency drive that allows highly accurate testing of reading efficiency of interrogation electronics and tags in a laboratory environment. Other equipment includes oscilloscopes, function generators, multimeters and other various electronic equipment. The field engineers are equipt with service vehicles for site visits which are scheduled weekly during the peak of the outmigration season. These vehicles accumulate over 20K miles each per year and are on a three year depreciation schedule.

The computer platforms located at the PIT interrogation sites utilize a Unix based file server connected via ethernet to primary and backup data collection computers (PC's). The Unix file server is connected through the Corps of Engineers internet connection to the PSMFC data center in Gladstone at three of the Walla Wall projects. The other projects rely on PPP telecommunications interface to transmit data between the field location and the PSMFC data center.s The above data systems and electronic test equipment are suitable based upon contemporary standards.

However, interrogation system electronics used at juvenile fish facilities is antiquated and in need of replacement. The system is currently based upon a 400kHz tag. A separate BPA project (9701000-Essential M&E Infrastructure PIT Tag Monitor Procurement and Installation) is underway to replace this existing system with one based upon the International Standards Organization (ISO) radio frequency identification standards 11784 and 11785. The PTAGIS project is actively involved in the project planning, and

testing of new electronics to replace the existing electronics in time for the year 2000 outmigration.

h. Budget

Cost estimates are based upon extrapolating the 1999 planned budget based upon a project 4% inflation rate.

Personnel includes Program Manager, Systems Analyst, Software Engineer, two Field Engineers and one Field Technician.

Fringe benefits are calculated at the standard PSMFC rate of 37% for regular full time employees.

Supplies and materials include the typical shop and field supplies required by the operation and maintenance of the PTAGIS field systems in the past. These include tools, modems, multiplexers, radio frequency and other electronic instruments and miscellaneous field supplies.

Operations and Maintenance includes floor space, office supplies, training, phone service, computer services, etc.

Capital acquisition includes costs to keep service vehicles and computer systems on a three to four year upgrade rotation.

PSMFC indirect cost rate is 15 percent of all costs excluding equipment.

Travel costs include field trips for planning coordination meetings, and training for project staff.

Section 9. Key personnel

Carter Stein

Program Manager

2080 Hrs per Year

Duties: Develop PTAGIS annual work plan and budgets;

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 Columbiar 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.

Section 10. Information/technology transfer

PTAGIS data is distributed many ways. The project sponsors a conference or workshop every other year or so. Summary information about PIT tagging projects is available on the world-wide web (www.psmfc.org/pittag) for casual/ad-hoc users. Power users and key researchers have login accounts on the PTAGIS dbms server (telnet.psmfc.org). PTAGIS produces a periodic Newsletter which is mailed to over 300 names. The PIT Tag Source Data Input Specification (Spec Doc), PTAGIS Users Manual, Marking and Procedures Manual are available in written format and on-line.

Congratulations!