

Columbia River Basin PIT Tag Information System (PTAGIS) Annual Progress Report

2004/2005

*Draft sent to Jan Brady via e-mail
7-8-2005*



PIT Tag Information Systems
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PROGRESS REPORT
2004/2005 PTAGIS ANNUAL STATUS REPORT
Grant # 90FG08221, "Columbia River Basin PIT Tag Information System"
BPA Project Number: 1990-080-00
Prepared by Carter Stein, PTAGIS Program Manager
Pacific States Marine Fisheries Commission
45 SE 82nd Dr. Ste. 100
Gladstone, OR 97027-2522
(503) 650-5400
May 20, 2005

This is the annual report for the PTAGIS project. February 28, 2005 marked the end of the 2004/05 PTAGIS fiscal year. All critical project activities progressed on schedule.

Objective 1: Operate, Maintain & Enhance the PTAGIS Database System and Data Collection Software

For the 2004 migration year 2,011,490 tagging records were processed and 7,609,000 interrogation records representing 660,000 fish were processed from all interrogation sites.

Server Systems

New Development Efforts

In their *Final Review of Fiscal Year 2003 Mainstem and Systemwide Proposals*, the Independent Scientific Review Panel for the Northwest Power Planning Council urged the "development and implementation of required procedures for storage and retrieval of full metadata on PIT tagged fish before records are stored in PTAGIS". They offered some ideas on linking individual PIT tag records to capture or rearing history and treatment of the fish. They also made the point that the existing three character code currently used to associate a batch of tagged fish with a tag coordinator is insufficient. In addition, they stated that PTAGIS funding may need to be increased in order to afford this enhanced capability.

PTAGIS funding was not increased, however, the PTAGIS staff and the PIT Tag Steering Committee have initiated efforts to develop robust data models and system processes to allow the collection and retrieval of information, from other sources, that would allow the association of PIT tagged fish with other information available on the word wide web.

Specific data models to support these new requirements have been researched during this fiscal year:

Model	Title	Description
ALRS	Activity Location River Segment	This model allows the activities performed along the migration path of a fish to be viewed based upon lat/long coordinates, river segment, or sub-basin
AE	Activity Event	This model allows the user to discriminate the type of detection events at a finer level of granularity.
ATC	Activity Technical Configuration	This model allows the user know about the configuration and type of equipment used during the detection event.
TDI	Tag Distribution and Inventory	This model allows the user to associate individual PIT tags with the NWPCF Fish and Wildlife Program Project number which could be used to cross-reference stock and rearing information about the tagged fish.
PR	Project Roles	This model allows the user to be able to identify a project or point of contact for a given project to an individual PIT tagged fish.

In addition to preliminary work done to implement a more robust set of PIT tag meta-data, we performed the following tasks:

- Designed and implemented auxiliary report "Distribution of Gate Actions during Past 24 Hours" for O&M support.
- Changed called procedure argument declarations to prevent truncation of flag-codes. Updated handling of rel_site, coll_site, and mort_date to conform to business rules. Provides data consistency between database systems and raw data file provided by users without redundant data which was inherent in former process.
- Accommodated new diagnostic message format that uses "INFO" instead of "ALARM" in response to unexpected firmware modifications made by PIT tag transceiver manufacturer.

- Designed and implemented an automated mechanism to keep 'FDVL file hierarchy' on development system populated with an exact copy of the files present on production system.
- Developed, documented, and implemented Activity-Location-River Segment schema (ALRS). Implemented 'extended meta-data dictionary' and populated from 'AST-formatted' ASCII files using a Perl tool built for this purpose. Created ALRS tables on production and populated with data retrieved from existing River Kilometer (rkm) table and an Excel spreadsheet. Used these tables for generating Flash-map XML configuration file for PTAGIS web-site.
- Developed and documented Activity-Technical Configuration schema
- Developed and documented Activity-Event schema
- Monitored system behavior, answered questions, participated in meetings and conference calls
- Made configuration changes to ADE, TASS, and STA to accommodate new site BO4

Operations and Maintenance

In addition to the work described above, database server systems were operated and maintained in order to collect PIT tag data throughout the year, 24 hours a day, and seven days per week. The following table identifies these key systems:

IDL	Interrogation Data Loader
DEA	Instantaneous Efficiency Analysis Tool
SCM	Site Configuration Management Tool
STA	Site Tally Accumulator
CEA	Cumulative Efficiency Analysis Tool
FDVL	Field Data Validation Loader
PTTP	PIT Tag Transfer Protocol (Server Side)
ADE	Adult Detection Efficiency Tools
TASS	Transceiver Analysis Statistics Summary
DGE	Diversion Gate Efficiency Analyzer
SBCA	Separation By Code Analyzer

End user tools produced by these systems can be used at [the PTAGIS web site](#).

All PIT tag data used by "Second Tier Data Providers", such as the Smolt Monitoring Program (198718700) and University of Washington statistical support programs including the "Technical Management Team" (199601900, 199105100, and 198910700) are provided by PTAGIS.

Client Systems

New Development Efforts

The data collection software used at the Federal Columbia River Power System dams was developed during the mid 1990's by National Marine Fisheries Service is called "MultiMon". One of the key requirements of MultiMon is that it must be able to implement "Separation by Code (SbyC) requirements. That is, it must signal switch gates that route specific fish in various directions, depending upon pre-programmed instructions.

MultiMon was developed in an unmanaged code environment called "C++". This development effort occurred at the time that the Microsoft Windows™ operating system was being introduced, and so it was developed for the previous Microsoft operating system called DOS. Since DOS does not have to monitor mouse

movements and update graphic displays in a real-time mode, it was much faster than the version of Microsoft Windows™ available during MultiMon development.

Over time, the PTAGIS project has been able to run the MultiMon program in a Microsoft Windows '98™ environment as a DOS application. Microsoft Windows '98™, however, does not run on any computer hardware that can be purchased today. It is obsolete.

The PTAGIS project has initiated work to develop a replacement for the MultiMon computer program. This work is code-named project "Mustang". Mustang will result in the replacement of the MultiMon program on a high-availability Microsoft Windows based operating system.

The most high risk and difficult challenge in this development is to provide the real-time performance that is inherent in the DOS operating system on a Microsoft Windows™ platform.

The PTAGIS project will continue to require the support of NOAA Fisheries in the development and testing of Mustang.

Mustang completed following pre-development phases in 2004/2005:

- Project Plan.
- Communication latency analysis.
- High-availability platform analysis and procurement.
- Functional and Architecture specifications.
- SbyC (separation by code) prototyping and latency analysis.

In addition to the work on Mustang, PTAGIS Software Engineers responded to PTAGIS user requests to provide a low-power solution for data collection. This solution utilizes a hand-held PocketPC.

PTAGIS delivered MobileMonitor PocketPC Interrogation Software beta releases 1.0.10 and 1.0.13 in third and fourth quarter of 2004.

Operations and Maintenance

PTAGIS continued to support our traditional data collection client software applications:

- P3 Tagging Software: released upgrade versions 1.3.6 and 1.4.0 per first quarter schedule of 2004 and 2005.
- Minimon Interrogation Software: released upgrade versions 1.4.4 and 1.4.6 per first quarter schedule of 2004 and 2005.
- TDI Tag Distribution and Inventory (internal use): released upgrade versions 1.2.21, 1.2.24, and 1.2.29 as needed throughout 2004-2005.

- TagCounter Monitored Release Software: released upgrade version 2.0.8 in first quarter 2004.

Technical support for all PTAGIS client applications was performed throughout the fiscal year.

Web Systems

Development of the new PTAGIS web site continued during this fiscal year. The PTAGIS project let a Request for Proposals for this development effort and awarded the contract to Scientific Applications International Corporation (SAIC). SAIC's solution incorporates commercial off-the-shelf (COTS) software from three vendors: BEA Systems (WebLogic Server); SiteScape (Forum); InetSoft (StyleReport). Technical issues related to a requirement to generate very large reports from PTAGIS data (output sizes of several million rows of data that generate giga-byte files) delayed development.

The new web site was opened for beta test users in September, 2004. Users were very responsive with new and additional requirements, which further delay the deployment schedule.

Other PTAGIS activities include:

- Created generic report meta-templates, header bean, footer bean, and JavaScript function library to facilitate development of reports with standardized appearance and behavior.
- Designed and implemented mechanisms for integrating existing event-logging mechanisms with SEF per-site Forums.
- Designed and implemented mechanisms for registration of tagging and interrogation files with SEF, integrated with FDVL and IDL, respectively.
- Designed, prototyped, implemented and deployed CEA Report to PTAGIS. Several development iterations were performed as behavioral inconsistencies - between Designer and run-time - were discovered with 'choice' and 'calendar' controls, work-arounds were explored, and fixes were received from InetSoft.

Objective 2: Operate and Maintain Separation by Code System (SbyC)

As described earlier, NOAA Fisheries (NMFS) developed the PIT Tag Separation by Code (SbyC) capability. The SbyC capability allows individual PIT tagged fish to be diverted to various destinations (e.g., to the river, barge or sample collection tank) upon detection at fish collection facilities. Researchers provide

PTAGIS a set of parameters for fish diversion. These parameters can include: begin diversion date, end diversion date, ratio of fish to route to a specified final disposition, maximum number of fish to diver per study, etc. These parameters could change on a daily basis. SbyC is a complex system that requires near real time management for optimal performance to achieve researchers' objectives.

In 1999, NMFS trained PTAGIS personnel to configure and maintain the SbyC systems. Since then, PTAGIS has had sole responsibility for the implementation of research requirements that utilize the SbyC system capability. PTAGIS utilizes a coordination protocol, first established in 2000, to ensure that SbyC requests do not impact other Columbia Basin fisheries research or management objectives (see internet link at the end of this section).

Seven-day per-week remote monitoring of diversion gate efficiencies at all sites is conducted by the PTAGIS field systems and data systems staff, throughout the migration season.

If any gate required attention, PTAGIS provided same-day adjustment or repair. We also provided phone support to facility operators. See PTAGIS Event Logs for details.

During the off-season several improvements were made to the electronics that control the diversion gates. Historically PSMFC has designed and constructed these controls using state-of-the-art programmable logic controllers (PLCs) with touch-screen human machine interfaces or (HMIs). Improvements to these systems included, adding new code to the PLCs and HMIs to improve SbyC gate timing, remodeling the PLC / HMI system at Lower Granite Juvenile (GRJ) to improve operability, adding uninterruptible power supplies (UPS) to all PLCs to allow monitoring of power outages and the installation of sensors that provide remote feedback on several facility operations.

In 2004, we implemented SbyC requests for nine projects, funded through either the Northwest Power Planning Council's Fish and Wildlife Program, or the U.S. Army Corps of Engineers Anadromous Fish Evaluation Program. These requests, invoked at seven juvenile and adult fish passage facilities, involved over 50 distinct stocks or groups of PIT-tagged fish.

The SbyC Projects supported were:

1. The Fish Passage Advisory Committee's, Comparative Survival Study (NWPPC Program Project Number 198712702), directed by the Fish Passage Center. This project required regular data updates to the PIT tag detection installations at the juvenile fish passage facilities at Lower Granite Dam (GRJ), Little Goose Dam (GOJ), and Lower Monumental

Dam (LMJ), including daily updates at GOJ and LMJ between April 1 and June 1.

2. The University of Idaho's (U of I) Adult Passage Telemetry Studies, conducted by Chris Peery and funded through the U.S. Army Corps of Engineers' Anadromous Fish Evaluation Program (AFEP). This project required regular data updates to the PIT tag detection installations at the adult fish traps at Lower Granite Dam (GRA) and Bonneville (BO3).
3. The National Marine Fisheries Service (NOAA-Fisheries) again requested SbyC at GOJ to collect, on a daily basis, up to 20 wild Chinook from each of a dozen groups marked in Idaho. Once implemented, this study required no updates from PTAGIS.
4. The Nez Perce Tribe (NPT) requested SbyC at GRJ, GOJ, and LMJ to *allow the transport of five stocks of hatchery and naturally-produced Chinook*; by default, these PIT-tagged fish would have been routed away from the transportation tanks and vessels, and instead diverted back to the river at these facilities. Once implemented, this request required occasional updates to the PIT tag installations at GRJ, GOJ, and LMJ.
5. Similarly, The Shoshone-Bannock Tribes (SHOBAN) and Idaho Department of Fish & Game (IDFG) requested SbyC at GRJ, GOJ, and LMJ to allow the transport of artificially-reared sockeye released into the Stanley Basin of south-central Idaho. Once implemented, this request required no updates to from PTAGIS.
6. NOAA-Fisheries again requested SbyC support for PIT tag detection installation at the McNary Dam juvenile fish transportation facility (MCJ) for the Mid-Columbia Transportation Evaluation, funded through AFEP. On alternate days during the Spring migration, 100% of the target group were segregated and transported, while the tagged and untagged run at large were routed back to the river below McNary Dam. Once implemented, this request required occasional updates to the MCJ PIT tag installation.
7. NOAA-Fisheries also requested SbyC support for their on-going Subyearling Fall Chinook Transportation Evaluation at Lower Granite, funded through the AFEP. This required occasional updates to the PIT tag installations at GRJ, GOJ, LMJ and MCJ.
8. PTAGIS implemented a SbyC request to support a study of Vertical Barrier Screen (VBS) performance at McNary Dam; this was a

collaborative project of the Corps of Engineers and NOAA-Fisheries. This project required occasional data updates at MCJ.

9. PTAGIS also implemented a SbyC request to support an Orifice Passage Evaluation at John Day Dam; this was a collaborative project of the Corps of Engineers and NOAA-Fisheries. This project required occasional data updates to the PIT tag detection installation at John Day Dam (JDJ).

See the "Separation by Code" links at the [PTAGIS web site](#) for more details.

Objective 3: Install, Operate & Maintain Interrogation Systems in Field Locations

Operations and maintenance of interrogation systems at PTOC supported interrogation sites proceeded as planned during the 2004/2005 fiscal year. See the Site Events link at the Data > Sites page of the [PTAGIS web site](#) for all operations and maintenance detail for any interrogation site.

During the spring of 2004, the PTAGIS project provided labor for the design, construction and implementation of a new PIT tag detection monitor on the adult separator exit at McNary Dam. This monitor was successfully operated throughout the 2004 season. During the late spring a failed counting window antenna was successfully replaced on the Oregon shore adult ladder at McNary Dam. We also continued the O&M of the adult detection sites while starting up the season for O&M of most juvenile detection sites.

During the summer of 2004, we continued the O&M of all operating sites which included upgrading the electronics as needed. More resources were focused on the documentation of our SOP.

During the fall of 2004, while continuing the O&M of all sites we then were able to focus resources into finishing the RF quiet room and continue SOP documentation. During the late fall a majority of juvenile detection sites were shut down for the season.

During the winter of 2004/2005, while continuing the O&M of the operating adult sites and writing SOP documents, we worked on several projects. These include the installation of a new adult separator monitor at John Day Dam, testing new transceiver firmware, and other activities.

Objective 4: Administration, Management and Coordination

For this element of work, we did the following:

- We completely redesigned the format and layout of the PTAGIS Newsletter, and published issues in November and December, 2004.
- We updated, published, and distributed the "2004 PIT Tag Specifications Document". See the "Documents" link at www.ptagis.org for a PDF version of this document. We also created an informational video, "PIT Tag Interrogation at McNary Dam", that documents the routes of juvenile and adult fish passage, and PIT tag detection and diversion capabilities, at this and other mainstem Columbia Basin hydroelectric facilities. We published and distributed this video on DVD in conjunction with a previously-produced tagging training video. Links to these videos are available in the Documents section of the Library on the PTAGIS web site.
- We prepared a new work statement and budget for PTAGIS for the 2004-05 fiscal year that met the budget guidelines imposed by the Northwest Power Planning Council and Columbia Basin Fish and Wildlife Authority.
- Our project coordinated and managed PIT tag forecasts, procurement and distribution to F&WP projects in conjunction with project 90-080-01.
- We provided, on a daily basis, ad-hoc telephone and e-mail support for user inquiries.
- We produced this annual report.

Objective 5: Additional Support Actions

This work element was added during the 1990's by the Bonneville Power Administration Contracting Officer's Technical Representative. It has evolved into a 'catch-all' task that covers new installations, consulting and technical assistance. Tasks within the scope of this work element are related to Adult PIT Tag System Design and Support, technical support for the design and development of the Bonneville Corner Collector PIT Tag Detection System, design, support and installation of PIT tag detection systems on full flow bypass flumes and support of other 'non-traditional' application of PIT tag detection technology.

- We provided technical support to the COE for testing of the B2CC antenna at Bonneville.
- We conducted a radio frequency (RF) survey at Prosser Dam to determine the suitability of installing adult antennas.

- We attended design review meetings for the Ice Harbor full flow, Bonneville slot antennas and the B2CC monitor
- We provided design input to the COE for the new full flow monitor at Ice Harbor (ICH).
- We provided design input to the Corps for the slot antenna project for the Washington shore at Bonneville Dam (BO4).
- We installed new adult ladder antennas at Prosser Dam in cooperation with the Bureau of Reclamation. We combined this new adult site with the existing juvenile site of PRJ (Prosser Juvenile) creating PRO.
- We started construction of a radio frequency quiet room in the Kennewick office in anticipation of upcoming new-tag qualification tests.
- We conducted performance evaluations of the new TX1400SGL PIT based upon regionally accepted performance test protocols.
- We developed the concept for development of a new antenna for the B2CC monitor.
- In cooperation with the Bureau of Reclamation and Oregon Department of Fish and Wildlife, we provided technical and design input for installation of a new adult ladder detector at Three Mile Dam on the Umatilla River.
- During the 2004/2005 fiscal year, the field O&M office provided phone and technical support for several projects. These included providing feedback to the COE regarding gate maintenance and networking and other issues.
- We continued to support various innovative research programs, including avian predation studies, and the PIT tag estuary trawl. We provided technical and logistical assistance for volitional releases at hatcheries or acclimation ponds (Rapid River hatchery, and the Jack Creek, Clark Flat, Easton, Grande Ronde, and Lostine acclimation ponds). We provided technical support to Oregon Department of Fish and Wildlife for their work detecting PIT tags at Sullivan Dam at Willamette Falls, and in both the juvenile fish bypass and adult passage ladder at Three Mile Falls Dam on the Umatilla River. We provided technical and logistical assistance for research projects conducted by the U.S. Fish & Wildlife Service, U.S. Geological Survey, Washington State University, and the University of Utah. We also provided assistance to the U.S. Department of Agriculture for their unsolicited use of the P3 data collection software. We responded to an inquiry from Scotland regarding the *utilization and application of PIT tags to Columbia Basin anadromous salmonids*.
- When needed, the PTAGIS project provided logistical and technical assistance to others in support of the mid-Columbia Public Utility Districts in Grant, Chelan, and Douglas counties. Most of this work was related to PIT

tag detection systems in the adult fish ladders at Priest Rapids Dam (PRA), Rock Island Dam (RIA) and Wells Dam (WEA).