Administration and System Operation of the Columbia Basin PIT Tag Information System

2010 Annual Report

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ABSTRACT

The Columbia River PIT Tag Information System (PTAGIS) is a data collection, distribution and coordination project. Over 2.8 million juvenile salmonids were marked with passive integrated transponder (PIT) tags for the 2010 out-migration through the Columbia and Snake rivers (Table 1). The proportions of salmon and steelhead tagged in 2010 were similar to those species tagged for the 2009 migration year (Table 2). In 2010, more than one million unique tagged fish were detected at one or more locations, generating 1.5 million detection events (Table 3). One fish can generate many interrogation records as it passes through multiple PIT tag antennas at one or more detection sites. Over 10.6 million interrogation records were reported to PTAGIS in 2010 (Table 4).

Table 1

Table 2

	2006	2007	2008	2009	2010
Chinook	1,564,653	1,073,046	1,868,338	1,722,630	2,035,226
Steelhead	355,871	326,288	484,835	459,664	566,903
Coho	78,579	80,079	89,958	135,375	113,841
Sockeye	25,407	24,644	28,055	90,843	105,295
All Others	6,458	5,207	5,115	6,320	5,391
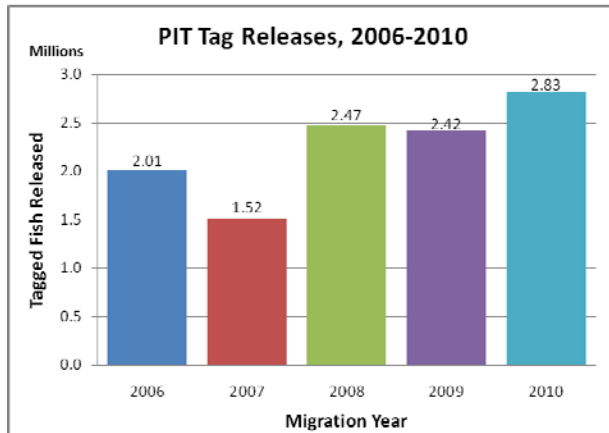
Table 3

Table 4

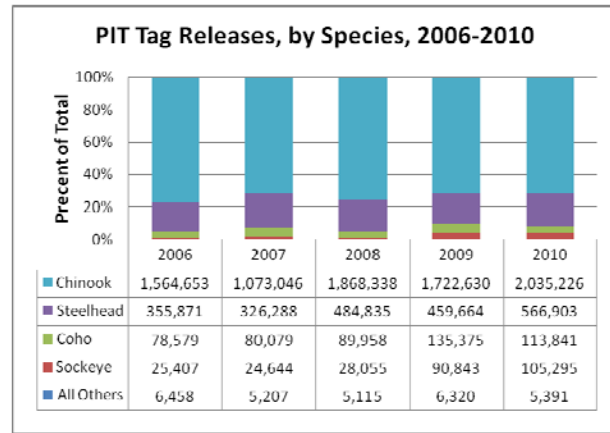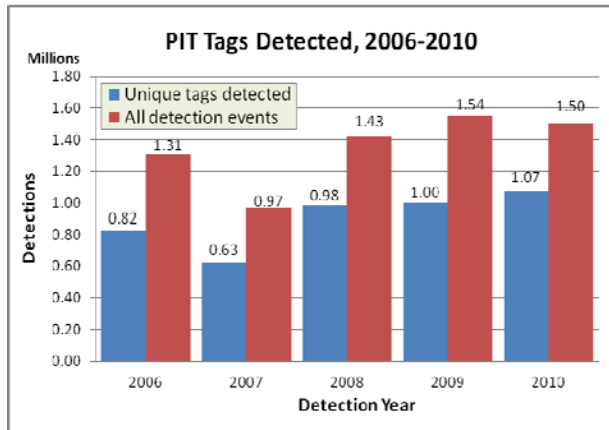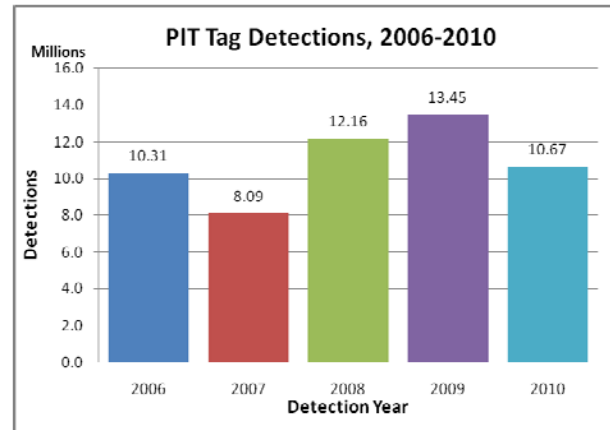PTAGIS continued to develop and maintain the software and systems use to collect and distribute PIT tag data. PTAGIS operated and maintained 20 interrogation sites with more than 380 PIT tag detectors. In 2010, the PTAGIS project implemented 15 Separation-by-Code projects for 8 agencies. PTAGIS distributed 1.3 million tags to 65 BPA Fish and Wildlife Projects. Also in 2010, 342 registered account

holders accessed the PTAGIS database. These users completed almost 15.7 thousand queries, retrieving nearly 1.6 billion data records.

PREFACE

In 1984, Bonneville Power Administration (BPA) entered into an agreement with the National Marine Fisheries Service (NMFS) to research and develop a passive integrated transponder (PIT) tag for use in the Columbia River Basin (CRB) Fish and Wildlife (F&W) Program. The PIT tag system enables large amounts of data to be produced using relatively few tags, compared to traditional tagging and marking systems.

In 1988 and 1989, NMFS contracted with PSMFC to develop and operate a prototype database system to help NMFS meet, in a timely manner, its contractual and verbal agreements involving PIT tag data. The database was designed to meet immediate needs as well as provide a framework for a formalized database system for the Columbia River Basin PIT tag program.

In April 1989, NMFS announced its intention to phase out of the operation, maintenance and management of the PIT tag systems in the Columbia River Basin. Subsequently, BPA contracted with PSMFC because it was the only agency experienced in data management with no vested interest in the interpretation of data generated from PIT tags, while being independent of water or fish and wildlife management responsibilities.

In 1992, NMFS initiated the transfer of field operations and maintenance (O&M) to PTAGIS. This transition was completed in 1995 when the Columbia Basin PIT Tag Information System transitioned from a research and development (R&D) effort into an operations and maintenance effort. Note, however, those R&D efforts by NOAA Fisheries continue in collaboration with the PTAGIS project staff and other contractors.

The PTAGIS project covered by this report has been part of the Northwest Power and Conservation Council's Fish and Wildlife Program funded by Bonneville Power Administration since 1990. The NMFS 2000 BiOp for the Federal Columbia River Power System (FCRPS) includes approximately 15 RPA Actions calling for studies that explicitly include PIT-tags or would likely employ them. The Tagging Studies Technical Committee (TSTC) would help ensure that the numbers of ESA-listed fish proposed for tagging (in the study designs) are necessary and adequate to address BiOp implementation and other needs. Additionally, the NMFS BiOp includes numerous RPA Actions calling for studies that may employ other tagging methods that may benefit from improved integration with PIT-tagging studies.

The PTAGIS project is guided by the Columbia Basin PIT Tag Steering Committee (PTSC) which was chartered through an agreement between Pacific States Marine Fisheries Commission and the Columbia Basin Fish and Wildlife Authority in 1993. PTSC representatives are National Marine Fisheries Service, U.S. Fish and Wildlife Service, Tribal Representation through CBFWA Anadromous Fish Advisory Committee, Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game and Washington Department of Fish and Wildlife.

The PTAGIS project is organized into data systems staff located at PSMFC headquarters in Portland, Oregon and field operations staff with an office in Kennewick, Washington.

INTRODUCTION

In 2010, PTAGIS operated computer systems to collect and distribute PIT tag information related to various projects in the Columbia River basin as shown in Figure 1. In addition, we operated and maintained (O&M) equipment to assist various entities in efforts to monitor, manage and study the migration of juvenile salmonids at seven dams Federal Columbia River Power System (FCRPS) projects on the Columbia and Snake rivers. These O&M locations are Bonneville Dam (BON), John Day Dam (JDA), McNary Dam (MCN), Ice Harbor Dam (ICH), Lower Monumental Dam (LMN), Little Goose Dam (LGO), Lower Granite Dam (LGR). In addition, we monitor fish migration at the Bureau of Reclamation facilities at Prosser and Yakima Indian Nation acclimation ponds on Yakima River tributaries. We also operate the PIT tag volitional release system located at Rapid River Hatchery.
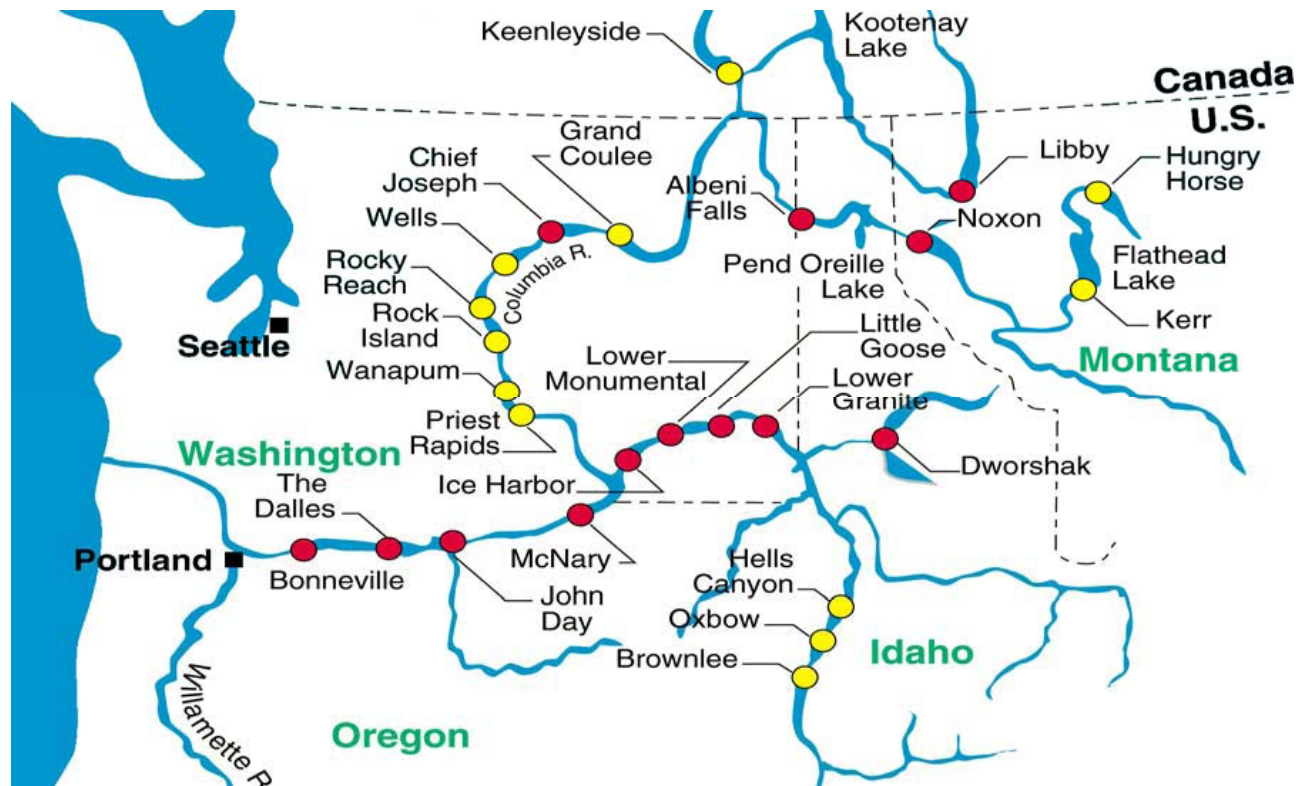

Figure 1: Hydroelectric projects on the Snake and Columbia Rivers. This figure is reprinted courtesy of the U.S. Army Corps of Engineers, Portland District. Red circles are Corps of Engineers projects, yellow circles are privately owned or Bureau of Reclamation projects.

PROJECT GOAL and OBJECTIVES

The goal of this project is to operate and maintain the Columbia River Basin-wide database for PIT Tagged fish and to operate and maintain the established interrogation systems. The data collected by this system is accessible to all entities. The measurable goal for the system is to collect 100% valid data[1] and provide that data[2] in "near-real" time with downtime of any system component of not more than one percent as measured during the period of peak outmigration.

The PTAGIS project achieved this goal. PTAGIS provides client software applications that capture field data, validate and submit this data to PTAGIS several times a day. Field data that are incorporated into the PTAGIS database are validated for conformance to format and content based upon rules defined in the updated *2009 PIT Tag Specifications Document*. PTAGIS server and web systems performed reliably with down-time limited to less than four hours on few occasions for some system components. PTAGIS supported interrogation equipment was also highly reliable and fully redundant. Any data outages are logged in the PTAGIS event logs which are available at the project's website (www.ptagis.org).

OPERATE, MAINTAIN and ENHANCE the PTAGIS SYSTEM

This objective relates to our BPA Work Element titled, A: 160. Create/Manage/Maintain Database". This objective intends to deliver near-real-time PIT tag mark, recapture and interrogation data and tools to allow for the collection and retrieval of that data to all entities. This objective also incorporates BPA Work Element, I: 119 Manage and Administer Projects, the purpose of which is to provide for the program and project management necessary for the PTAGIS efforts.

This objective, managed by PTAGIS staff and a principal consultant, are described in three parts:

- O&M Server Systems Development
- O&M Client Systems Development
- O&M Web Systems Development

O&M Server Systems Development

This portion of the objective addresses the continuous administration and development to a central repository for all PTAGIS data and related metadata. The central repository consists of a relational database system that contains several million rows of tagging and observation data. Key tasks related to this portion of the objective include:

- Maintenance and enhancement of system components that support the automated extraction, transformation and loading of field data into the central database.

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[1] Valid Data is defined in the "2009 PIT Tag Specification Document" which is maintained by the Columbia Basin PIT Tag Steering Committee.

[2] This means PIT tag mark, recapture and release information provided by PTAGIS users in addition to interrogation data provided by PTAGIS or other system users.

- Systems management, including backup, performance tuning, capacity planning, system monitoring, database, hardware and operating systems upgrades and other necessary activities.
- Development of new database schema and supporting infrastructure to address new and changing user requirements.

Tables 1- 4 in the Abstract of this report summarize acquisition, processing and update of mark/release/ recapture and interrogation data for this milestone.

2010 O&M Server System Development Activities

Activities associated with this portion of the objective are divided between work performed to maintain the current PTAGIS3 server system and development of the next-generation PTAGIS4 server. The rational for upgrading this system is explained in the previous year's annual report. The PTAGIS3 server was maintained with limited enhancements while resource and efforts were focused on developing PTAGIS4. The upgrade process had no impact to the integrity or availability of PTAGIS data.

2010 PTAGIS3 O&M Server System Development Activities

The following list summarizes server system development activities performed primarily by a principal consultant on the PTAGIS3 server system in 2010. The tasks are grouped by task order and include O&M activities related to the Tag Distribution System (TDS).

TO 10-01: Database Maintenance & Knowledge Transfer

Work with Dave Marvin to maintain the Ingres RDBMS (Relational Database Management System) installation in good operating condition. Transfer knowledge about the Ingres RDBMS, the PTAGIS database, PTAGIS web- and UNIX-based technologies, processes, systems, and procedures to Dave, Craig White, and Alan Brower to harness their creative input for ongoing adaptation to changing needs, and to enhance their ability to perform routine operational tasks within the PTAGIS server environment.

1. General Questions
   Includes answering questions about Ingres or other server-side components.

2. Maintain Ingres Database
   Includes database administration (DBA) activities and monitoring of day-to-day behavior of the development and production Ingres database installations.

3. Ingres Query Optimization
   Includes generating fresh Ingres query-optimizer statistics as needed (typically, twice per year) and addressing query performance issues by studying query execution plans (QEPs) and creating additional access methods (e.g. secondary indexes) as necessary.

4. Maintain O&M and TMT
   Includes initializing report-specific counters and incorporating additions or changes to interrogation equipment into configuration files to support the automated generation of reports used by PTAGIS O&M staff, and the Technical Management Team.

5. File Validation Mechanisms
   Includes requirements analysis, design, implementation, testing, and deployment of improved mechanisms for interrogation file validation, and associated diagnostic messaging capabilities.

6. TDS at Fiscal Year End
   Includes sending bulk email messages to projects authorized by BPA to request PIT tags through TDS, and adding or updating information about authorized projects and associated personnel in the PPO tables, at the end of the BPA fiscal year (i.e. late September).

7. Craig – File Submittal K-T
   Includes Knowledge Transfer from Doug Clough to Craig White, regarding mechanisms by which interrogation and tagging files are submitted to the PTAGIS server environment (i.e. PTTP – PIT-Tag Transfer Protocol) and their respective validation / rejection / messaging facilities (IDL File Validator for interrogation files, and FDVL for tagging files).

8. Craig – O&M Reporting K-T
   Includes Knowledge Transfer from Doug Clough to Craig White, on initializing report-specific counters and incorporating additions or changes to interrogation equipment into configuration files that support the automated generation of reports used by PTAGIS O&M staff, and the Technical Management Team.

9. Alan – TPA Messaging K-T
   Includes Knowledge Transfer from Doug Clough to Alan Brower, on use of the email-based TPA (Tag Procurement Activities) messaging system for registration of "make-up tags", by means of QA STOCK messages, and registration of replacements for defective PIT tags culled out by the Automated PIT-Tag Testing System (APTTS) by means of REPLACED, and VERIFIED messages.

10. PTAGIS3 to PTAGIS4 Sync
    Includes design, construction, and deployment of mechanism to implement the Extract component of the ETL (Extract-Transform-Load) process for keeping the new PTAGIS4 datamart in sync with the PTAGIS3 database, as new data arrive.

TO 10-03: Tag Distribution System (TDS)

Complete the implementation of Calendar-Driven Alerts, in progress as of February 2009. Fix known TDS bugs, identified as of February 2009. Create or update on-line user guides. Provide ongoing support for administrative users (e.g. Jennifer Nighbor and Sharon Grant) throughout the fiscal year.

1. Bug Fixes
   Includes developing, testing, and deploying fixes for several bugs in the TDS user interface, which had been identified as of the beginning of the 2010 fiscal year.

2. UserGuide – Basic
   Includes updating the TDS on-line user guide to incorporate screen shots of the as-deployed application, which exhibits a few cosmetic differences relative to the pre-deployment screens shown in the current user guide. Priorities did not allow this to be addressed in FY 2010.

3. UserGuide – Approval
   Includes creation and deployment of a TDS on-line guide for users exercising the Approval role, and a minor modification to the TDS interface such that which guide is displayed will depend on which role the user is exercising. Note that TDS allows users with administrative privileges to switch between roles, while all others exercise only the Basic role. Priorities did not allow this to be

addressed in FY 2010.

4. UserGuide – Inventory
   Includes creation and deployment of a TDS on-line guide for users exercising the Approval role. Priorities did not allow this to be addressed in FY 2010.

5. Alerting – Calendar-Driven
   To avoid unnecessary constraints on its users, while supporting BPA's business process for PIT-tag ordering and distribution, TDS was designed to be tolerant of missing information – up to the point when its continued absence would bring the process to a halt. Notifying its participants before the business process encounters such a road block is the job of the TDS CALENDAR-mode alerting facility. Includes design, implementation, testing, and deployment; begun in FY 2009, completed in FY 2010.

6. Ongoing Support
   Includes routine configuration of PPO data for projects and personnel eligible for requesting PIT tags through TDS and, in addition, development and implementation of procedures to accommodate a large-scale recall of PIT tags by the manufacturer due to sub-standard performance.

2010 PTAGIS3 O&M Server System Development Activities

The tasks described in this section are specific to the PTAGIS4 server upgrade and were performed by PTAGIS staff (primarily by Craig White, the new PTAGIS software engineer hired in 2009) and limited engagements with consultants as noted. The PTAGIS software engineer presented an upgrade plan at the *Annual PIT Tag Steering Committee Meeting* that stressed iterative development techniques (Agile).

Development Platform

PTAGIS and PSMFC IT staff created multiple virtual servers onto existing Commission *VM Ware* infrastructure. These virtual servers combined with MSDN development licenses provided a very low-cost development platform and provided staff the ability to evaluate any system within the Microsoft product stack without purchasing it. The virtual servers can be easily migrated to production hardware with licensed software once the solution is complete.

Field Data Synchronization

PTAGIS software engineers developed and tested a beta release of new upload technology based upon Microsoft Synchronization Framework. This technology allows relational data captured in the field (M4 SQL Compact database) to be synchronized, or uploaded, to a staging SQL Server database server (part of the PTAGIS4 datamart server upgrade). The *Field Data Sync* process performed well (~1K records per second) and proved to be extensible as new data types were added to the M4 system with minimal changes. This feature abridges server-side validation required to validate field data.

Dimensional Model

PTAGIS staff contracted a consultant to develop a first iteration of a dimensional model based upon a subset of PTAGIS data. The consultant developed complex extraction, transform and loading (ETL) scripts to load relational PTAGIS data into the dimensional model and tested various strategies to improve OLAP cube refresh rates. Microsoft Excel 2010 Services was evaluated using this dimensional model and was determined to be insufficient replacement of the QueryBuilder tool currently used by researchers to get data out of PTAGIS3 server system.

PTAGIS staff received training in multidimensional data modeling technology and went on to develop a revised dimensional model and OLAP cubes based upon the current views within QueryBuilder. The model made use of a complete set of PTAGIS3 data already loaded into the PTAGIS4 datamart.

Online Reporting User Survey

In August 2010, PTAGIS staff distributed an online user survey to hundreds of registered PTAGIS users for feedback on the current PTAGIS3 online reporting system and guidance on specific reporting needs for the new PTAGIS4 system. Over 100 users completed the survey and of those, 20 volunteered to participate in a focus group to help PTAGIS evaluate new reporting technologies and features. A summary of the user survey is included in the Appendix 1 of this report.

Business Intelligence Reporting

Over a dozen off-the-shelf, ad-hoc querying and analysis products were evaluated by PTAGIS staff to interface with the dimensional model and provide self-service, web-enabled data retrieval features. Of them, two products were developed into prototypes using a large subset of PTAGIS data. The focus group from the user survey (including PTSC members) helped PTAGIS staff identify the MicroStrategy Business Intelligence product as the leading solution.

PTAGIS negotiated a significant discount and began the initial deployment of the MicroStrategy solution onto a virtual server with the expertise of a local consultant. This reporting solution (Figure 2), using the PTAGIS4 datamart and dimensional model, provides efficient ad-hoc querying and satisfies all PTAGIS reporting requirements including those for internal O&M field interrogation system reports.

Figure 2: MicroStrategy Reporting Solution

2011 Planned O&M Server System Development Activities

This list below summarizes an O&M activity plan for all PTAGIS server system components. To continue balancing the resources required for upgrading to a new system, the tasks related to the current PTAGIS3 server and web portal will be limited to routine maintenance and minor enhancements.

1. 2011 Planned <u>PTAGIS3</u> O&M Activities
   a. Perform general support and maintenance duties as well as the 2010 Annual "Game Reset".
   b. Continue administration, minor refinements and documentation of the TDS system as necessary.
   c. Perform knowledge transfer to PTAGIS staff on system, database and report design to further the system upgrade process as well as the on-going maintenance of the PTAGIS3 server.
   d. Provide manual and automated data exports to synchronize data between the two server systems with data integrity verifications.
2. 2011 Planned <u>PTAGIS4</u> Development Activities
   a. PTAGIS4 Phase I rollout: (to be completed for 2011 PIT Tag Workshop) contains a significant portion of PTAGIS data and related reporting model combined with a portion of the MicroStrategy analysis and reporting tool features to be used for demonstration purposes, determining appropriate hardware and verify proposed licensing model.
   b. PTAGIS4 Phase II rollout: (April/May 2011) will contain an optimized datamart and a second iteration of MicroStrategy reporting solution running on production hardware servers. Staff will have trained on the MicroStrategy product to learn how to optimize and make the best use of a large number of features in this product. This rollout will also contain a functioning home page of the new web site (see Web System Development) to test authentication of PTAGIS users. This rollout will be limited to a focus group to qualify design and usability.
   c. PTAGIS4 Phase III rollout: (August/September 2011) will include additional optimizations and refinements of the datamart and reporting system. The phase will also include the real-time updates of PTAGIS3 data. All system and software components will be licensed to be potentially used as a production replacement for QueryBuilder while additional web features are implemented in parallel.
   d. PTAGIS4 Phase IV rollout: (schedule TBD) will include field O&M reports for internal use. Additional field O&M reporting for in-stream interrogation sites managed by external stewards may also be included in this release as well as public facing dashboards providing an interactive, high-level view of PTAGIS data.

2010 O&M Client Systems Development

Client Systems Development Overview

The PTAGIS project develops and maintains custom client software systems to capture mark/release and interrogation data from hundreds of field sites operated by PTAGIS staff, disparate fisheries management agencies and research organizations within the Columbia Basin. These software systems

perform simultaneous communication with atypical hardware devices such as RFID tag readers, PLC devices, GPS units, digitizer boards and digital balances. Field data captured by client systems are verified to be 100% valid and uploaded to the PTAGIS server to be incorporated into the regional database in "near real-time" to meet the goals of the program as defined in *Project Goal and Objectives* section of this report.

2010 O&M Client System Development Activities

This section describes development, operational and maintenance activities performed for each client software system in the calendar year of 2010. As noted in previous annual reports, PTAGIS is balancing the development of the next-generation client software with the concurrent support of existing client software systems already in the field.

An engagement with a software consultant to help with the development of M4 was quickly terminated due to substandard performance. The work described in this section was performed by a single software engineer while concurrently performing program management duties. A new staff position was hired in 2010 to help manage the technical support of these systems as well as the testing of each software release.

Before each client software version is released, thorough testing is performed on all supported platforms (operating systems). PTAGIS have made a decision to limit the number of supported platforms to those that are currently supported by Microsoft for client computer systems:

- Windows XP
- Windows Vista (x86 and x64*)
- Windows 7 (x86 and x64*).

Our existing client software systems may run just fine on older systems, but we cannot support expired platforms that often require additional versions of our software.

*P3 and MiniMon software will run on x64 systems as 32-bit systems in compatibility mode (WoW); M4 can run natively as a 64-bit system.

P3 Tagging Software

P3, also known as PITTAG3, is software used to capture mark/recapture field data and submit to PTAGIS. In December 2010, an unplanned release of P3 version 1.4.8 was created to support a new type of PIT tag from Biomark. Included with this release were minor enhancements and bug fixes listed below. This version of P3 was upgraded to the latest service packs for runtimes and other related Microsoft libraries.

The 1.4.8 version of P3 will support half-duplex tags read from the following portable readers:

- Destron FS2001F ISO running 5.0 firmware
- Allflex Portable running 1.13 firmware

There were also minor bug fixed in the 1.4.8 release related to importing external data:

- Exporting a tag session can produce a runtime "Invalid Null" error. This error can happen when a tag session is created from import data and is associated with a header template that contains a tag date value and the session header is never edited by the end-user, bypassing automated 'tag file name' generation and validation.
- P3 converts all alpha characters to upper case to avoid importing lower case validation codes.
- P3 checks and flags negative weight and length values from imported data.

The web installation feature that allowed quick-patching can no longer be supported. To upgrade or install the latest P3 requires the entire 26 MB installation file to be downloaded and executed on the target system.

MiniMon Interrogation Software

MiniMon was developed by PTAGIS in 1999 as a PC-based replacement for the MultiMon application at interrogation sites that do not have separation-by-code requirements. It provides 24x7 unattended monitoring for fish marked with a PIT Tag by collecting data from 50 or more transceivers simultaneously. The collected data is transformed into interrogation files that are automatically uploaded into the PTAGIS database in "near real-time".

MiniMon version 1.5.4 was release in September 2010 and included support for additional tag types (Biomark tags) as well as a minor formatting correction for the status report from a Destron FS1001M running 2.1 firmware. The deployment technology was updated to support installing on x64 systems.

An attempt to correct a rare upload error was also included in this release. The PTAGIS FTP server can prematurely disconnect an upload session leaving behind stale temporary files on the client system that may prevent subsequent uploads. Staff has been unable to reproduce this rare scenario to verify the cause or a correction and seems to be prevalent at remote sites running on slower Internet connections.

M4 Interrogation Software

M4 is the next-generation interrogation software designed to capture real-time observation data from fish marked with a PIT tag. M4 will also support Separation-by-Code (SxC) diversion activities at various facilities. PTAGIS will be presenting M4 at the *2011 PIT Tag Workshop.* Listed below is a summary of significant progress that has been made on this project in 2010:

- Completion of new data submission system corresponding with upgraded database server technology (PTAGIS4). Relational interrogation data can be synchronized between field computers and the PTAGIS server over common HTTP and TCP network protocols.
- Additional transceiver models were incorporated into the M4 Device library that includes Bonneville Corner Collector (BCC) transceiver and additional support for the Automated Read Range Tester (ARRT) system. A beta release of M4 has been successfully running at the BCC site throughout most of 2010 to support ARRT system.
- A beta release of M4 was successfully deployed to support the experimental SxC system designed by NOAA for the Pair Trawl Program.

- Revised system architecture with an "always on" background host service to improve startup time and separate subservices such as monitoring, clustering, SxC, uploading and others to facilitate control operations.
- Completion of revised 'Failover Clustering' features allowing two M4 instances running on separate, physical computers to communicate and operate as one. The user interface (Dashboard) still requires enhancements but is fully functional at this point.
- All M4 systems were upgraded to run on the Microsoft .NET Framework version 4.0.

The final phase of development is underway to incorporate the remaining SxC features with a few more development cycles remaining in 2011. Once these features are implemented and unit-tested, the application will go through a laboratory performance analysis and optimization phase. When M4 SxC and other monitoring features are fully optimized, PTAGIS will perform in-situ field testing at various facilities to verify the software meets defined performance standards before it is released for production use.

PIFF Utility Software
PIFF, short for PTAGIS Interrogation File Formatter, is utility software released in 2009 to submit raw data from remote interrogation sites (primarily in-stream or tributary) into the PTAGIS3 server using traditional spec-doc formatted files. The latest release contains these enhancements:

- Upgraded to use the latest M4 Device library and now supports decoding raw data from a Destron FS1001M multiplexer transceiver running version firmware version 2.1. **Note:** PIFF will decode status reports from FS1001 1.7 and 2.x firmware only.
- Upgraded to use the Microsoft .NET 4.0 Framework. The PIFF installer will automatically install this framework if needed on the target system.
- Validation and error reporting have been enhanced during the scanning of raw data files.
- By request, PIFF will display and output data in the original order output from the source system and will not sort the by date.
- A timestamp generated from a transceiver takes precedence over a CR1000 data logger timestamp.
- All records output from a CR1000 data logger are marked as "buffered".

The PIFF client software will eventually be migrated into a PTAGIS web service. This web service will provide similar features from a common web browser so that researchers can submit raw field data into PTAGIS without having to install client software on their local machines. The web service will also provide an optional machine interface allowing automated system-to-system, raw field data submission into PTAGIS.

2011 Planned O&M Client System Development Activities
The M4 development will continue as reported with laboratory and in-situ performance testing throughout 2011 and the eventual production release in the latter half of the year. M4 support for in-stream systems may be scaled back due to growing popularity of the ISEMP data logger systems. This will allow the remaining development and testing of M4 to focus on mainstem requirements and free-

up development resources to design and develop the *Site Steward Web Portal* described in the next section.

O&M Web Systems Development

The PTAGIS web site (www.ptagis.org) serves all of the PTAGIS data to researchers and includes real-time updates and audits of current PIT tag data collection activities. The PTAGIS web site was redesigned and deployed about 5 years ago with the goal to make it easier for researchers to find the data they're looking for. Advanced data management features are available through individual user accounts. Users can generate database queries store them to rerun at a later time through the QueryBuilder feature of the web site. Often researchers need megabytes of data from the system to perform in-depth analysis.

Additionally the PTAGIS web site provides a portal for downloading all PTAGIS client applications released to the community. An online library contains the latest PTAGIS Specification Document and other useful information.

2010 O&M Web System Development Activities

This section describes development, operational and maintenance activities performed for major components of the web application system in the year of 2010. The current web system, running on a Java/J2EE/WebLogic/UNIX platform, is primarily maintained by a principal consultant. This consultant performed the user-account maintenance tasks (e.g., quota increases, password revisions) previously performed by Ryan Day who left the project in 2009. The consultant also provided Web Portal maintenance and repair / error-recovery, excluding new development work. These maintenance tasks are described as follows:

1. User Account Maintenance
   Includes establishing LDAP and PPO entries for new TDS users, and gleaning information on changes in contact information from TDS logs, so that PPO entries may be kept current.

2. Web-Portal Maintenance
   Includes monitoring behavior of the PTAGIS web-application, hosted by WebLogic application servers on two front-end machines; monitoring disk and memory usage, and taking corrective action in the face of imminent resource exhaustion.

Web Portal Upgrade

In December 2010, PTAGIS initiated a process to begin the upgrade of the web system to a common development platform and improved integration with the new PTAGIS4 server system. This will consolidate the technical skillset required to support all PTAGIS systems. A local consultant, Sitka Technology, was hired for a limited engagement to produce a scope-of-work for upgrading, or migrating, the current web system to a common Microsoft .NET/Windows Server platform. The deliverable for this contract is due in February 2011 and will determine the next steps for this process.

2011 Planned O&M Web System Activities

PTAGIS will continue the web portal upgrade in parallel with PTAGIS4 server development. A majority of the web system development will most likely be performed by Sitka Technology consultants under the

supervision of the PTAGIS Senior Software Engineer. This process will leverage technology and solutions already built by Sitka for similar programs. PTAGIS will also work with a visual designer to refine the overall usability of the site.

A central goal of this project is to not only leverage the new PTAGIS4 reporting features but enhance community collaboration. For example, with several in-stream (tributary) interrogation sites coming online, the new PTAGIS web site can provide self-service features allowing stewards to maintain site metadata and manually import raw field data (PIFF replacement). An RSS feed will provide an online display as well as automate the delivery of news items in "near real-time" related to the PTAGIS program and the community at large.

SEPARATION by CODE SUPPORT

This objective relates to our BPA Work Element titled, <u>B: 160. Create/Manage/Maintain Database</u>. This objective intends to deliver a well coordinated and successfully implemented Separation by Code (SxC) system for use by the research community. Key milestones include updating seasonal database support tables, capturing user requests, implementing user requests and monitoring separation by code passage on a daily or more frequent basis during the migration season.

We identified a third work element in our statement of work, <u>D: 70 Install Fish Monitoring Equipment</u> with the deliverable of providing instrumentation to activate fish routing gates based upon SxC activity. This work is performed by PTAGIS Kennewick field staff.

2010 SxC Project Support Activities

PTAGIS project provides researchers in the Columbia Basin the opportunity to target and collect specific PIT-tagged fish as those fish pass through the detection facilities at six main-stem dams on the Snake and Columbia rivers. This process of selecting and diverting individual PIT-tagged fish is called Separation by Code (SxC). In 2010, the PTAGIS project implemented 15 Separation by Code projects for eight agencies. PTAGIS managed more than 2.1 million PIT tags in the look-up databases at seven of the eight SxC sites in the Columbia Basin.

SxC ID	Project ID	Project Title	Project Description
2010001	FWP:1996-200-00	CSS - Comparative Survival Study	Treat PIT-tagged fish similar to untagged fish when detected in the JFFs at LGR, LGS, LMN, and MCN dams.
2010002	FWP:1991-028-00	Monitor wild Salmon River Chinook salmon migrations.	Sample fish at Little Goose Dam marked in the Salmon River Basin during 2008-2009.
2010003	Refer to Project Title	Chinook salmon transportation and life history studies.	Transport wild and hatchery yearling and subyearling Chinook; subsample smolts at B2J; collect all target tags at GRA.
2010004	Refer to Project Title	BPA project numbers 199401500 and 200301700: Lemhi River watershed monitoring and evaluation.	Divert returning Chinook originating from the Lemhi River watershed to the trap at the Lower Granite adult fishway.
2010005	BPA:00-GS-75064	Smolt outmigration timing and survival for LSRCP steelhead from the Grande Ronde and Wallowa	Treat PIT-tagged fish similar to untagged fish when detected in the JFFs at LMN or MCN.

		basins.	
2010006	BPA:00-GS-75064	Estimate SARs for endemic stock hatchery steelhead released in SE Washington and NE Oregon rivers.	Treat PIT-tagged fish similar to untagged fish when detected in the JFFs at LGR, LGS, LMN, and MCN dams.
2010007	Refer to Project Title	Johnson Cr. Project #199604300; LSCRP agreement #14110-3-j010; Imnaha R. SMP project #199701501	Treat PIT-tagged fish similar to untagged fish when detected in the JFFs at LGR, LGS, LMN, and MCN dams.
2010008	LSRCP: See Title	LSRCP M&E #14110-6-J009: Clearwater/Sawtooth/Pahsimeroi hatchery spring/summer Chinook	Treat PIT-tagged fall Chinook similar to the untagged population when detected in the JFFs at LGR, LGS, LMN, or MCN dams.
2010009	USFWS: 2005-002	Evaluate releases of spring Chinook from Kooskia NFH and releases of steelhead from Dworshak NFH.	Treat most tagged fish similar to the untagged population. Collect and sample some fish at GRJ, MCJ, and B2J as scheduled.
2010010	Refer to Project Title	NW Fisheries Science Center: Evaluate Adult Sp/Su Chinook Survival in the Columbia River below BON.	Avoid collecting tagged fish in the BON AFF fish trap; collect up to 50 tagged fish in the adult trap in the LGR fish ladder.
2010011	FWP: 199102900	Research, monitoring, and evaluation related to recovery of the Snake River fall Chinook salmon ESU	Collect tagged fish at the LGR JFF.
2010012	Refer to Project Title	Effects of Tagging; test the assumptions of the 2010 Lower Columbia River study survival model.	Collect fish at BON PH2 LMF that were tagged at JDA and released at Arlington.
2010013	Refer to Project Title	Improve adult Chinook radio telemetry studies on the Columbia and Snake rivers.	Collect target fish in the BON AFF.
2010014	Refer to Project Title	A Pilot Study to Develop a Snake River Sockeye Transportation Plan.	Treat PIT-tagged fish similar to the untagged population when detected at LGR, LGS, LMN, or MCN.
2010015	BPA:2002-053-00	Asotin Creek RM&E Project	Treat PIT-tagged fish similar to untagged fish when detected in the JFFs at LGR, LGS, LMN, and MCN dams.

2010 SxC Field System Support Activities

During the migration season, PTAGIS field systems personnel inspect and test separation by code pneumatic, electrical, and mechanical components at each facility on a weekly basis. During these site visits, PTAGIS staff communicates with Corps of Engineers facility biologists and other researchers at the site. Often time's SxC issues are identified during these discussions. In 2006, there were 27 gate related issues between the Lower Granite, Little Goose, and Lower Monumental sites. The issues ranged from gates sticking open or closed to gates breaking due to slamming. In October 2006, PTAGIS field O&M staff kicked off a project to upgrade slide gates in time for the 2007 migration season. The project included the collaboration of the NOAA Fisheries Pasco shop to provide fortification and mounting modifications to the slide gates. Three optical sensors were added to each gate and the programmable logic controllers (PLC) at the facilities were upgraded to incorporate these sensors as inputs. The PLC

logic was updated to incorporate the optical sensor input to prevent gate slamming. In addition, human machine interfaces (HMI) and signal lights were installed to notify on-site personnel when a gate problem alarm was issued by the PLC. As a result of these efforts, gate related issues were reduced from 27 issues in 2006 to 2 issues in 2007. During 2010, gate reliability has continued with little downtime and few trouble alarms. Emailing of gate alarms at a few test sites was initiated in 2010, adding another investigative tool. Gate mechanical longevity has continued to increased, resulting in cost savings for the operating agencies.

FIELD OPERATIONS and MAINTENANCE

This objective relates to the following BPA Work Elements in the PTAGIS Statement of Work:

- E: 70 Install Fish Monitoring Equipment. This work element provides for milestones (tasks) required to deliver installed PIT tag detection system as required by Action Agencies and approved by Bonneville Power Administration.
- F: 159 Transfer/Consolidate Regionally Standardized Data. This work element provides milestones (tasks) necessary to deliver high quality, near-real-time PIT tag interrogation data for incorporation into the PTAGIS database.
- G: 122 Provide Technical Review. This work element provides for development technical documentation, written standard operating procedures, provision of technical assistance and support to the research community related to the design, installation, operation and maintenance of PIT tag interrogation system by other entities engaged in PIT tag detection research activities in the Columbia Basin.
- H: 119 Manage and Administer Projects. This work element provides for the efforts necessary for planning, organizing work, and directing and controlling efforts to achieve optimal results for PTAGIS field system operations.

The following describes the activities performed within the above work elements:

2010 Field Operations and Maintenance Activities (Including SxC Field Support)

Since 1993, the PTAGIS Kennewick Field Office staff has worked behind the scenes to keep PIT tag detection efficiency as the "gold standard" of fish detection. These detection sites include Corps of Engineers dams on the Snake and Columbia, Bureau of Reclamation (BOR) sites on the Yakima and various other sites throughout the region. Details of all 2010 field system operations can be found in event logs published on the PTAGIS 'PTOC Central' web site: http://www.ptoccentral.org/Ptoc_OM/event_log/index.html.

The PTAGIS Field O&M Staff utilizes daily operational reports, which are monitored multiple times each day, 365 days a year. During the portions of the season with high fish migration, PTAGIS field staff performed weekly, on-site, standard maintenance checks at each facility. In periods with lower migration, these maintenance checks were performed every other week. These visits include tuning all readers, inspecting and timing diversion gates and meeting with site operators and biologists.

As in previous years, the juvenile fish bypass facilities on the Snake and Columbia Rivers began operating on or before April 1, 2010. Prior to these operations, the PTAGIS Kennewick staff performed all the necessary pre-season tuning and maintenance to ensure peak performance of the juvenile fish detection

and diversion equipment. Detection efficiency rates for 2010 were kept at a very high level as listed in this report: http://php.ptagis.org/wiki/index.php/CEA_YTD_Efficiency_Tallies

The efficiency of the diversion gates at the Separation by Code interrogation sites were improved by PTAGIS upgrades to the Programmable Logic Controller (PLC) programs that control the gates. The addition of remote monitoring capabilities included the addition of automated email notifications of potential gate problems. Another benefit of the PLC improvements is the very low number of mechanical gate failures causing unscheduled site visits. Mechanical longevity of the gates has greatly increased due to these efforts. Diversion efficiency rates for 2010 were outstanding as listed in this report: http://php.ptagis.org/wiki/index.php/DGE_Gate_Efficiency_YTD_Summary

Other PTAGIS Field Office projects in 2010 that continued into 2011 include the following:

- Data collection platforms and critical-location transceivers at all sites are being upgraded with higher capacity uninterruptible power supplies (UPS) to cover power outages lasting up to two hours.

- PLC communications are being upgraded from DH485 to high speed Ethernet.

- A robotically controlled arm to test the read range of the Bonneville Corner Collector PIT tag antenna was developed and deployed. Extra decking for this project was provided by the Portland District COE. The Automated Read Range Tester (ARRT) was developed to compliment several other electronic means of determining when the system needs fine tuning or repair.

- Flat plate antennas that incorporate ferrite tiles were developed and deployed at Roza Dam for the Yakama Nation and BOR. These antennas are the first of its kind that can be installed on a metal surface with no performance degradation. This development opens the door for deployment of PIT tag detectors at many locations that were thought unsuitable in the past.

- PTAGIS continues to support the Klickitat River Passage Improvement Project with ongoing technical advice and is currently having slot antennas built for Castile and Lyle Falls. PTAGIS is also teaming with the NMFS shop in Pasco to construct 12 antennas for the Lyle Falls Wet Lab. In the final stages of construction, PTAGIS will install all PIT tag equipment including antennas, readers, computers and communication equipment. PTAGIS will assume ongoing O&M responsibilities once the construction phase of the project concludes.

- PTAGIS continues to provide QA for new and production PIT tags for all BPA projects.

- PTAGIS continues to repair all failed transceivers in our Kennewick lab.

- PTAGIS continues to refine facility controls for all COE main-stem juvenile fish facilities.

- PTAGIS continues to provide researchers with Separation by Code capabilities.

- PTAGIS continues to receive, house, inventory and ship PIT tags to all BPA funded projects.

- PTAGIS continues on the design team with NOAA and the COE for the Ice Harbor Ogee Pit Tag Project.

PTAGIS will continue all of the on-going operational and maintenance tasks, described in this section, for 20 interrogation sites located throughout the Columbia Basin Region.

ADMINSTRATION, MANAGEMENT, and COORDINATION

This objective relates to the following BPA Work Elements in the PTAGIS Statement of Work:

- <u>I: 119 Manage and Administer Projects</u>. This work element provides for the efforts necessary for planning, organizing work, and directing and controlling efforts to achieve optimal results for overall PTAGIS program and project management.
- <u>J: 122 Provide Technical Review</u>. This work element provides for development technical documentation, written standard operating procedures, provision of technical assistance and support to the research community related to the design, installation, operation and maintenance of PIT tag interrogation system by other entities engaged in PIT tag detection research activities in the Columbia Basin.
- <u>K: 122 Provide Technical Review</u>. This work element provides for development technical documentation, written standard operating procedures, provision of technical assistance and support to the research community related to the design, installation, operation and maintenance of PIT tag interrogation system by other entities engaged in PIT tag detection research activities in the Columbia Basin.
- <u>L: 132 Produce (Annual) Progress Report</u>. This work product is this report.
- <u>M: 185 Produce Pisces Status Report</u>. This work involves updating the BPA contracting data through its "PISCES" Microsoft Windows client application.

Administration and Management

This on-going work consists of delivering annual funding packages, statements of work and providing technical review as well as the day-to-day supervision of staff, consultants, budgets and contracts.

Staffing
In 2010, the PSMFC Executive Director and PTAGIS Senior Software Engineer continued to fulfill the duties of the vacant Program Manager position. PTAGIS hired a *Tech Support-Data Management Specialist 2* in the summer of 2010. This position is new and will provide teir-1 technical support, release testing, data management, and will have a supporting role in the PTAGIS4 upgrade. In December 2010, PTAGIS hired an additional field engineer for the Kennewick office to offset the increasing field O&M and technical coordination workload.

In 2011, PSMFC plans to recruit and hire the vacant Program Manager position in the second half of the year. A review of program staffing needs will be conducted once the PTAGIS4 system upgrade is near a production release.

Coordination

PTAGIS continued on-going coordination activities throughout 2010. These activities include the Annual PIT Tag Steering Committee (meeting notes can be viewed on the PTAGIS wiki), 3 newsletter articles, presentations at various review meetings, provided technical support for all PTAGIS systems, and other specific coordination activities described in the following subsections.

PIT Tag Distribution

During calendar year of 2010, the PTAGIS project distributed 1,314,000 tags to 65 Fish and Wildlife PIT tagging projects funded by Bonneville Power Administration. PTAGIS continues to coordinate with BPA staff using the TDS (Tag Distribution System) web application to inventory, approve and distribute these PIT Tags. This year 241,000 pre-loaded 12mm tags were distributed to 8 different projects.

On-going PIT-Tag Testing

PTAGIS finalized standard operating procedures (SOP) and protocols for on-going tag quality assurance (QA) and new tag acceptance (BPA RFO). Official performance metrics will be included in the next BPA tag procurement contract for future QA.

QA sample testing of tags distributed by PTAGIS program began in October 2010. This testing immediately discovered quality issues with a large percentage of tags currently in PTAGIS inventory and the manufacturer quickly replaced them. Staff is working day and night shifts to keep up with the demands for QA and the upcoming BPA RFO tag acceptance processes using the automated system (APTTS shown in Figure 3). PTAGIS hopes to increase the sample size of on-going tag testing in 2012 using an automatic tag sorter (ATS) mechanism to put sampled tags back into the original vial.
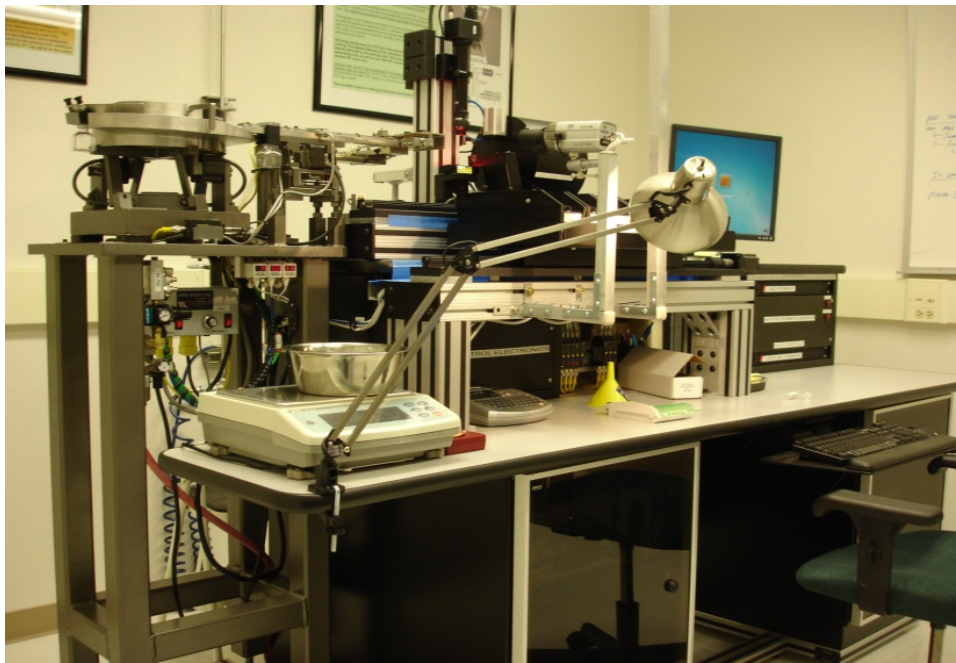

Figure 3: Automated PIT Tag Testing System (APPTS) located in the PTAGIS Kennewick laboratory

Field O&M Technical Coordination

The following highlight the 2010 field O&M technical coordination activities performed by the Kennewick field engineers.

Klickitat River Project

PTAGIS is providing technical coordination on the new sites on the Klickitat River. Construction began at both Lyle and Castile Falls in 2010. Lyle Falls will have 12 smaller antennas for the lab and 3 large slot antennas. Castile Falls will have 3 large slot antennas and run unstaffed throughout the winter. A separate contract and budget was setup by BPA for equipment procurement.

Figure 4: Construction on the Klickitat River Project

Roza Dam Flat Plate Prototype

The design of new flat-plate antennas using ferrite tiles started in July of 2010 and will be installed at the Roza dam. The construction for these prototype antennas started in November 2010 with the system to be operational in April 2011 and will be tested with a live fish evaluation. Based upon the performance of this prototype, the Yakima Nation and Bureau of Reclamation are discussing spanning the full 110' length of roller-gates with antennas in 2013/2014.

Other

The Kennewick staff has provided technical coordination for the Ice Harbor Ogee PIT Tag Design project. They are also part of the design team for the COE MCJ and LMJ Full Flow remodel projects.

ISRP Review

PTAGIS completed a proposal to the Independent Scientific Review Panel (ISRP) for the *FY 2010 RM&E Artificial Production Review*. This lengthy proposal and ISRP comments can be viewed on the www.cbfish.org web site. PTAGIS staff provided a presentation of the program to the ISRP and answered their questions. The ISRP concluded the PTAGIS program was one of the 38% of all proposals that met scientific review criteria. This removed the '*met scientific criteria with qualifications'* ratings of the last two proposals where the ISRP took issue with the PTAGIS program related to concerns about metadata.

2011 PIT Tag Workshop

PTAGIS and PSMFC staff worked with community members and vendors to coordinate an upcoming 2011 PIT Tag Workshop. Work included participant registration, accommodations, agenda and abstracts as well as staff presentations. The workshop is schedule for 3rd week of January 2011.

PIT Tag Recovery Rewards

During 2010, the PTAGIS project continued its incentive program to encourage people to report PIT tags found by fishers in the ocean or rivers and tributaries. The PTAGIS project offers a "PIT Tag Recovery Program" ball cap, a PTAGIS test-tag key chain and a reward letter with detailed information and history on the host fish marked with the recovered PIT tag. Details on the PIT Tag Recovery Program can be found on the PTAGIS Wiki at php.ptagis.org/wiki/index.php/PIT_Tag_Recovery_Program.

There were 20 PIT tag recoveries reported to PTAGIS in 2010. Eight tags were returned from sport fisheries in the Columbia River below Bonneville Dam, and another six tags were taken in sport fisheries on tributaries to the mainstem Columbia and Snake rivers. Five tags were returned from commercial salmon ocean trollers in Oregon and Washington. One tag was returned from a fish harvested in the Zone 6 tribal gillnet fishery above Bonneville Dam.

Annual Report

This report is the 2010 Annual Report that will be submitted to the PISCES system.

Appendix 1: Summary of *Survey for Online Reporting Features*

The summary described in this appendix is from a 2010 online survey sent to PTAGIS users regarding online reporting features. Survey invitations were distributed in two ways: published in the most recent PTAGIS Newsletter on August 12, and in email messages to registered PTAGIS Web Portal users and Tag Data Coordinators. The email invitation was sent to 831 unique email addresses, corresponding to approximately 780 unique persons; 60 of those messages bounced back because of stale email addresses. We received 117 responses to the survey, 3 of which were from an early test version of the survey. The newsletter article garnered 14 responses and the email invitation brought in 100 responses.

Top 5 Important functions

What are the MOST IMPORTANT functions in a web-enabled reporting/data access tool? Check no more than 5 answers.

Answer Options	Response Percent	Response Count
Quick and easy download of data	82.1%	87
Download data in multiple formats (e.g. CSV, Excel, Word, PDF, XML)	49.1%	52
Browse, explore, and interact with data online	43.4%	46
Create custom reports	36.8%	39
Upload files to use as query parameters (e.g. lists of tag codes)	36.8%	39
Schedule queries to run automatically	25.5%	27
Create queries using a GUI (graphical user interface)	24.5%	26
Data mining or pattern matching	20.8%	22
Online analysis tools	19.8%	21
Share queries/reports with other users	19.8%	21
Create charts and/or graphs to download or print	17.9%	19
Subscribe to receive query results/reports via email	16.0%	17
Create queries using SQL statements	14.2%	15
Link to other databases	8.5%	9
Other (please specify)	1.9%	2
answered question		**106**
skipped question		**11**

Other (please specify)	
ease of making queries	
One-fish history	

Desired online reporting/querying functions based on survey comments
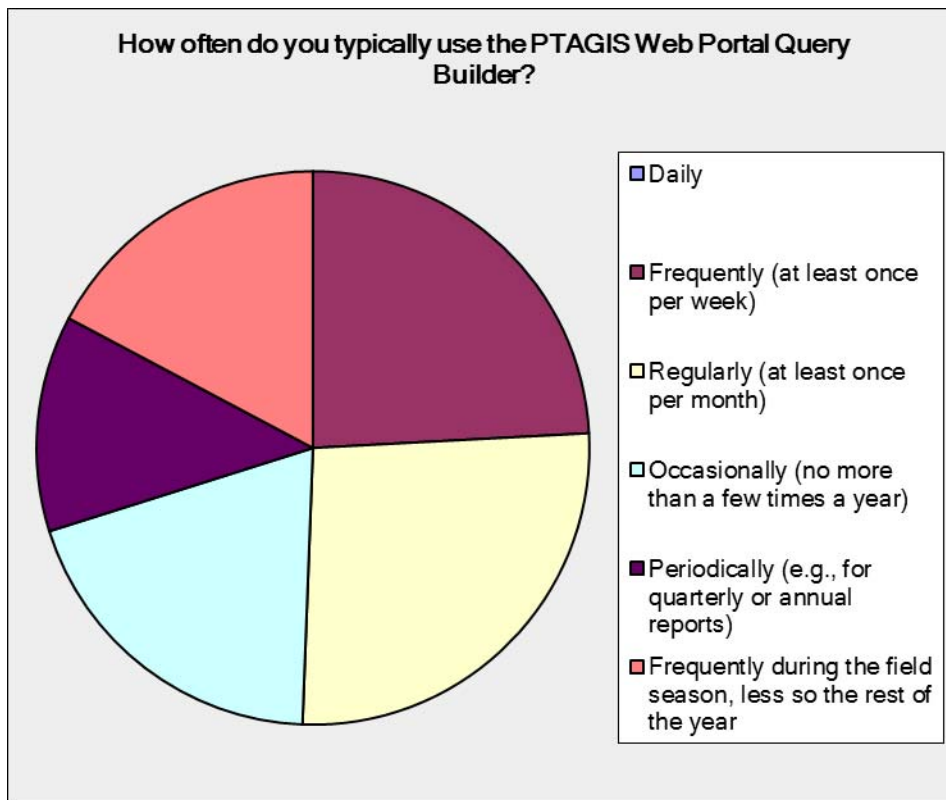
Compiled comments from question numbers 6 (Does the QB meet your needs?) and 12 (Share any additional comments).

- First Obs query –first and/or last detection at any interrogation site in the basin, or at any detection site in a list of sites selected by the user
- Query interrogation data for multiple years and sites (e.g. all detections from a particular release over multiple years and/or sites)
- Get all interrogation, recapture and mortality events for a specific group of fish (one fish history for a group of tag IDs)
- Filter by broad categories like Adult/Juvenile/In-stream, Geographic areas (all releases at or above Lower Granite Dam), ESUs
- Filter on more than 20 HUCs or Tag File IDs
- Filter on any of the available data fields
- Filter using advanced operators and wildcards (e.g. OR, NOT, LIKE)
- Query mortality data by tagging data (coordinator id, tag site, release site)
- Provide better documentation and/or training

- Folders to better organize saved queries
- Integrate with GIS
- Format data for PitPro or SURPH
- Way to filter out fish that never migrated downstream, a Parameter that filters out fish that not hit at least one, two or three adult fish ladders in mainstem dams
- Interested in specific groups of fish that pass multiple dams, and proportions of fish at each dam

Query Builder

92 (79%) respondents use Query Builder

How often do you typically use the PTAGIS Web Portal Query Builder?

- Daily
- Frequently (at least once per week)
- Regularly (at least once per month)
- Occasionally (no more than a few times a year)
- Periodically (e.g., for quarterly or annual reports)
- Frequently during the field season, less so the rest of the year

Does the QueryBuilder tool meet your needs in the following areas?

A bar chart comparing Yes and No responses across three areas:
- Ease of Use: Yes ≈ 57, No ≈ 26
- Flexibility: Yes ≈ 55, No ≈ 29
- Performance: Yes ≈ 70, No ≈ 12

Comments

It's getting better, but I still find glitches in the query builder

Constraints on queries force me to get creative in getting the specific data I need for some analyses (across year, or multiple release sites)

I sometimes have to be creative in obtaining the desired data I need due to the constraints in the queries (across years, multiple release sites, etc).

I personally do not find it easy to navigate, BUT Dave Marvin rules and is easy to work with and will help me through it.

Checked no for "ease of use" as I am a database idiot. Could use a "short-bus" app for us infrequent, technologically challenged users.

It is really hard to get data I am interested in in a format that it useful for me

It has gotten more reliable and quick. Please keep the Telnet interface for my occasional multi-year, multi-site queries!

The query builder is not very intuitive when setting up parameters for queries. An off-season class in it's use would be helpful.

too restrictive for some querries--especially when doing at large scale (i.e adult detetions at BON)-- limited number of HUc codes for filter; 1 year limit on interogations

could be better in all areas

query builder unable to filter for adult or juveniles, I think I have also run into file size limits

Queries that produce large tables take a very long time to produce results and at times it seems that the query is finished when it actually is not, causing incomplete or no data.

Defining the tag group is not flexible enough. Often I want to include more than 20 HUCs or tag ID filenames, so end up having to download my data in pieces and then compile them myself.

I actually end up using PIT tag data systems that have been put together by the Fish Passage Center and DART more often than a direct query from PITAGIS. I find PITAGIS difficult to use directly because the raw data needs so much sorting out and cleaning up before it can be confidently used.

Overall the query builder is good. However, I think it could be more flexible without being so cumbersome. It takes a long time to drill down to get to the level of data needed. It may helpful to have a system to allow the query outputs to be dumped right into a program like SURPH or PitPro.

I understand restricting user access and query structure. I often need to query across years or filter based n esoteric criteria

The ability to span calendar years for interrogation details would be nice.

It would be nice to be allowed more memory for multiple large registered tag lists.

Performance is slow.

Wishlist?: Searching within comment fields with wildcards (e.g. '%RT%' for adult radio tagged fish in recap comments), building multi-year tag_lists - I don't think multi-year queries are allowed.

| I wish you could query mortality records by tag coordinator id or by tag location. , instead of who found the mort. |
| I can usually find what I want but not easily. The ability to run sql select statements would be easier. |
| Difficult to find the corrrect data types |
| Additional flexibility in search criteria needed (i.e. by capture method, etc) |
| directions are confusing but get better with frequent use. slow slow |
| when editing an existing query, I have a problem saving it. Seems like if you don't rename it, you lose all your editing. |
| Better descriptions of how to use search definitions and the ability to download tag/release site information would help |
| Wish list: query comment field with wild cards (e.g., "%RT%" for recap remark would get all adults with radio tag); also being able to |
| It would be nice to be able to query for an interrogation details for more than a year at a time..... |
| Unfortunately I sometimes have to make multiple queries because of the limited number of interrogation sites you can query at a time. |
| I would like to see folders to better organize queries for different projects, and would like to have the ability to query on more field types (capture method, etc) |
| At times, the query process is slow |

How do you use Query Builder to search for data? Check all that apply.		
Answer Options	**Response Percent**	**Response Count**
I query for interrogation events for all tags released at a specific location	85.9%	73
I query for marking/release events for all tags detected at a specific interrogation site	68.2%	58
I query for marking/recover/interrogation events for a specific PIT tag	67.1%	57
I build a registered tag list and query for any matching marking/recovery/interrogation events	48.2%	41
Other (please describe)	5.9%	5
answered question		**85**
skipped question		**32**

Other (please describe)

| Check recapture and mortality events I cannot obtain from TMT files (e.g., MYnnnn, YTDnnn, etc.) |
| I cast a very wide net during the field season, using the results for a variety of tasks. I do more specific queries only to meet the requirements of PitPro survival analysis software. |
| tagging data--need easier access to tag header information |
| I query for all release information in the basin and query for tags detected with our project |
| I ocasionally need information about a tag or tags and generraly fumble arround in the application until I get what I need, or not. |

DART Users

62 (56%) respondents indicated they use DART to obtain PIT tag data.

 50 of these respondents also use QB or Telnet, 12 use neither.
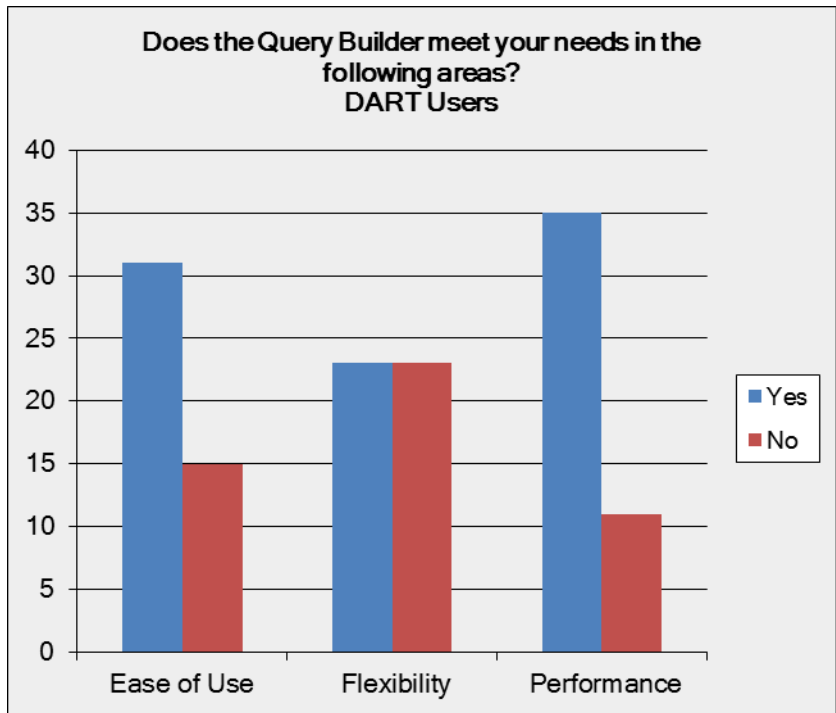
If you access PIT tag data through the Columbia River DART website, what reports/queries do you typically use? Check all that apply. If you do not use DART, please skip this question.

Answer Options	Response Percent	Response Count
PIT Tag Adult Salmon Returns	81.7%	49
PIT Tag Salmon Observations by Release Site	60.0%	36
PIT Tag Juvenile Salmon Release & Observation Summary	56.7%	34
PIT Tag Salmon Observations by Observation Site	55.0%	33
PIT Tag Salmon Releases	36.7%	22
PIT Tag Salmon Observations by Tag Coordinator	35.0%	21
PIT Tag Release Site List	28.3%	17
PIT Tag Salmon Observations by Hydro Unit	25.0%	15
PIT Tag Adult Salmon Fallback Rates	18.3%	11
Columbia Basin ESU Queries	16.7%	10
PIT Tag Resident Species Summaries	8.3%	5
Other (please specify)	5.0%	3
answered question		**60**
skipped question		**57**

Data Discovery or Reporting Tools

Are you interested in using any of the following data discovery or reporting tools? Check all that apply.

Answer Options	Response Percent	Response Count
Pivot tables	50.5%	52

I don't know	43.7%	45
Custom report creation	23.3%	24
Crosstab tables	21.4%	22
OLAP data cubes	13.6%	14
Other (please specify)	3.9%	4
answered question		103
skipped question		14

Other (please specify)

I prefer to do my own analysis

I don't have much interest in pre-formatted reports, but am open to tools that overcome limitations of spreadsheet or relational database structures.

incorporate instream array systems into queries

Am not familiar with OLAP, Crosstab, Pivot but would be interested to see if these applications fit my needs

General Comments

1. First Obs" is not an option in the Query Builder (QB). This is an important query for our projects (SMP, ISMES, ISS) and was a component of the Telnet version. Because the QB version includes ALL obs, the file size is massive. Each coil is a record. I am currently evaluating 2008 Rapid River Hatchery smolt obs at Lower Granite Dam (GRA/GRJ). This query returns more than 500k records. Only 145k is relevant. The excess records cause the file to be so large that it is difficult to handle with our computers and software. I ultimately need to query the first obs for these same fish at each of the eight facilities. The file size to do this is >40M. A lot of time is lost reducing this data to a usable form. I prefer to analyze the data in Excel 2007. However, the application struggles with this amount of data and another application, such as Access 2007, must be used to reduce it first.

   I would like to see the end user's concerns addressed in a timely manner. For example, the First Obs issue has been known for about four years. However, it still has not been addressed. I believe this is a basic query that should have been retained from the Telnet version or added when the need was expressed.

2. One problem with current PIT data queries is that not enough query parameters are available, or they are too broad. For example, one can only get results within a single calander year or migration year in a query. Salmon return as age-6+ fish sometimes, why make us re-query for every year a fish might survive? We simply want to be able to get all PIT hits from a release group, remote tagging site, hatchery brood, pond site, etc. in a single query, regardless of where they are or when they are.
   Also, can you make some way of filtering out meaningless hits? For example, if I want to use PIT tags to generate a smolt to adult survival for hatchery steelhead, my query results will include lots of hits from smolts that never migrated downstream (especially with the increase in remote detection sites). Can you provide us a way to filter out those fish? Maybe add a parameter that filters out any fish that did not hit at least one, or two, or three, adult fish ladders at mainstem Col. River Dams?

3. I am particularly interested in looking at specific groups of adult fish that pass multiple dams. I don't trust the conversion rate feature on DART because it doesn't explain how they do it. I would like to be able to easily compare proportions of fish at each dam. I have yet to find an easy way to do this. I also have yet to find an easy way to find all of the adult interogation, recapture, mortality events for a specific group of fish. It would be nice to be able to querry for all the detections for a group of tags and get the results in a csv table.

4. My habit is to do all my data manipulation locally, with layers of queries ultimately linking to a single, huge, fairly detailed detection table. Long ago I decided to download all of my organization's detections for the whole year to date, every day, essentially replacing the whole table daily. In a way, that's inefficient, but in terms of my time, it's

very efficient. I'm open to new approaches, partly because I'll have to hand his stuff off to someone else in a few years.

5	Need easier ways to restrict queries on all fields in PTAGIS. Need to be able to query by inclusion (field equals xxx) or exclusion (field not equal xxx). Would be nice to do "high level" queries like: show me all PIT detection history (observations, recaptures, etc.) for juvenile steelhead tagged and released in the Yakima Basin between 2005 and 2007 that were detected at ANY site in 2008-2010.
6	need more user defined filters: adult vs juveniles, broad geograhical release locations
7	Need more information about the tags that are uploaded - were they used for experimental fish, should they be used in monitoring and evaluation? If you are making the data available, the users must have more guidance in how to use the data. Could be as simple as including a flag in the tagging details file.
8	Primarily query data by release location for all tagged species (anadromos and resident) utilizing DART as the queries are relatively quick and easy to use. Would prefer to do so through PTAGIS as it seems that there is a lag time in data availability between the two sites.
9	Overall, the web query is cumbersome. I think the upgrade should be paired with a user based interrogation and taggin upload program, so they are developed together (similar tools from the same toolbox.) But I do love Ptagis, and things work decently now. Just time consuming.
10	Need ways to directly identify transported juveniles, ESU of listed fish, and more easily integrate with GIS,provide GIS Metadata for tagging and observation sites, need to link to database with more complete description of studies that are tagging the fish
11	Options for queries and Training as to how features are used/applied and how to most efficiently mine the data.
12	For users who are familiar with SQL, writing your own sql statement for submission would be the most flexible application.
13	The only reason I've continued with telnet is that I can't use wildcards or choose enough categories so that I can do a simple thing like ask for all releases at or above Lower Granite Dam...seems it should be easy to do.
14	Linking databases will be key to achieving broad analysis of environmental data and formulating recovery protocols and long-term habitat infrastructure improvements.
15	Very useful site, appreciate the free access to the database.
16	I use primarily DART but I have not found an easy query or reporting tool for obtaining site and run specific information by date. I generally need say hatchery fall chinook passage at McNary, Ice Harbor, and Priest Rapids for August 1 to November 15 or conversion rates between Projects. I usually end up with a download of all runs for this period and then sort to obtain the data I need. Files are often too large to deal with. I'm sure what I really need is some training to use the queries that are available. Maybe an online tutorial?