Project Title
Development of a Centralized PIT Tag Database for the San Juan and Upper Basin Recover Programs, 2020-2024

Bureau of Reclamation Agreement Number:
R20AP00027

Project/Grant Period:
Start date: 06/01/2020
End date: 12/31/2024
Reporting period end date: 09/30/2023
Is this the final report? Yes _____ No _X_

Principal Investigator:
Amy Greenwell, Conservation Data Services Co-Team Leader and GIS Manager
Colorado Natural Heritage Program
Colorado State University
1475 Campus Delivery
Fort Collins, CO 80523-1475
Phone: (970) 491-2847
Fax: (970) 491-3349
Email: amy.lavender@colostate.edu

Abstract:
The Colorado Natural Heritage Program (CNHP) at Colorado State University developed an online data system (the Species Tagging, Research and Monitoring System or STReaMS) for the Bureau of Reclamation and the Upper Colorado and San Juan River Endangered Fish Recovery Programs. The database is designed to track PIT tags and endangered fish activities in the Upper Colorado River Basin. The data system can be accessed at streamsystem.org (registration is required). CNHP continues to host and maintain the data system and work with Database Managers to address Recovery Program priorities.

Study Schedule:
FY20-FY24

Relationship to RIPRAP:
General Recovery Program. Conduct interagency data management program to compile, manage, and maintain all research and monitoring data collected by the Recovery Program.

Accomplishment of FY 23 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Deliverables thus far include an enhanced version of the website at https://streamsystem.org. The database manager working group has been resurrected. These monthly meetings with members from both Recovery Programs and CNHP have been invaluable in connecting CNHP with Recovery Program data issues from the field to the database and providing cross training opportunities within the group.

STReaMS is now running on a new server, and the test site has been moved to upgraded hardware, improving performance of both the live and test environment. We now need to focus on upgrading the SQL Server software, moving source control to GitHub, and finalizing the direct database PIA upload process.

A list of completed tasks for FY23 is below.

Task1: Server Maintenance

- Internal meetings and preparation for new server migration
    - Identify and prioritize action steps
    - Software inventory for switch to new servers
    - Purchase new SQL Server and acquire installation file
- New server
    - Physical restructuring of server room to accommodate new hardware
    - Installed virtual host and set up partitions
    - Installed Microsoft Windows Server 2019
    - Moved live website and SQL database to new server, checkpoint and testing
- Moved test website and database to an improved server
    - Upgraded operating system to Microsoft Windows Server 2019
    - Check point and testing
- Built new server for source control
    - Installed Git
    - Set up groups, project structure and user permissions
    - Tested import of code from Microsoft TFS to Git
- Maintained server and performed Windows updates
- Performed regular back-ups and analyzed back-up file and log sizes .
- Re-registered domain name
- Updated web certification authentication
- Monitor CPU usage
- Cleaned up hard drives to free up disk space on both live and test site
- Replaced power supply battery

Task 2: Website Maintenance, Feature Enhancements and Program Priorities

- SQL Server maintenance
    - Scripted alerts to automatically monitor scheduled tasks
        - CDC data capture, back-ups, indexing and running jobs (alerts if there are more than 7 running jobs)
    - Refreshed data in test database periodically with live data for testing purposes
    - Database permissions
- Added field for genetically verified fish and updated fish species in batch accordingly (from SJ program)
    - Updated change data capture job to incorporate new fields in fish table
    - Updated fish page on website to show new data fields
    - Updated online help and tool tips
- Removed Lake Powell entries from hydro areas, and updated all related records to valid hydro areas, SJ or CO
    - Identified and updated encounters, studies, non-tagged fish, stocking events and samples
- Flagged ghost tags from Ben Stout project as test tags in batch and made sure they were not linked to “fish” in the database
- Added query information to a text file for all downloads to help with troubleshooting

  - Fish, encounter, tags, tag lots, popular downloads, and QC tools downloads
- Scoped out Amazon Web Services to support data submissions
  - Sent pricing and specifications to DB Managers
- Worked with database managers to verify/update PIA river miles
  - Identified and fixed river miles mismatches between PIA records and related encounters in batch
- Meetings/trainings
  - Monthly Database Manager Working Group meetings
  - Future of data collection meeting
  - Researchers Meeting
  - Researchers future of PIA meeting
  - QC training session with Database Manager Working Group
  - Rejected records training sessions with Database Manager Working Group
  - Met with SJ to discuss PA (PNM Fish Passage) gear type
- Adjusted event page to not require end date time if start date time is populated
- Bug fixes
  - Fixed hydro area constraint on samples and stocking events to show rivers or lakes
  - Fixed bug with rejected records download
  - Fixed rejected records sorting
  - Fixed bug with parent org filter on browse encounters
  - Added new QC check to batch uploads and page entries to prevent tag codes with all zeroes from getting into the database
- Purchases
  - SiteGround renewal for annual hosting of recovery program website
  - Mentimeter renewal for Recovery Program presentations
  - WPDatatables Pro plug in purchase for Word Press on the recovery program website
  - Domain renewal of www.coloradoriverrecovery.org from godaddy
- Troubleshoot database connections
  - Rebuild virtual switch
- Many adjustments to code base for PHP 8 compliance
  - Extensive log troubleshooting to reconcile warnings
  - Website testing
- Upgraded to php 8.0.29
- Updated exceltophp library
- New release Oct 2022
  - Extensive testing
  - Version control - pull code to live site
  - Release notes
- New release May 2023
  - Extensive testing
  - Version control - pull code to live site
  - Release notes
- DB Manager access to backend database
  - Troubleshoot issues with old CSU laptop, decided to retire it
  - Global Protect setup
  - Set up remote desktop option
  - Purchase and setup new laptop for backend access
- Database Manager Support
  - Questions/issues with batch uploads
  - Questions/issues with downloads
  - Questions/assistance with procedures for completing tasks and help with SQL queries

    - User support where needed
- Colorado Recovery Program WordPress website maintenance/upgrades, backups, and WP data table plug-in setup
- Added unknown river to each basin
- Updates to STReaMS internal documentation and Database Manager User Guide

Task 3: Project Management

- Annual reporting
- Budget and expense tracking
- Revise budget proposal and scope for BOR/Recovery Programs for Year 5 (FY24)
    - Added new feature for issues tracking in Scope FY24
- CSU administrative requirements and reporting
- Train CNHP staff on database design and tasks

Task 4: Develop Direct Database Upload System for PIA Data (preparation for switch to new upload process)

- Created new bin (table) in SQL Server to support direct database uploads
- PIA data connection issues
    - Noticed duplicate issues in PIA data files for Price Mounds and Price Woodside from Biologic, tested with Biologic, updated next sequence IDs for import since IDs were reset during the remove duplicate fix
    - McElmo Creek Confluence and McElmo Creek Bridge biologic data file update, reset next sequence ID for import since IDs were reset
- Fixed encounter dates for McElmo Creek that had reset to 1996 in the dat file (manufacturers date)
- Inactivated McElmo Creek Aneth Confluence (per Peter no longer functional and will not be repaired)
- Ongoing communications with Peter MacKinnon on potential stuck tags and monitoring units that are not uploading new data
- Monitor weekly PIA reporting to identify potential issues with weekly upload

Additional noteworthy observations:

As of October 18, 2023 the database has:
• 2,266,510 PIT Tags
• 19,706 Tag Lots
• 1,579,998 Individual Fish
• 6,352,363 Encounters

Between October 1, 2022 and September 30, 2023, Google Analytics show:
31,876 page views
5,697 sessions
Average session duration of 6:16 minutes
Average of 5.59 pages per session
Bounce rate : 46.58%

Recommendations:

Server maintenance and code upgrades will continue to be the responsibility of CNHP. Recommendations under the FY20-24 agreement are listed below. CNHP will continue to work closely with Database Managers to adapt to emerging needs.

CNHP will continue to maintain the STReaMS database and enhance existing features during the Federal FY20-24. Tasks are broken out below.

Task 1: Server and Database Maintenance

- Maintain the server, server security, and perform regular database backups
- Maintain the test server and web development environment
- Perform necessary software installs and upgrades including Windows operating system, Windows updates, MS SQL Server, source control, and PHP. Ensure all code performs as expected following updates.
- Upgrade app dependencies to keep website current and secure (ex. jQuery, PHPtoExcel, etc.)
- Assess overall performance and optimize resources
- Maintain Database Manager credentials to access SQL Server
- Replace hardware (e.g. server, hard drives, RAM, etc.) as needed and configure new hardware
- Monitor daily interim back-ups, running jobs, and change tracking

Task 2: Website Maintenance and Feature Enhancements

- Develop issue tracking tools on STReaMS website
    - New table to store issue tracking data
    - Web page for users to submit issues
    - Web interface for Database Managers to manage issues
    - Email reporting system
- Enhancements to existing tools as funding allows
    - Batch uploads (Rare Fish, Stocked Fish, Site Effort, Stocking Events, PIT Tags, PIT Tag Lots, and Non-tagged Fish)
    - QC tools
    - Split/Merge tool
    - Calculated fields
    - Rejected records
- Work with key recovery program staff to ensure complete PIA data in STReaMS
    - Needs assessment and training with key staff
    - Add and remove PIAs to the automatic upload system as needed
    - Monitor PIA data to ensure data connections are working as expected; report data connections issues/data gaps to Merck
- Work with Database Managers to develop any necessary custom queries, including non-tagged fish queries
- Bug fixes
- Internal testing and stress tests

- Update online help, data dictionary, user manuals, Data Managers user guide, Release Notes, and internal system documentation
- Train Recovery Program participants on features and enhancements
- Participate in monthly Database Manager meetings
- Support hosting and other technical needs for Recovery Program website
    - WordPress, TablePress, Mentimeter, SiteGround
- Set up Amazon Web Services for PI data submissions
- Other priorities identified by Recovery Program Database Managers

Task 3: Project Management

- Prepare annual reports
- Perform project management and CSU compliance
- Maintain regular communication with Database Managers
- Ensure CNHP staff are fully trained on database design and tasks
- Recovery Program purchases

Task 4: Develop Direct Database Upload System for PIA Data to Enhance Security, Reliability, and Resiliency

- Work with Merck to test direct database access
- Revise upload methodology
    - Record import tracking
    - Problem records (stuck tags, etc.)
    - Rejected records
    - Data retention
    - Raw data download
- Write PIA upload code to import raw data bin into the main STReaMS database (Tags, Fish, Encounters)
    - Maintain current code for data files (if needed for old files, units not on Biologic system, etc.)
- Gather existing PIA data files, format, and import to a bin so available raw data are in a central location
- Change SQL database schema to accommodate PIA working group discussion results
- Update web interface and email notifications to align with the new import process
- Testing
- Post changes to live site
- Dismantle existing FTPS site

Project Status:
Ongoing

FY2023 Budget Status
Official financial information comes from CSU Sponsored Programs. Budget had a delayed start date.

Funds Provided: $43,2342.63
Funds Expended: Financial Report will come from CSU Sponsored Programs
Difference:
Recovery Program funds spent for publication charges: $0

Status of Data Submission
Not Applicable

Signed:
Amy Greenwell
Principal Investigator
10/31/2023