

**COLORADO RIVER RECOVERY PROGRAM
FY-2015-2016 SCOPE OF WORK**

Project No.: 170

Database Development

Reclamation Agreement number: R14AC00084
Reclamation Agreement term: September 18, 2014 – Jun 30, 2019

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Category:

- Ongoing project
- Ongoing-revised project
- Requested new project
- Unsolicited proposal

Expected Funding Source:

- Annual funds
- Capital funds
- Other (explain) FWS

I. Title of Proposal:

Upper Colorado & San Juan River Recovery Programs Database Development

II. Relationship to RIPRAP:

GENERAL ACTION PLAN:

III.A.2.c.(3) Develop one or more standardized nonnative fish datasets to facilitate data analyses and information tracking (one dataset will incorporate all tagging data, others may incorporate all movement, mark-recapture, removal data, etc.).

V.A.1. Conduct interagency data management program to compile, manage, and maintain all research and monitoring data collected by the Recovery Program.

III. Study Background:

The stakeholders of the Upper Colorado River Endangered Fish Recovery Program and the San Juan River Endangered Fish Recovery Program have been collecting large quantities of data on stocked and wild endangered fishes. These data are stored in separate datasets at individual program offices. Currently, fish are crossing between basins and it is difficult to identify individual fish and capture histories. The sharing of data between stakeholders is

not streamlined and the current system impedes thorough data analysis. Furthermore, there is a need for an efficient way to collate data from the increasing number of Passive Interrogation Arrays. A web-based master database is needed to improve efficiency of data entry and retrieval, and to prevent duplication of records and efforts between stakeholders. The master database will standardize content and provide convenient, easy access to all available data. This will benefit the stakeholders and all involved by streamlining data.

IV. Study Goals, Objectives, End Product:

Objectives:

- Work closely with stakeholders to assess needs and develop database design and technological requirements
- Prepare database mockups for stakeholders to review
- Quality control existing MS Excel and MS Access datasets and prepare for bulk upload to MS SQL Server
- Develop MS SQL Server database and import current fishes data
- Prepare web interface for entering and retrieving data
- Develop online Data Management System for quality control and database administration, including users, permissions and user roles
- Develop online Query Builder for customizing data downloads
- Develop upload capabilities for batch files and data recorded by Passive Interrogation Arrays
- Develop revision tracking components, and set up defect tracking and user tracking (GitHub and Google Analytics)
- Create online help, user manual and system documentation
- Conduct internal and external testing of database and web interface; perform stress tests
- Enhance features and functionality based on user feedback
- Educate stakeholders on using and managing the database
- Investigate crosswalks for similar datasets from other institutions
- Prepare quarterly, semi-annual and annual reports as well as final reports as needed
- Maintain the server, server security and database backups
- Respond to the stakeholder needs for database maintenance and website enhancements
- Update online help, user manual and system documentation
- Participate in the Recovery Program's meetings and workshops
- Train stakeholder participants on new features and enhancements
- Prepare quarterly, semi-annual and annual reports
- Perform project management and CSU compliance

V. Study Area: Database will cover the Upper Colorado and San Juan river subbasins.

VI. Study Methods/Approach:

The development cycle will proceed on a quarterly basis. Once the database has been designed, an updated version of the web system will be released every three months to the principle investigators. When the updated version of the website is released, it will replace the existing website without impacting the data. This allows researchers to begin using the existing features, while development continues on more advanced functions. Each three-month cycle will include three monthly cycles of design, development, rigorous internal testing, and documentation of new features. Internal testing will include basic user tests that run through the integral features, stress tests for performance, and step-by-step testing scripts for more error prone processes. Rigorous documentation is an essential component for the sustainability of the system.

For the duration of the project, CSU's team will handle database backups, server maintenance, and user support. CSU is willing to either continue maintaining the servers for a maintenance fee, or to transfer the server and its management to the recovery programs once the system has been built. The database will be incrementally backed up on a daily basis, with full backups weekly. CSU will archive the latest three months of full backups and keep one full backup for each month of the project. User support will be available by telephone or email during regular business hours. CSU will support Internet Explorer (version 9 and above), FireFox, and Chrome web browsers.

Year 1: The goals of the first year will be integration of the disparate data sources into a centralized database and development of the core components of the web system. We will begin with a needs assessment, meeting with principle investigators (PIs) to decide on the appropriate technology (database platform, preferred coding language, location and size of the servers, etc.) and refine the feature set. Our team will generate mockups of the most important user interface elements and solicit feedback. The research goals will drive the design of the database, which will be flexible enough to accommodate future expansions.

Once we have a functional database design, team members will begin manipulating the existing data and importing it into the database. This process will include QA/QC checks on data integrity by experienced data managers and zoologists with input from program researchers. Development of the web system will start with user management features. Although some data views will be accessible by the public, the advanced query and editing functions may be restricted to registered users, and segregated by role. For example, there may be a data entry role that allows research assistants to use web forms for entering records, a PI role that has fewer restrictions, and an administrator role with advanced access. The roles will be developed in detail through discussions with program researchers. Administrators will need an interface to assign these roles and manage registered users. In addition, this User Management component of the website will include pages for registration, password reset, and account management for individual users.

A few basic online views of the data, forms for entering and editing individual records, and several preset download queries will also be developed during the first year. The views will allow researchers to browse through data online in a tabular format and double

check the integrity of the data, via links back to original PIT tag distribution files. Web forms allow users to edit the data, to change individual records and insert new data. These standard web forms will insure a controlled vocabulary across the project. Preset download queries will distribute commonly requested data in the most direct way possible. These will be developed based on communication with BOR/USFWS principle investigators. The format of these files will be tab separated text files, a non-proprietary format which can be imported into a variety of different software programs. Until more complex web forms for queries are available, other datasets will be available by contacting us directly.

Frequent communication between our team and the principle investigators will be vital during the design and intensive development of the first year. An initial in person meeting, while not essential, would be very productive. We will purchase online meeting software to facilitate communications between CNHP, BOR and program investigators. Weekly communication to discuss questions that emerge during development and to seek feedback about the effectiveness of the existing website would greatly expedite the process. We can adjust the frequency of these meetings as needs require. Conference calls timed to coincide with periodic releases of major new features will allow our team to explain changes, collect feedback, and train users. We would also call in to whatever other committee meetings the PI's deem necessary, and attend the annual meetings to present progress to researchers.

Year 1 deliverables: Core database with basic data entry forms, ability to manage users and permissions, basic online help, and canned queries for several common downloading formats; user manual for core database; quarterly, semi-annual and annual reports.

Year 2: The second year of the project will focus on refining the interface according to feedback from users and developing advanced features. Batch upload tools will be developed. Additional database tables to support tracking of record revisions will be added, along with user interface elements to display the revision history of a record. This history will track date changed, content changed, and the user name of the editor. Revision history provides principle investigators with a way to track changes to their data, and revert to previous versions of a record if a change is made in error.

We will also expand the default queries by adding a query building interface to allow researchers to construct their own complex queries of the database. It will have a graphical user interface for choosing which fields, tables and filters to apply, as well as a more advanced dialog for researchers and data managers familiar with SQL (similar to the Design and SQL views in Microsoft Access queries). Query results will be downloadable as tab delimited text files.

Data management quality control features will also be built during this year. Automated database scripts will be created and run as scheduled database tasks. Web-based management tools for duplicate record management, finding orphaned records, and managing empty records will be added to the administration functions of the site. Additional QA/QC controls can be added, as needed, based on the use of the system.

Standard uploading scripts will be expanded to allow more flexible imports of large data sets, such as the Passive Interrogation Array data.

Communication during the second year may be on a less frequent basis than during initial design and development, though intensive documentation of changes will continue. The online help system will be expanded to include a database dictionary, which will aid researchers using the query tool.

Year 2 deliverables: advanced database with data management tools for quality control and content management, query builder, built-in batch upload capabilities, revision and defect tracking components, and updated online help; database dictionary, system documentation and updated user manual; quarterly, semi-annual and annual reports.

Year 3: Work during the third year will focus on maintenance, additional enhancements, training, and cross-walking datasets from outside sources, where available. We will make improvements to work flow based on system usage, and add enhancements as time allows. If data can be obtained from additional sources, we will crosswalk those data and assess the feasibility of importing them to the master database. As development nears completion, we will increase our training efforts. Workshops, either online or in person, to train users on specific tasks will be offered. During this time, we will also prepare the future database manager to take on maintenance and support responsibilities.

Year 3 deliverables: final database with enhancements; education of staff and data manager to use and administer database; final system documentation for maintaining the system and cross walking other data sources, and final user manual; transfer of database and server to data manager; quarterly, semi-annual and final report.

Years 4 and 5 (optional):

CNHP will continue to:

- Maintain and enhance the database and maintain the server, server security and database backups
- Respond to the Recovery Program's needs for database maintenance and website enhancements
- Update online help, user manual and system documentation
- Participate in the Recovery Program's meetings and workshops
- Train Recovery Program participants on new features and enhancements
- Prepare quarterly, semi-annual and annual reports
- Perform project management and CSU compliance

VII. Task Description and Schedule

We propose a 3 year project, with year 1 starting in September of 2014. Schedule details are provided in the following tables.

YEAR 1 (Sept 2014-Sept 2015)	Sept-14 - Nov-14	Dec-14 - Feb-15	Mar-15 - May-15	Jun-15 - Aug-15
Work closely with investigators to assess database needs and design				
Purchase and set up server to host database				
Server security, database backups and server maintenance				
Prepare database mockups				
Develop SQL server database				
QA/QC existing MS Excel and MS Access databases and reformat as needed				
Import existing fishes data into MS SQL Server				
Code web interface for entering and retrieving data				
Code management system for managing users and permissions				
Develop canned queries for basic downloads				
Create online help, user manual and system documentation				
Internal testing and stress tests				
Post core version of database online				
Train personnel to use the database				
Prepare quarterly, semi-annual and annual reports				
Project Management and CSU Compliance				

YEAR 2 (Sept 2015-Sept 2016)	Sept-15 - Nov-15	Dec-15 - Feb-16	Mar-16 - May-16	Jun-16 - Aug-16
Work closely with investigators to assess database needs and design				
Update online help, user manual and system documentation				
Server security, database backups and server maintenance				
Develop online Data Management System for quality control and database administration				
Develop online Query Builder for customizing data downloads				
Develop upload capabilities for batch files and data recorded by PIAs				
Develop revision tracking component				
Set up GitHub defect tracking				
Set up tracking system using Google Analytics to track public use of the site				
Internal testing and stress tests				
Post advanced version of the database online				
Train personnel on using and managing the database				
Prepare quarterly, semi-annual and annual reports				
Project Management and CSU Compliance				

YEAR 3 (Sept 2016-Sept 2017)	Sept-16 - Nov-16	Dec-16 - Feb-17	Mar-17 - May-17	Jun-17 - Aug-17
Work closely with investigators to assess database needs and design				
Server security, database backups and server maintenance				
Finalize online help, user manual and system documentation				
Enhance features and functionality based on user feedback				
Internal testing and stress tests				
Investigate crosswalks for similar datasets from other institutions				
If practical, batch upload datasets from other institutions				
Post enhanced version of the database online				
Train USFWS and BOR personnel on using and managing the database				
Transfer server and database to BOR or setup maintenance agreement				
Prepare quarterly, semi-annual and final reports				
Project Management and CSU Compliance				

Years 4 and 5 (optional): See Section VI for task descriptions. Task schedule is to be determined but most tasks will occur continuously or on an as-needed basis.

VIII. FY-2016/17 Work:

See years 2 and 3, section VII, above. Funding for year 2 was provided in FY-2015 and funding for year 3 will be provided in FY-2016.

IX. Budget Summary

(Note: UCRIP will provide 2/3 of total project costs; SJRIP will provide the balance).

Year	Total Budget	UCRP Portion	SJRIP Portion
FY-2014	\$142,829	\$ 95,219.33	\$ 47,609.67
FY-2015	\$123,505	\$ 82,336.67	\$ 41,168.33
FY-2016	\$109,099	\$ 72,732.67	\$ 36,366.33
FY-2017	\$ 69,968	\$ 46,645.33	\$ 23,322.67
FY-2018	\$ 69,969	\$ 46,646.00	\$ 23,323.00
Total:	\$515,357	\$ 343,580	\$171,790

FY-2014:

YEAR 1 BUDGET ITEM	\$/Unit	Quantity	TOTAL COST
Labor	\$/mo		
Principle investigator	\$6,234.96	8	\$49,879.68
Co-principle investigator	\$9,747.67	0.65	\$6,335.99
Co-principle investigator	\$7,089.37	2.5	\$17,723.43
Zoology Team Leader and Information Manager	\$7,596.81	2	\$15,193.62
Data Distribution Coordinator and IT Supervisor	\$6,410.67	1.5	\$9,616.01
Subtotal			\$98,749
TRAVEL			
Vehicle rental, Grand Junction, CO	\$200	1	\$200
Fuel (\$4 per gallon at 25 mpg), Grand Junction, CO	\$4 per gallon at 25 mpg	608 miles	\$100
Per Diem (2 people at \$51 /person /day), Grand Junction, CO	\$102	4	\$408
Lodging (2 people), Grand Junction, CO	\$200	3	\$600
Vehicle rental, Farmington, NM	\$200	1	\$200
Fuel (\$4 per gallon at 25 mpg), Farmington, NM	\$4 per gallon at 25 mpg	868 miles	\$140
Per Diem (2 people at \$51 /person /day), Farmington, NM	\$102	4	\$408
Lodging (2 people), Farmington, NM	\$200	3	\$600
Subtotal			\$2,656

YEAR 1 BUDGET ITEM	\$/Unit	Quantity	TOTAL COST
EQUIPMENT			
Server	\$6,500	1	\$6,500
APC UPS 1500 Backup Power Supply	\$610	1	\$610
Subtotal			\$7,110
SUPPLIES/MATERIALS			
External Hard drive	\$160	1	\$160
SEP Antivirus	\$5	1	\$5
Server 2010	\$180	1	\$180
SQL License	\$180	1	\$180
Backup Exec Agent License	\$90	1	\$90
Web Meeting Software	\$500	1	\$500
Job Control Software	\$500	1	\$500
Subtotal			\$1,615
OTHER			
Long Distance Phone Calls	\$200	1	\$200
Subtotal			\$200
INDIRECT COSTS (@31.3%)			\$32,499
FY14 TOTAL PROJECT COSTS			\$142,829

FY-2015:

YEAR 2 BUDGET ITEM	\$/Unit	Quantity	Inflation	TOTAL COST
OTHER DIRECT	\$/mo			
Principle investigator	\$6,469.24	8		\$51,753.92
Co-principle investigator	\$10,126.91	0.65		\$6,582.49
Co-principle investigator	\$7,358.91	2		\$14,717.82
Zoology Team Leader and Information Manager	\$7,887.29	1		\$7,887.29
Data Distribution Coordinator and IT Supervisor	\$6,652.20	1.25		\$8,315.25
Subtotal				\$89,257
TRAVEL				
Vehicle rental, Grand Junction, CO	\$200	1	4%	\$208
Fuel (\$4 per gallon at 25 mpg), Grand Junction, CO	\$4 per gallon at 25 mpg	608 miles	4%	\$104
Per Diem (1 person at \$51 /person /day), Grand Junction, CO	\$51	4	4%	\$212
Lodging (1 person), Grand Junction, CO	\$100	3	4%	\$312
Vehicle rental, Farmington, NM	\$200	1	4%	\$208
Fuel (\$4 per gallon at 25 mpg), Farmington, NM	\$4 per gallon at 25 mpg	868 miles	4%	\$146
Per Diem 1 person at \$51 /person /day), Farmington, NM	\$51	4	4%	\$212
Lodging (1 person), Farmington, NM	\$100	3	4%	\$312
Subtotal				\$1,714
SUPPLIES/MATERIALS				
Web Meeting Software	\$500	1	4%	\$520
Subtotal				\$520
OTHER				
Long Distance Phone Calls	\$200	1	4%	\$208
Subtotal				\$208
INDIRECT COSTS (@31.3%)				\$28,702
FY15 TOTAL PROJECT COSTS				\$120,401

FY-2015 budget addendum (attendance at PIT-tag workshop, Stevenson, WA Jan 2015).

Item	Amount	Notes
Airfare (Ft. Collins CO to Portland OR)	\$290	Roundtrip for co-PI, one way for PI
Transportation to Airport	\$68.30	\$0.50 per mile, 136.6 miles
Toll Road	\$10.80	Roundtrip
Lodging	\$900	\$150/night including fees and taxes, 3 nights
Per Diem	\$336	\$56/day, 2 full day, 2 travel days at 75%
Conference Registration	\$500	
Car rental	\$250	\$50/day, 5 days
Gas for rental car	\$9.20	\$3.25 per gallon, 30 mpg, 85.2 miles roundtrip to lodge
Indirect (31.3%)	\$740	
Total	\$3,104	

Total FY-2015: \$123,505

FY-2016:

YEAR 3 BUDGET ITEM	\$/Unit	Quantity	Inflation	TOTAL COST
OTHER DIRECT	\$/mo			
Principle investigator	\$6,704.93	6		\$40,229.58
Co-principle investigator	\$10,508.44	0.65		\$6,830.49
Co-principle investigator	\$7,630.07	2.5		\$19,075.18
Zoology Team Leader and Information Manager	\$8,179.52	0.5		\$4,089.76
Data Distribution Coordinator and IT Supervisor	\$6,895.18	1.5		\$10,342.77
Subtotal				\$80,568
TRAVEL				
Vehicle rental, Grand Junction, CO	\$200	1	4%	\$216
Fuel (\$4 per gallon at 25 mpg), Grand Junction, CO	\$4 per gallon at 25 mpg	608 miles	4%	\$108
Per Diem (1 person at \$51 /person /day), Grand Junction, CO	\$51	4	4%	\$221
Lodging (1 person), Grand Junction, CO	\$100	3	4%	\$324
Vehicle rental, Farmington, NM	\$200	1	4%	\$216
Fuel (\$4 per gallon at 25 mpg), Farmington, NM	\$4 per gallon at 25 mpg	868 miles	4%	\$151
Per Diem 1 person at \$51 /person /day), Farmington, NM	\$51	4	4%	\$221
Lodging (1 person), Farmington, NM	\$100	3	4%	\$324
Subtotal				\$1,781
SUPPLIES/MATERIALS				
Web Meeting Software	\$500	1	4%	\$541
Subtotal				\$541
OTHER				
Long Distance Phone Calls	\$200	1	4%	\$216
Subtotal				\$216
INDIRECT COSTS (@31.3%)				\$26,012
FY16 TOTAL PROJECT COSTS				\$109,118

FY-2017 (optional)

YEAR 4 BUDGET ITEM	\$/Unit	Quantity	TOTAL COST
PROFESSIONAL SERVICES	\$/mo		
Principle investigator	\$7,567.00	2.5	\$18,917.50
Co-principle investigator	\$11,110.08	0.35	\$3,888.53
Co-principle investigator	\$8,430.51	1.5	\$12,645.77
Zoology Team Leader and Information Manager	\$8,943.47	0.25	\$2,235.87
Data Distribution Coordinator and IT Supervisor	\$7,744.56	1.25	\$9,680.70
Subtotal			\$47,368
TRAVEL (2 people)			
Two 3 day/2 night car trips for two people			
Car rental/gas	\$350/trip	2	\$700
Per diem	\$300/trip	2	\$600
Lodging	\$400/trip	2	\$800
			\$2100
One 3 day/2 night plane trip for two people			
Airfare	\$700/trip	1	\$700
Per diem	\$300/trip	1	\$300
Lodging	\$400/trip	1	\$400
			\$1,400
One day trip			
Car/gas	\$300	1	\$300
Total travel			\$3,800
MATERIALS/SUPPLIES			
Computer hardware/software	\$1000	2	\$2,000
OTHER			
Long Distance Phone Calls	\$120	1	\$120
TOTAL DIRECT			\$53,288
INDIRECT COSTS (@31.3%)			\$16,679.26
FY17 TOTAL PROJECT COSTS			\$69,968

FY-2018 (optional)

YEAR 5 BUDGET ITEM	\$/Unit	Quantity	TOTAL COST
PROFESSIONAL SERVICES	\$/mo		
Principle investigator	\$7,862.97	2.5	\$19,657.42
Co-principle investigator	\$11,556.53	0.31	\$3,582.52
Co-principle investigator	\$8,763.16	1.5	\$13,144.74
Zoology Team Leader and Information Manager	\$9,297.90	0.25	\$2,324.47
Data Distribution Coordinator and IT Supervisor	\$8,048.07	1.25	\$10,060.09
Subtotal			\$48,769
TRAVEL (two people)			
Two 3 day/2 night car trips for two people			
Car rental/gas	\$350/trip	2	\$700
Per diem	\$300/trip	2	\$600
Lodging	\$400/trip	2	\$800
			\$2100
One day trip			
Car/gas	\$300	1	\$300
Travel total			\$2,400
MATERIALS/SUPPLIES			
Computer hardware/software	\$1000	2	\$2,000
OTHER			
Long Distance Phone Calls	\$120	1	\$120
TOTAL DIRECT			\$53,289
INDIRECT COSTS (@31.3%)			\$16,680
FY18 TOTAL PROJECT COSTS			\$69,969