

I. Project Title: **Upper Basin Database**

II. Bureau of Reclamation Agreement Number(s): N/A

Project/Grant Period: Start date (Mo/Day/Yr): 10/1/2015
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Is this the final report? Yes X No _____

III. Principal Investigator(s): Travis Francis, Fish Biologist
Dale Ryden, Project Leader
Grand Junction FWCO
445 West Gunnison Ave., Suite 140
Grand Junction, Colorado 81501
Phone: (970) 628-7204
FAX: (970) 628-7217
Email: travis_francis@fws.gov
dale_ryden@fws.gov

IV. Abstract: Development of a centralized database was a requirement of the Recovery Program when it was formed in 1986. All researchers and hatcheries who receive funding through the Recovery Program are required to submit all fishery data, including complete lists of all endangered, native, and non-native fish handled to the centralized database at the completion of their field study or rearing season. Most data have been submitted and included into the centralized database through 2015. STReAMS (<https://streamsystem.org/> -- an online PIT tag database) is nearly complete and now accessible to all researchers. Beginning in FY 2017, the centralized database will be managed by Julie Stahli, out of the Recovery Program Office in Lakewood Colorado.

This report includes FY 2016 findings from the Price-Stubb Fish Passage Antenna on the Colorado River. Beginning in FY 2017, Price-Stubb Antenna findings will be reported in C4B-GVP's report.

V. Study Schedule: 1986-2016.

VI. Relationship to RIPRAP: General Recovery Program Support Action Plan.
V.A.2. Conduct interagency data management program to compile, manage, and maintain, all research and monitoring data collected by the Recovery Program.

VII. Accomplishment of FY 2016 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Tasks:

Most of the UCRB database consists of ‘all fish’ data collected during the different investigations funded by the Recovery Program. These data relate to species, number of individuals collected, collection date, site, gear, effort expended, habitat and any other parameter associated with collection or stocking of that fish. Fish collection data from the field, radiotelemetry data, stationary and portable PIT tag antenna data, and program-funded propagation data are required to be submitted. The Recovery Program does not require submitting data from invertebrate, geomorphology, or laboratory studies. All fishery data associated with a study are due for submission to the centralized database when the final report is approved by the Recovery Program.

The database manager checks each file to ensure that the data conform to the required format. Future users will be referred to the reports for a complete description of the study design and conclusions of the original researchers. This past year the database manager was asked to run queries by Recovery Program researchers over fifty times.

The database manager also distributes PIT tags to researchers as they request them and maintains a list of all PIT tags received from the manufacturer and currently available for distribution, as well what tags have been distributed and to whom they were distributed. PIT tag lists submitted by researchers are compared with this database to identify transcription errors. While many transcription errors are unable to be reconciled, at least a few errors can be eliminated before they are included in the basin-wide tagging list. Other errors are able to be corrected later, as they are identified.

The database manager is also tasked with collecting and reporting all data associated with a PIT tag antenna that was installed (8/13/2010) in the Colorado River at the Price-Stubb instream diversion dam within the non-selective fish passage structure at river mile 188.3. All of the FY 2016 data for the Price-Stubb PIT tag antenna array is reported in this annual report. Future year reporting for Price-Stubb can be found under project C4B-GVP.

Accomplishments:

PIT tags have been distributed as researchers and hatchery managers have requested them. An Access database is maintained documenting distribution of all PIT tags that are sent to investigators in both the Upper Basin and San Juan Recovery Programs. Since the 2012 Request for Proposals (RFP) when new PIT-tagging products became available to the programs, we found that most researchers and hatchery personnel were interested in the new ‘gun’ style implanter and pre-loaded needles in trays. Both Dexter NFH and the Ouray NFH – Grand Valley Unit (Ouray NFH-GVU) had the ability to hold fish for a period of time after using the traditional and new style (gun) implanters. Their results varied. Ouray NHF-GVU found that the new implanters resulted in fewer delayed mortalities and less slipped tags. Dexter NFH found a slight increase in delayed mortalities when using the new pre-loaded needles. However, considering each fish receives a new needle with the pre-loaded tags, we believe that the new style implanters are the way of the future for hatchery and research applications. Unfortunately, the trays in which pre-loaded tags come from the manufacturer are bulky and require extra funds

for distribution (shipping charges). It is estimated that shipping charges could cost an additional \$1,200 (or higher) per year for pre-loaded tags.

All tagging databases (stocking and river) are up to date through 2015. All tagging and stocking databases have been converted to MicroSoft Access (Access) format and are available online in STreaMS.

Efforts have continued to start bringing the 'other fish' data into consolidated Access files. They currently reside in a variety of different formats, including Excel, Dbase, and Quattro Pro files. This will be a more complicated process because of the wide variety of data types that fall into this broad category. Older data will be transferred to the new database manager during winter 2016-2017.

Efforts in 2009 and 2010 concentrated on providing a consolidated database of all the nonnative fish data that has been accumulated since 2000. These consolidated data will play an important role in ongoing efforts to synthesize this important information for all rivers of the upper basin. This data has been updated through 2012. Data from 2013 through 2015 non-native sampling has been received. However, it has not yet been included into the database due to time constraints. They will be updated and given to the new database manager during winter 2016-2017.

Additionally, efforts were made to consolidate the YOY Colorado pikeminnow monitoring data for a long term analysis. Data from the now terminated adult monitoring program were also consolidated into an Access file. Catch data from both the Grand Valley Water Users Fish Ladder and Redlands Water and Power fish passages were consolidated into an Access database.

Investigators haven't been nearly as diligent about submitting the 'other fish' data as they are about submitting rare fish data. So in the future, it will be up to the Recovery Program to update that information as it is received. The database manager has been working with researchers to incorporate the more recent data. Work on updating the database is continually ongoing.

An RFP to develop a web based PIT tag database was awarded by the Bureau of Reclamation in FY 2014 to the Colorado Natural Heritage Program (CNHP). Database managers from both the San Juan and Upper Basin Recovery Programs were on the Technical Panel for award of the contract. FY 2015 and 2016 required substantial time and coordination between these database managers and the CNHP for development, testing, and application of the new PIT tag database. The STReaMS database is now nearly complete and is accessible by researchers.

Price-Stubb Antenna

The Price-Stubb PIT tag antennas (at river mile 188.3) produced multiple hits on 536 unique PIT tags during FY 2016 (Table 2), 50 of these tags were detected on multiple days (n = 2-5). We reported in 2010 that the close placement of these four antennas in relation to one another (~10 inches apart) complicated determining directionality of fish movements (upstream vs. downstream). In late June of 2011 Audrey Hopkins of

Biomark adjusted some of the settings at the unit. She changed the antenna sequence (AS) from 1,2,3,4,0,0,0,0,0,0,0 to 1,3,1,3,1,3,2,4,2,4,2,4 and adjusted the delay time from 100mS to 45mS. These adjustments have provided more resolution for determining directionality of fish movements from detections. Some unknowns still remain, however not as many as were previously encountered. For FY 2016; there were 598 daily detections and 78% (n=464) of those fish passed the antenna heading upstream, 12% (n=69) in an undetermined direction, and 11% (n=65) in a downstream direction. Bluehead sucker (n=67, *Catostomus discobolus*), bonytail (n=126, *Gila elegans*), Colorado pikeminnow (n=13, *Ptychocheilus lucius*), flannelmouth sucker (n=245, *Catostomus latipinnis*), razorback sucker (n=36, *Xyrauchen texanus*), roundtail chub (n=21, *Gila robusta*), and twenty eight unidentified PIT tags were detected (many were detected on multiple dates) during FY 2016. Table 1 gives a detailed breakdown of the fish that were detected by the antenna:

Table 1

Month of Detection	Direction	Species	Number of Fish	History
October 2015	Upstream	BH	0	N=2 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		2	
	Upstream	BT	1	N=1 stocked 7/23/2015 at CO RMI 157
	Unknown		0	
	Downstream		0	
	Upstream	FM	1	N=2 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		1	
	Upstream	RZ	0	N=1 stocked Sep. 2013 at Rifle Bridge RMI 240.7 N=1 stocked Apr. 2015 at CO RMI 166.7; detected at Price Stubb 5/2/2015
Unknown	0			
Downstream	2			
November 2015	Upstream	BT	0	N=6 stocked Jul. 2015 at CO RMI 157 N=2 stocked Jul. 2015 at CO RMI 184
	Unknown		3	
	Downstream		5	
	Upstream	FM	0	N=2 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		1	
	Downstream		1	
December 2015	Upstream	BH	0	N=2 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		2	
January 2016	Upstream	FM	0	N=1 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		1	
	Upstream	RZ	0	N=1 stocked Oct. 2010 at CO RMI 227.6
	Unknown		0	
	Downstream		1	

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
March 2016	Upstream	Unknown	1	N=1 tags distributed to CPW for 3 spp. work N=1 not a program tag
	Unknown		0	
	Downstream		1	
	Upstream	BH	3	N=3 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		0	
	Upstream	CS	0	N=1 Male tagged 5/10/1995 GR RMI 254.0, recaptured twice in 1999 CO RMI 174-178, recaptured 5/16/2003 CO RMI 187.6, recaptured 5/26/2005 CO RMI 170.5, recaptured 4/22/2009 CO RMI 192.9, detected three times at Price Stubb Antenna in 2012, recaptured 8/6/2013 CO RMI 177.1, detected twice at Price Stubb Antenna in 2013, detected three times in 2014, detected once in 2015
	Unknown		1	
	Downstream		0	
	Upstream	FM	20	N=23 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7 N=1 tagged by CPW in 2003 at CO RMI 154.3 and was detected at Price Stubb in Apr. 2012
	Unknown		1	
	Downstream		3	
	Upstream	RT	1	N=1 tagged Jun. 2005 on the YA at RMI 69.3!!
	Unknown		0	
	Downstream		0	

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
April 2016	Upstream	Unknown	12	N=11 tags distributed to CPW for 3 spp. work N=2 not program tags
	Unknown		1	
	Downstream		0	
	Upstream	BH	41	N=43 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		1	
	Downstream		1	
	Upstream	BT	0	N=1 stocked Sep. 2015 at CO RMI 195
	Unknown		1	
	Downstream		0	
	Upstream	CS	1	N=1 tagged Jun. 2006 at GR RMI 29.5, recaptured May 2007 at GR RMI 29
	Unknown		0	
	Downstream		0	
	Upstream	FM	117	N=125 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7 many were detected multiple times
	Unknown		5	
	Downstream		3	
	Upstream	RT	4	N=1 tagged Oct. 2008 at CO RMI 136 N=1 tagged Oct. 2011 at CO RMI 136 and was detected at Price Stubb once in 2012, 2013 and 2014 N=1 tagged Oct. 2012 at CO RMI 136 N=1 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		0	
	Upstream	RZ	1	N=1 stocked Oct. 2008 at CO RMI 185.1
	Unknown		0	
Downstream	0			

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
May 2016	Upstream	Unknown	2	N=2 tags distributed to CPW for 3 spp. work N=1 tag distributed to CPW for YA NNF N=1 not program tags
	Unknown		1	
	Downstream		1	
	Upstream	BH	15	N=17 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		1	
	Downstream		1	
	Upstream	BT	1	N=2 stocked Jul. 2015 at CO RMI 184
	Unknown		1	
	Downstream		0	
	Upstream	CS	1	N=1 tagged Apr. 2014 at CO RMI 142.6, recaptured May 2014 at CO RMI 166.7
	Unknown		0	
	Downstream		0	
	Upstream	FM	82	N=101 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7 many were detected multiple times N=1 tagged by CPW in 2003 at CO RMI 160 and was detected at Price Stubb in Apr. 2011
	Unknown		14	
	Downstream		6	
	Upstream	RT	4	N=1 tagged Sep. 2011 at CO RMI 136 and was detected at Price Stubb four times in 2012, twice in 2013 and twice in 2014 N=1 tagged Oct. 2011 at CO RMI 136 and was detected at Price Stubb twice in 2012, and once in 2013 N=1 tagged Oct. 2012 at CO RMI 123.4 and was detected at Price Stubb once in both 2013 and 2014 N=1 tagged Oct. 2012 at CO RMI 136 and was detected in 2013 at Price Stubb N=1 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		1	
	Downstream		0	
	Unknown		0	

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
May 2016 Cont.	Upstream	RZ	3	N=1 stocked Oct. 2010 at CO RMI 227.6 N=1 stocked Oct 2011 at CO RMI 227.6 N=1 stocked Aug. 2013 at CO RMI 183.6 and was recaptured May 2014 at CO RMI 158.4 and in Sep. 2015 at CO RMI 157.8 N=1 stocked Aug. 2013 at CO RMI 140.7 and was recaptured once Jun. 2014 at CO RMI 179.2 and in Apr. 2015 at CO RMI 181.3 N=1 Stocked Sep. 2013 at CO RMI 240.7 and was recaptured Jul. 2014 at CO RMI 197.5 and in Jul. 2015 at CO RMI 193.7 N=1 stocked Oct. 2014 at CO RMI 240.7 N=2 stocked Oct. 2014, one recaptured Apr. 2015 at CO RMI 163.7, one recaptured at GVWU fish passage Jul. 2015 N=2 stocked May 2015 at CO RMI 240.7 N=1 stocked Jul. 2015 at CO RMI 204.5 N=2 stocked Apr. 2016 at CO RMI 204.5
	Unknown		8	
	Downstream		2	
June 2016	Upstream	Unknown	1	N=2 tags distributed to CPW for 3 spp. work N=1 not program tags
	Unknown		1	
	Downstream		0	
	Upstream	BH	2	N=3 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		1	
	Upstream	FM	5	N=12 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		3	
	Downstream		4	

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
June 2016 Cont.	Upstream	RT	7	N=1 tagged Sep. 2008 at CO RMI 120 and was recaptured Sep. 2011 at CO RMI 119.8 and was detected at Price Stubb once in 2011, 2013, and 2014 and twice in 2012 N= 1 tagged Oct. 2008 at CO RMI 136 detected at Price Stubb twice in 2013 and once in 2014 N=1 tagged Sep. 2011 at CO RMI 136 N=1 tagged Oct. 2011 at CO RMI 121.8 N=3 tagged Oct 2011 at CO RMI 136, one was detected at Price Stubb in 2011, one was detected at Price Stubb once in both 2011 and 2012, one was recaptured Oct. 2012 at CO RMI 136 and was detected at Price Stubb in 2013 N=1 tagged Oct. 2012 at CO RMI 123.4 and was detected at Price Stubb once in both 2013 and 2014 N=1 tagged Oct. 2012 at CO RMI 136 N=1 tagged Oct. 2014 at CO RMI 136 N=1 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		3	
	Downstream		1	
	Upstream	RZ	0	
	Unknown		2	
	Downstream		1	

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
July 2016	Upstream	Unknown	0	N=1 distributed to ONFH-GV
	Unknown		0	
	Downstream		1	
	Upstream	BT	4	N=4 stocked Jul. 2016 at CO RMI 183.6
	Unknown		0	
	Downstream		0	
	Upstream	CS	1	N=1 tagged Jun. 2015 at CO RMI 22.9
	Unknown		0	
	Downstream		0	
	Upstream	FM	2	N=3 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		1	
	Downstream		0	
	Upstream	RT	1	N=1 tagged Sep. 2008 at CO RMI 123.4 and at GVWU fish passage in Jul. 2014
	Unknown		0	
	Downstream		0	
Upstream	RZ	1	N=1 stocked Jun 2016 at CO RMI 204.5	
Unknown		0		
Downstream		0		
August 2016	Upstream	Unknown	1	N=2 distributed to ONFH-GV
	Unknown		1	
	Downstream		0	
	Upstream	BH	0	N=1 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		1	
	Upstream	BT	46	N=47 stocked Jun. or Jul. 2016 at CO RMI 183.6
	Unknown		0	
	Downstream		1	
	Upstream	CS	4	N=1 tagged Jun. 2013 at CO RMI 52.2 N=1 tagged Mar. 2014 at CO RMI 58.4 N=1 tagged Apr. 2014 at CO RMI 142.6, recaptured May 2014 at CO RMI 166.7 N=1 tagged Apr. 2014 at CO RMI 52.5 and was recaptured Oct. 2014 at CO RMI 52.4 N=1 tagged Apr. 2014 at CO RMI 131.5 N=1 tagged Apr. 2014 at CO RMI 74.5 N=1 tagged Jun. 2015 at CO RMI 22.9 N=1 tagged Oct. 2015 at CO RMI 79.7
	Unknown		0	
	Downstream		4	

Table 1 cont.

Month of Detection	Direction	Species	Number of Fish	History
August 2016 Cont.	Upstream	FM	1	N=3 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		2	
	Upstream	RZ	6	N=7 stocked Oct. 2014 at CO RMI 240.7, one was recaptured Apr. 2015 at CO RMI 187.1, one was recaptured Jul. 2015 at CO RMI 156.6 and again Sep. 2015 at CO RMI 183.6 N=1 stocked Oct. 2014 at CO RMI 183.6 N=1 stocked Apr. 2015 at CO RMI 240.7 N=1 tagged at GVWU fish passage in Aug. 2016
	Unknown		2	
	Downstream		2	
September 2016	Upstream	Unknown	1	N=1 distributed to ONFH-GV N=3 distributed to MUMMA
	Unknown		1	
	Downstream		2	
	Upstream	BH	0	N=1 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		0	
	Downstream		1	
	Upstream	BT	54	N=1 stocked Jul. 2015 at CO RMI 157 N=2 stocked Jun. 2016 at CO RMI 157.1 N=61 stocked Jun. or Jul. 2016 at CO RMI 183.6
	Unknown		4	
	Downstream		6	
	Upstream	CS	2	N=1 tagged Apr. 2011 at GR RMI 28.3 and was recaptured Apr. 2013 at CO RMI 130.3, twice May 2014 at CO RMI 130.3, and Jun. 2015 at CO RMI 136.9 N=1 tagged Jun. 2013 at CO RMI 40.6 and recaptured May 2015 at CO RMI 42.6 N= 1 tagged Jun 2013 at CO RMI 111
	Unknown		0	
	Downstream		1	
	Upstream	RZ	2	N=3 tagged by CPW for 3 Spp. work in Oct. 2014-2015 between CO RMI 175.3 and 177.7
	Unknown		3	
	Downstream		2	

Table 2

Species	BH	BT	CS	FM	HB	RT	RZ
# of Individuals FY2010***	0	0	2	0	0	6	0
# of Individuals FY2011**	0	16	1	1	0	19	83
# of Individuals FY2012**	0	88	8	3	1	36	135
# of Individuals FY2013**	0	138	2	1	0	79	239
# of Individuals FY2014**	0	114	3	1	0	29	69
# of Individuals FY2015**	106	22	4	251	0	19	19
# of Individuals FY2016**	67	126	13	245	0	21	36
Grand total	173	504	33	502	1	209	581
* Antenna was only in operation for 1.5 months during FY 2010							
** Some of these fish were detected more than once during the fiscal year							

VIII. Additional noteworthy observations: *See above.*

IX. Recommendations: Continue to identify and acquire data sets that belong in the centralized database. Continue collecting data from Price-Stubb antenna. Consider additional budgeting for operation and maintenance (O&M) charges associated with the Price-Stubb antenna (~\$5,000 safety net for unforeseen costs). Consider providing additional funds for distributing (shipping) the trays with pre-loaded needles (~\$1,200) to hatcheries and researchers. Current data queries are more difficult to fulfill because of the many sources of tags and the lack of a centralized tag distribution database from all of these sources; however, the STReAMS website should lessen this burden. Mandate that field stations working with more than one source of PIT tags use only program-acquired PIT tags in endangered fish – and that they not use program-acquired PIT tags in projects that are not funded by the respective programs. Alternatively, have agencies and universities that use PIT tags for any fisheries work (whether program-acquired or not) within the boundaries of the Colorado River drainage (including all tributaries) submit all PIT tag data to the STReAMS database, no matter what the project is or what species of fish (or other aquatic animal) are being PIT-tagged.

X. Project Status: On track and ongoing.

XI. FY 2016 Budget Status

- A. Funds Provided: \$67,896
- B. Funds Expended: \$67,896
- C. Difference: -0-
- D. Percent of the FY 2016 work completed, and projected costs to complete: 90% completed, no additional costs will be incurred
- E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission (Where applicable): Price-Stubb antenna data will be submitted to UCRRP database by January 2016.

XIII. Signed: Travis Francis 10/31/2016
Principal Investigator Date