

I. Project Title: General Hydrology Support

II. Principal Investigator:  
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III. Project Summary:

The Service's Division of Water Resources provides basic hydrology support to Recovery Program researchers and undertakes tasks to support the Recovery Program in basic data collection and monitoring projects. Accomplishments during FY 2010 include: 1) collecting temperature data at 10 sites on the Green River and four sites on the Gunnison River, and assembling a temperature database for use by Recovery Program researchers; 2) coordinating review of the sediment analysis report; 3) providing technical hydrology support for a wide range of Recovery Program activities on a year-to-year basis; and 4) coordinating other Recovery Program efforts relating to hydrology and temperature analysis.

IV. Study Schedule: Initial Year - 1990, Final Year - Ongoing.

V. Relationship to RIPRAP:

General Recovery Program Support Action Plan  
I.A.4.b. Conduct needed Geomorphology research and monitoring.

Green River Action Plan: Mainstem  
I.A.3. Deliver identified flows

Colorado River Action Plan: Mainstem  
I.E. Evaluate and revise as needed flow regimes to benefit endangered fish populations.

Colorado River Action Plan: Gunnison River  
I.D. Evaluate and revise as needed flow regimes to benefit endangered fish populations.

VI. Accomplishments of FY 2011 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

A. Temperature Data Collection

Temperature data collection went well during FY-2011. Thermographs on four locations on the Gunnison River, five locations on the Colorado River, and seven locations on the Green River were

checked semiannually periodically and calibrated with on-site temperature readings. Temperature data collection on the Colorado River by CRFP was consolidated in this Scope of Work beginning in FY- 99 and a separate budget table is included for this work. The information for these gages can be found at: <http://www.r6.fws.gov/riverdata/>

The Service's Division of Water Resources provides basic hydrology support to Recovery Program researchers and undertakes tasks to support the Recovery Program in basic data collection and monitoring projects. Temperature monitoring duties are divided between the Division of Water Resources Regional Office staff (Denver) and the Colorado River Fishery Project (CRFP), Grand Junction field station. The Grand Junction CRFP station currently collects water temperature data from five sites on the mainstem Colorado River, four sites on the Gunnison River and one site on the Uncompahgre River. These data, along with those collected by the Water Resources staff for the Green, Yampa and Gunnison rivers are assembled into a temperature database for use by Recovery Program researchers. In addition to downloading data, the CRFP PI for this project summarized Colorado and Gunnison River data sets for the period 1986-2011 and converted mean daily temperatures to annual thermal units for Colorado pikeminnow growth. Distributions of adult Colorado pikeminnow in the Gunnison and Yampa rivers were compared and upstream endpoints to distribution were found to occur at thermally similar locations. This information was then applied to the mainstem Colorado River to predict the extent of upstream range expansion of Colorado pikeminnow following construction of two fish ladders there. In addition, the degree of warming in the Gunnison River at Delta, Colorado (the upstream limit of critical habitat) required to bring temperatures there up to the level found at distribution endpoints was calculated. A manuscript describing these analyses was prepared over the last few years for submission to a scientific journal. In FY 2010, the article was accepted for publication in River Research and Applications. It has been published online and will appear in print in summer of 2011.

Temperature data collection began in 1986 at two Colorado River stations, Palisade (rk 292.8) and Walker (rk 264.7). Over the years other sites have been added: Rulison in 1994 (rk 369.9), Dewey in 1994 (rk 154.5), Gold Bar in 1992 (rk 83.7) and The Slide upstream of the Green River confluence in 2000 (rk 2.9). A site on the Gunnison River at People's Orchard (rk 63.9) was added in 1999; one downstream of the North Fork confluence (rk 117.5) was added in 2007, one at the NPS Never Sink recreation access area (just upstream of the Blue Mesa inflow) was added in 2007, and one just upstream of the confluence with the Uncompahgre River (rk 90.9) was added in fall 2008. These additional Gunnison River sites were added in an effort to provide better data for future temperature modeling efforts for management of Aspinall Unit releases. The Dewey site on the Colorado River was discontinued in 2007 when it was found that USGS had established their own temperature monitoring sensor at their streamflow gauging station.

With the 2011 high flows several of the thermographs were lost, although a second, backup logger has been deployed at most sites to ensure data collection when loggers are lost, stolen, or covered with sediment.

The temperature data can be accessed and downloaded from the river data web page at: <http://www.fws.gov/mountain-prairie/riverdata/>

## B. Hydrology Support for Biological Opinion Development and Monitoring

In Northern reaches of the Upper Basin snowpack was well above average, more than 16 million acre-feet of water poured into Lake Powell -- the highest volume since the Upper Colorado Program began in 1988.

Participate in releasing from; Flaming Gorge and considering a larval release, mainstem Colorado Reservoirs, Elkhead with a later and higher research release and the Aspinall Unit for endangered fish during the spring runoff and baseflow period.

The PIT Tag GIS was moved to a FWS server with ARCGIS software, layers still need to have metadata attached to meet federal standards

Flows were too high in the spring to coordinate additional reservoir releases (CROS). Colorado River at Cameo attained 29,000 cfs surpassing the newly revised flood stage of 25,400 cfs. During summer flows in the 15-mile reach the high target of 1630 cfs was met 64 of the 75 days.

Coordinated two positive Grand Valley Water Users meetings

We released the draft Price River and White River flow recommendations, both are still under review by the BC and WAC.

The Water Acquisition and Biology Committee approved the USGS's "Application of Sediment Characteristics and Transport Conditions to Resource Management in Selected Main-Stem Reaches of the Upper Colorado River, Colorado and Utah, 1967–2007," by Cory A. Williams, Keelin R. Schaffrath, John G. Elliott, and Rodney J. Richards. The work needs additional work to link it to previous flow recommendations; a task force is being recruited.

Hydrology updates were presented to these meetings; 2 Biology Committees, 3 Management Committees, 2 Grand Junction Irrigators meetings, 2 Green River Flow protecting meetings, 2 Water Acquisition meetings and the Annual Researchers meeting.

Coordinated peak flow imagery in 2011 for the critical habitat in the Upper Colorado River. Seeking perspective partners for funding the post processing from; COR, WAPA and State of Colorado are committing. Samples from 2008 Photos: <http://upperbasinphotos.com>

Four hydrology articles were written with Debbie Felker: 1.) A FWS article with national distribution describing infrastructure built by the Program that helps protect from Climate Change 2.) Press release to notifying of cancellation of the coordinated reservoir operation due to flooding 3.) Press release to warn of a large Elkhead release on Memorial weekend so that non-native fish removal boats in the water for a longer season 4.) The cover story for the Program Newsletter to describe the high flows of 2011. Others were written outside our office, two submitted by Mr. Pitts in the Irrigator magazine and one in Headwaters about the HUP call

Contributed portions to the 10825 EA which transfers reservoir operation of 10,825 acft of water from Wolford & Williams Fork reservoirs to Ruedi and Granby for endangered fish. Green River Reservoir repayment concerns slowed the process, but hopefully will be complete early in 2012.

Public outreach included; manning the CRRP booth in the Utah, Wyoming and Colorado's water congress for multi-day conferences. Staged a picture of Governor Hickenlooper with Debbie Felker in CRRP booth and in Utah heard Mike Styler & Dennis Strong give speeches stating that Utah will protect

the Green River and help recover endangered fish.

Filed a water right objection on the White River in Utah. As a result of GRUWAT committee work Utah behaved as though FWS had an instream flow for endangered fish (161cfs) that is senior to the new right.

Coordinated guidance for the endangered fish portion of Appendix F in the Proposed Conservation Measures for the Programmatic Environmental Impact Statement for the BLM's Oil Shale and Tar Sands Leasing and Development Policy.

Developed metrics for USBR Colorado River Basin Study by converting UCREFRP flow recommendations from instantaneous cfs to monthly volumes. There was concern that USBR wanted to use the State's instream flows for the environmental metrics Three Refuges on the Green River were also included for the model which predicts water conditions in the Colorado River for the next 50 years.

Developed graphs of pre- and post- reservoir peak flows for 6 sites at the Program's request.

VII. Recommendations:

The work provided is, for the most part, in support of other research projects or activities such as flow delivery, flow quantification, and habitat restoration, all of which have a direct impact on the recovery of the Colorado River endangered fish. We recommend continuation of the current data collection efforts at the established sites.

- Work with the Green River Water Acquisition Team (GRUWAT) to progress in formulating the Green River flow protection plan with the State of Utah to be complete by 2015.
- Finish the PIT Tag GIS migration to a USFWS server
- Coordinate Grand Valley Water Users meetings
- Complete flow recommendations for the White River and finalize the Price River
- Coordinate a geomorphology committee with the results of USGS sediment study

VIII. Project Status: Ongoing and on-track.

IX. FY 2011 Budget Status:

A. Funds provided:

- \$140,835 project funds
- + \$55,473 FY 09 carry-over

B. Funds expended: \$142,957

C. Difference: \$ 53,351 (most will be returned to the Recovery Program to cover FY 11 budget shortfalls; see project #3 annual report).

X. Status of Data Submission: Not applicable.

XI. Signed: Jana Mohrman  
Principal Investigator

December 19, 2011  
Date: