

I. Project Title: General Hydrology Support

II. Principal Investigator:
Jana Mohrman
P.O. Box 25486, Denver, Colorado 80225-0486
E-mail: Jana_Mohrman@fws.gov
Phone: (303) 236-4486
Cell: (720)-232-6330

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 2010 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

A. Temperature Data Collection

Temperature data collection went well during FY-2010. 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 1986-2005 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 Aspinal 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.

In earlier years, data were recorded using TempMentor (Ryan Instruments, Redmond, Washington) thermographs. These units were later replaced with StowAway Tidbit (Onset Computer Corporation, Bourne, Massachusetts) temperature loggers (accurate to 0.2°C). Loggers are placed in sites where depth and velocity will safeguard against dewatering and shoreline warming. Data are downloaded 1—2 times annually. Mean daily temperatures (MDT) are calculated from readings taken every two hours and reported to the nearest 0.1°C. In recent years, a second, backup logger has been deployed at most sites to ensure data collection when

loggers are lost, stolen, or covered with sediment.

In 2005, all previously collected data were summarized as mean daily temperatures in Excel spreadsheets following the format used by USGS in their Water Resources Data yearbooks. The spreadsheets are then forwarded to Carrie Cordova of FWS Water Resources whom web enables them and links them to the Riverdata Web Page. The temperature data can be accessed and downloaded from the riverdata web page at <http://www.r6.fws.gov/riverdata/> or by email request from FWS Division of Water Resources. GPS locations for each thermograph is available by request; for security purposes the exact locations are not provided on the web page.

B. Hydrology Support for Biological Opinion Development and Monitoring

- Participate in releasing from Flaming Gorge, mainstem Colorado Reservoirs, Elkhead and the Aspinall Unit for endangered fish during the spring runoff and baseflow period.
- Obtained a temporary water right from Utah with an existing Ouray NWR claim to fill grow-out ponds at Baeser Bend for the fourth year in a row.
- The Water Acquisition Committee formulated the Green River flow protection plan with the State of Utah to be complete by 2015.
- 10825 water supply project progressed, the EA available in the spring of 2011.
- The PIT Tag GIS is current to 2009, ARCGIS software has been substituted and it is offline. Plans are being made to move it to a USFWS server.
- Consulted on proposals by Million in the Green and Shell Oil the Yampa River.
- CROS coordinated a spring peak release of 73,971 ac-ft for the 15-mile reach, the highest volume since CROS began (average 25,000 af)
- Coordinated two positive Grand Valley Water Users meetings
- Presented results of a mod-dry peak flow in 2010 peak flows at the Implementation, Management meetings. Peak flows were above average. Summer rain and fish releases prevented severe conditions in 15-mile reach after the rapid snowmelt runoff.
- The FWS objected to a dozen change applications to protect public interest as a prevention to keep native fish from being listed. These were extensions of rights for water that has not been put to use in the Green River, including the proposal by the Blue Castle Nuclear Plant. The Program discontinued this practice as it does not seem congruent with underlying premise of recovery of fish while water development occurs.
- Presented updates on Ruedi operations at 3 public meetings in Basalt
- Coordinated review of the sediment study by Cory Williams of the USGS by the Recovery Program, scientific peers (von Guerard, Pitlick, Wright, Mussetter, LaGory), the BC and the WAC (Luecke/Bledsoe, Pitts). The next draft will be early in 2011.
- Coordinated review of USGS Elkhead Transit Loss Study, final available early 2011
- In April when the snowpack was so low bought 500 acft from Elkhead Reservoir that was carried over to 2011. Learned we can buy water on a monthly basis so it is best to wait for a later snowpack forecast.
- The new higher flood stage for Cameo by the NWS was complete in 2010 and put to use.
- We released the draft Price River flow recommendation, the draft White River recommendations will be circulated in early 2011.

2008 Upper Colorado River basin aerial photography

This imagery was flown at approximately 1500 ft. above the rivers. The mosaics are made from individual frames stitched together into approximately 1/2 mile segments, some are individual frames. Photo mosaics have a pixel resolution of 4 to 6 inches; a swath is about 1/3 mile.

- 6/3/08 & 8/29/08 - Gunnison R. Colorado R. confluence to North Fork
- 6/4/08 & 6/5/08 - Yampa R., Maybell to Steamboat
- 6/5/08 & 8/28/08- Green R., Split Mt to Sand Wash
- 8/28/08 - Green R., Town of Green River to Colorado R. confluence
- 6/4/08 - Colorado R., Loma to Rifle

<http://upperbasinphotos.com>

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.
- Work on the 10825 committee to finalize the EA, to be available in the spring of 2011
- Finish the PIT Tag GIS migration to a USFWS server
- Coordinate Grand Valley Water Users meetings
- Write flow recommendations for the White River and finalize the Price River
- Coordinate final review of USGS sediment study with the Recovery Program, due early in 2011

VIII. Project Status: Ongoing and on-track.

IX. FY 2010 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

January 19, 2011
Date: