

# DISCUSSION Draft for Program Staff

Colorado River Recovery Program  
FY-2002 Proposed Scope of Work

Project No.: 85 Umbrella

Lead Agency: Colorado River Recovery Implementation Program  
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Date: May 25, 2001

Category:

Expected Funding Source:

Ongoing Project

Ongoing Revised Project

Requested New Project

Unsolicited Proposal

Annual Funds

Capital Funds

Other (explain)

I. Title of Proposal:

Habitat Monitoring Program for the Colorado River & Green Rivers  
Umbrella Work Plan

II. Relation to RIPRAP: General Citations

V.A.3.a. Develop draft habitat monitoring plan (12/01)

V.A.3.b. Implement habitat monitoring plan (9/02)

III. Study Background/Rationale and Hypotheses:

The Recovery Program Guidance process for 2001 identified a need for a habitat monitoring program to accompany and interact with endangered fish population estimates on the Colorado River as called for in the Colorado River Programmatic Biological Opinion (December 20, 1999). While the original concept was to immediately begin a habitat monitoring program for the Colorado River, after 2 years of inactivity and limited time to work on a habitat monitoring program the, Program staff recommended combining all of the existing habitat monitoring activities into an umbrella program which could be coordinated and refined in subsequent years.

#### IV. Study Goals, Objectives, End Products:

- A. Goal: The goal of the this Umbrella SOW is to pull all the physical habitat monitoring activities together in one place so that the activities can be reviewed as package.

The proposed Umbrella project will lay out the existing element of a habitat monitoring program based upon current Recovery Program activities, make recommendations to the Program for a habitat monitoring program to identify physical habitat links to biological identification of current habitat monitoring activities, and recommendation for any future habitat monitoring program.

- B: Objectives:

(1) To identify and physically describe important habitat areas to endangered fish recruitment and other life history stages as necessary.

(2) To identify, compile, and summarize existing physical habitat data and/or previous study sites on the Colorado River.

- C. End Products: The framework for a habitat monitoring program. (describe Products of an overall habitat monitoring program here after staff devised such a plan)

#### V. Study Area:

Upper Colorado and Green River Subbasins.

#### VI. Study Method/Approach:

The Program has been discussing the development of a habitat monitoring program for several years and a number of ideas and opinions have been expressed at meetings and by E-mail. Upon a review of the E-mail discussions relating to a habitat monitoring program and sorting through the SOW to create this umbrella work plan it became evident that a habitat monitoring program needs to be more than a collection of tasks to collect physical data. Much of the Email discussion focused on a need to establish links between physical habitat and the biology of endangered fish. After reviewing the physical monitoring SOW's chronicled below it became very clear that little of the current work is directly focused upon establishing biological links. Of the six SOW's chronicled below only two contain any work designed to establish cause and effects relationships between physical habitat process biological processes which support habitat life history requirements of endangered fish. SOW 85C Upper Colorado River Basin Channel Monitoring (cobble embeddedness in the Grand Valley) which is collecting information on cobble embeddedness, is also collecting, invertebrate samples at each of the sites with the total biomass of invertebrates at each site will be analyzed. This information could be used to quantifying the biological link between physical substrate characteristics and food base production.

The other SOW which has a direct biological connection is SOW 85D “Time-Series Monitoring of Deposition and Erosion at the Jensen Razorback Sucker Spawning Bar.” This SOW proposes to establish a link between razorback spawning success, river flows, and sediment transport across the Jensen razorback spawning bar. While the study has been able to demonstrate sediment movement over the spawning bar the link to fish production has been hampered by the lack of consistent information on larval sampling which is being phased out as the Recovery Program money to marked recapture protocol of fish population estimates.

A similar situation was identified in Email discussion from Dr. Tom Nesler *“If we cannot demonstrate how reproductive success in terms of larval production or YOY abundance is enhanced by increases in number or area of backwaters due to higher flows, what is the purpose of monitoring these habitat indices? If we truly believe there is a link between annual floodable nursery habitat, water temperatures, amount of suitable spawning gravel, embeddedness, quantity/quality of food per life stage, and type/abundance of nonnative fish and increased production and survival of the larval endangered fishes and other native fishes, then lets monitor either the habitat indices or the population indices. We do not need to do both. My recommendation is to stay with the monitoring of the fish populations as a direct means of monitoring status and trends. While I believe there is intuitively a link between the habitat features described and the population dynamics of the native fish species, our attempts at discerning this link through correlation analyses has not been particularly instructive.”*

*While Tom is not specifically addressing sediment movement across spawning bars his observations are valid and could be applied to any type physical monitoring. The reality of the situation is that the Program is collecting physical habitat data and this data is or will be used at some point to help identify links between the habitat features described and the population dynamics of the native fish species. The task at hand is to identify what the program is currently doing and lay out a plan of action for future activities. Section VII identifies the programs current data collection effort and section VIII makes recommendations on integrating current efforts with additional efforts to forge a habitat monitoring program for the Program.*

## VII. Task Description of Current and Ongoing Monitoring Activities:

Beginning in 1988 the newly created Recovery Program identified the need for river temperature monitoring for the Colorado and Green Rivers. Temperature monitoring was expanded in 1990 to include channel monitoring, in the mid-1990's, geomorphology studies were implemented on the Green, Gunnison, and mainstem Colorado Rivers. In the late 1990's channel cobble embeddedness in the Grand Valley and sediment studies were added based upon growing concerns with sediment burying spawning bars. Current and ongoing monitoring activities are chronicled below.

- 1) SOW 8 Operation and Maintenance of Gages Important to the Recovery Implementation Program.
  - A. Geological Survey will operate and maintain the 15-Mile Reach gage on the Colorado river.
  - B. Geological Survey will operate and maintain the two gages installed on the Yampa River.

- C. Geological Survey will operate and maintain the gages installed on the Duchesne and Uinta Rivers.
  - D. Geological Survey will operate and maintain the temperature equipment installed on the Duchesne and Uinta Rivers.
  - E. Geological Survey will operate and maintain the temperature equipment installed on the Jensen Utah Gage.
  - F. Geological Survey will operate and maintain the gage installed on the Price River, river stage/flow and temperature will be collected.
  - G. Geological Survey will produce daily flow and temperature records that will be published in the annual water resource paper for Colorado and Utah. Data will also be available on Colorado Water Talk and on the USGS web site.
- 2) Scope of Work 19H Hydrology Support for Biological Research

A. Temperature Data Collection and Analysis:

In coordination with the CRFP offices in Grand Junction and Vernal, water temperature data will be gathered systematically to support the water temperature model and other research projects. Thermographs will be installed at four locations on the Gunnison River, five locations on the Colorado River, and eight locations on the Green River. The thermographs will be checked periodically and calibrated with on-site temperature readings.

The temperature data, together with climatic, hydrologic, and stream geometry data, will be used to support ongoing research and future stream network temperature model. An annual report will be prepared and presented at the annual research meeting and made available on the Internet. The temperature data along with the channel monitoring and sediment monitoring data will added to the Recovery Program Physical Data Repository.

One of the recommendations of the report “Recommendations for Endangered Fish in the Green River Downstream of Flaming Gorge Dam” is that temperatures in the Green River be maintained within levels which are advantageous to endangered fish. The report targets water temperatures of 18 degrees C or greater for 2 to 5 weeks in upper Lodore Canyon beginning at the onset of base flows. The report recommends that the temperature of the Green River be no more than 5 degrees C colder than the Yampa River at the confluence during the summer base-flow period to prevent cold shock to drifting Colorado pikeminnow larvae.

To achieve these recommendations, water released from Flaming Gorge will need to managed and monitored closely at the dam and at various points along the Green and Yampa Rivers. A network of temperature monitoring stations needs to be establish which can be accessed on a near real time basis.

3) Scope of Work 85b Green and Yampa River Basin Sediment Monitoring Program

- A. An ongoing bed-load and bed-material sampling program will be established at the Deerlodge Park gage on the Yampa River, to supplement the already established program of suspended sediment measurements that is being conducted by the U.S. Geological Survey, in cooperation with the Recovery

Program and Colorado River Water Conservation District. Nine (9) samples of each parameter will be collected per year.

- B. An ongoing suspended-sediment and bed-load measuring program and bed-material sampling program will be established at an appropriate site on the Yampa River between the Little Snake River confluence and the mouth of Cross Mountain Canyon. These parameters will also be sampled nine (9) times per year.
- C. An ongoing sediment-load measuring program, including both suspended -and bed- load, and a bed-material sampling program will be re-established at the Jensen gage on the Green River. Ten (10) samples of each parameter will be collected per year.
- D. An annual report will be prepared to summarize data collected during that year, present comparisons of the newly collected data with previous data, and provide an evaluation of the relationship between the magnitude and duration of the streamflow at associated sites relative to sediment transport balance through the system and the morphological changes to the river channel.
- E. Report Preparation Phase after the third year of the program, a detailed evaluation of the results will be prepared for publication as a USGS Water-Resources Investigations report. This report will focus on trends in both the sediment load and morphometric (cross section) data, and their implications to management decisions that would provide flows to maintain or improve habitat conditions for the endangered fish.
- F. Continue collection of sediment data at the Lily gage on the Little Snake River which was dropped by the Colorado River Water Conservation District.

4) SOW 85C Upper Colorado River Basin Channel Monitoring (cobble embeddedness in the Grand Valley)

- A. Continue monitoring cobble embeddedness in the Grand Valley portion of the Colorado River on 5-6 sampling dates each year. Twenty measurements of depth-to-embeddedness will be taken at each of 16 sites in the Grand Valley on each date. One date will be in late March prior to runoff; 1-2 dates will be on the declining limb of the spring hydrograph; and three dates will be during the late summer/early fall base flow period. Wolman pebble counts (rock size frequency distribution) will be taken at the 15 sites twice yearly (once to correspond to the runoff embeddedness samples and once for the base flow samples). The results of this work will be incorporated into the annual channel monitoring report.
- B. In addition to the physical measurements, invertebrate sampling will be conducted at each of the sites on the three summer/fall baseflow sampling dates as well as the one early spring date. A modified Hess sampler will be used to collect invertebrates. Three samples will be collected at each embeddedness sampling site (3 samples x 16 sites x 4 dates = 192 samples per year). Total biomass of invertebrates will be analyzed in the lab. This information is critical to quantifying the biological link between physical substrate characteristics and food base production. To date, we have only year-to-year data on changes in substrate embeddedness in relation to discharge, but do not have the data to quantify how these changes affect invertebrate production and ultimately the carrying capacity for the fish community. This additional sampling will allow us

to discern year-to-year changes in invertebrate production and relate these changes to depth-to-embeddedness and flow regimes. After 2 years of data collection, results will be evaluated before additional years of data collection are proposed.

C. Prepare final report.

5) SOW 85D Time-Series Monitoring of Deposition and Erosion at the Jensen Razorback Sucker Spawning Bar.

A. Repair or replace 10 sensor pairs which are currently deployed on the Green River sites. Replace equipment on loan from USGS and NPS. The sediment load sensors will be repaired or replaced periodically.

B. Install real-time monitoring equipment so that the function of the sensors can be monitored and sediment movement can be tracked.

C. Mike Carpenter of USGS will develop a data template and a web page where the data from the sensor can be view on a near real-time basis.

D. The sensor locations will be monitored during runoff with sonar and acoustic-Doppler equipment to facilitate channel surveying which will be used as calibration checks of thickness of bed material above the sensors. This work will be coordinated with USGS Biological Research Division.

E. Each site will be visited in July of each year to service and download data.

G. During fall the graphs and reports on each site will be prepared. A database will be developed to store the sensor data. The data will be plotted, quality checked, and provided to the Recovery Program. A publishable report documenting the status of the effort and relating the sediment data to biological information and hydrograph from nearby USGS gages.

6) SOW CAP 4C Operate Gunnison River gage below Redlands Diversion Dam and gage in the Redlands Fish ladder.

A. The Bureau of Reclamation will operate a gaging station on the Gunnison River below the Redlands Diversion Dam. The gage is necessary to evaluate the effects of the releases on occupied habitat of endangered fish in the Gunnison River. Flow measurement in the Redlands Fish Ladder and bypass pipeline is used for operation and for river administration.

## VIII Discussion and Recommendations:

### Recommendations:

Having identified the areas where the Program is currently collecting physical data which could be incorporated into a habitat monitoring program and summarized some of the

issues it appears obvious that the Program`needs to spend more time focusing our current efforts in the program work plan adding and cutting item as needed to meet the future needs of the Program. Items I would suggest adding to the mix are:

1. Require all new pure research proposal to have a habitat component.
2. Add temperature monitoring to monitoring of restored wetlands.
3. Add habitat mapping and temperature monitoring to the mark recapture population estimate program.
4. A GIS based information depositary for biological and physical data.
5. A GIS to monitor area of inundation of restored wetlands.
6. GIS mapping of vegetation in restored wetlands cover factor.
7. A SWAT team to collect flow, sediment and inundation data on short notice to react to extreme hydrological conditions.
8. A workshop to refine the programs current activities and to identify other areas where monitoring would be appropriate.
9. **Other RIP STAFF Suggestions to be inserted here.**

IX Budget: From FY 2002 By Scopes of Work:

SOW Number	RIP Funding Proposed
8.	\$ 47,560
19H	45,500
85B.	45,000
85C.	18,000
85D.	35,000
CAP 4C	<u>11,000</u>
Total:	\$154,500

X. Budget Summary: N/A New start

XI Reference:

Programmatic Biological Opinion for Recovery Program Actions and Water Depletions in the Upper Colorado River from Rifle, Colorado to Lake Powell (December 20, 1999)