

- I. Project Title: Floodplain Inundation and Entrainment Studies- Upper Colorado Recovery Implementation Program
  
- II. Principal Investigator(s): Kevin R. Bestgen  
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- III. Project Summary: Flood plain wetlands are presumed important habitat for early life stages of razorback sucker in the middle Green River, Utah, because they are warm, food-rich, and may promote higher survival of larvae and recruitment to juvenile and adult life stages. Flow recommendations were developed to provide for river flows needed for entrainment of early life stages of razorback sucker from the main stem Green River in spring into flood plain wetlands. However, it is not precisely known if flood plain connectivity and flow timing, magnitude, and duration, as outlined in flow recommendations, is adequate for entrainment of razorback sucker larvae into target wetlands. Information to guide management of Green River flood plain wetlands for razorback sucker is extensive but a single synthesis of that information does not exist. A synthesis would be useful to integrate biological and physical information that will assist managers in efforts to increase recruitment of early life history stages of razorback sucker and, ultimately, recover the species. This project proposal is designed to fill those information needs.
  
- IV. Study Schedule: Project was funded in mid-June 2008, end date was to be one year after funding began. The final product is close to completion (end of November 2009).
  
- V. Relationship to RIPRAP: Reproduction and recruitment of early life stages are critical components of the life history of endangered razorback sucker and Colorado pikeminnow. Understanding trends in reproductive success may help define status of razorback sucker and Colorado pikeminnow in specific river reaches in the Colorado River Basin and should play a role in determining when recovery has been achieved.

Relationship to specific RIPRAP items:

Green River Action Plan: Mainstem

- I. Provide and protect instream flows--habitat management.
- I.B.\_ Green River above Duchesne River.  
Initially identify year-round flows needed for recovery while providing

experimental flows.

1.1.2 Restore Habitat (Habitat Development and Maintenance)

II.A. Restore and manage flooded bottomland habitat.

II.A.3. Implement levee removal strategy at high priority sites.

II.A.3.d. Evaluation.

VI. Accomplishment of FY 2009 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

The proposal and study design listed eight information needs which were addressed during this study.

**Information need 1.** Flow and stage at which floodplains with levee breaches become sufficiently inundated to provide nursery habitat for razorback suckers.

**Information need 2.** Frequency of flood plain inundation relative to the hydrologic cycle.

**Information need 3.** Area, depth, volume, and persistence of floodplain depression habitat after peak flows recede and relationship with peak flow magnitude.

**Information need 4.** Rates of sediment deposition and erosion in breaches and floodplains.

**Information need 5.** Entrainment and retention of larvae in floodplain nursery habitats as a function of physical characteristics and timing of drift.

**Information need 6.** Temporal relationships between drifting larvae and hydrology during the runoff period with a focus on the peak flow characteristics needed to entrain larvae.

**Information need 7.** The area of terrace and depression floodplains inundated at different flows.

**Information need 8.** What is the optimal combination of flow magnitude and duration to maximize entrainment of razorback sucker larvae.

This proposal presented a plan to fill those information needs. Information was gathered and synthesized from available per-reviewed literature and technical reports, and original data was gathered from the sources needed. Original data analyses included simulations to assess entrainment rates of larvae into flood plain wetlands under different hydrologic regimes, focusing on flow frequency, magnitude, and duration in relation to timing of reproduction of razorback suckers. The report contains a synthesis of available information on flood plain connection and inundation related to flow frequency, magnitude, and duration, with a goal of maximizing entrainment of early life stages of razorback sucker larvae. The report results will be useful to evaluate effectiveness of existing flow and temperature recommendations in the middle Green River, and will identify possible strategies to enhance of those recommendations for flood plain wetland habitat management and for conservation and recovery of razorback sucker.

Task Description (FY 2009)

Accomplishments by Information need.

- I). All work has been completed in the area of identifying data for capture, hatching, and spawning sequences of razorback sucker in relation to flow and temperature patterns, information needs 6 and 8.
- 2). Also gave a summary of this data at the January 2009 Biology Committee meeting in Grand Junction, CO.
- 3). Also conducted extensive analysis and review of data and literature for the razorback sucker entrainment study, information which will play a large role in the data integration for this study.
- 4). Flow scenarios that incorporate hatching times and floodplain inundation schedules have been completed.
- 5). All aspects of the data analysis and integration have been completed. What remains is finalizing report content and obtaining a review from co-author Bruce Haines.

VII. Recommendations: Finish and submit report.

VIII. Project Status: On track and ongoing.

IX. FY 2009 Budget Status

- A. Funds Provided: \$46,000
- B. Funds Expended: \$ 4,000
- C. Difference: 4,000 remaining funds to complete the study.
- D. Percent of the FY 2009 work completed, and projected costs to complete: About 90% complete.
- E. Recovery Program funds spent for publication charges: None.

X. Status of Data Submission (Where applicable): NA

XI. Signed: Kevin R. Bestgen 13 Nov. 2009  
Principal Investigator Date

*(Just put name and date here, since you will be submitting the report electronically)*

APPENDIX: [More comprehensive/final project reports (NOT to be used in place of a complete annual report.). If distributed previously, simply reference the document or report.]