I. Project Title:

Evaluation of middle Green River floodplains for the restoration of bonytail.

II. Principal Investigators:

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III. Project Summary:

Little is known of bonytail *Gila elegans* life history. Even the question of what habitats they occupied is unclear. Prior to mainstem impoundments bonytail were widespread among the larger rivers of the Colorado River basin (Jordan and Evermann 1896). Although the most recent captures of bonytail in the upper Colorado River basin were made in high gradient, canyon reaches (summarized by Valdez et al. 2001), historical records suggest bonytail may have been more abundant in alluvial reaches.

Among the large river fishes in the Colorado River basin, the bonytail has responded to altered habitats in a manner more similar to the razorback sucker than other native species. Unlike the Colorado pikeminnow, humpback chub or roundtail chub, both the razorback sucker and bonytail are able to survive and reproduce in artificial impoundments. In addition, both species seem to have flexible spawning requirements, having successfully spawned on gravel bars or wind-swept gravel shorelines, and in ponds with little or no gravel substrate without flow. If life history needs are similar to razorback sucker, then habitat restoration efforts being planned for razorback sucker will also benefit bonytail. Although the current bonytail stocking plan for the state of Utah specifies riverine stocking (Lentsch et al. 1996), the Colorado bonytail stocking plan recognizes the potential need of floodplain

habitat to restore bonytail (Nesler 1998).

The key to survival of bonytail in alluvial reaches is survival of larvae. Recent Recovery Program studies have illustrated that survival of adult and juvenile life stages of razorback sucker in floodplains in the presence of large numbers of nonnative fishes is relatively high (Modde 1997; UDWR unpublished data). The obstacle to recovering bonytail may be survival of larvae in wetland habitats. The November 2001 Recovery Program wetland restoration workshop in Denver, Colorado, promoted the concept of "resetting" floodplains as the most probable scenario in which larval razorback sucker and bonytail were likely to survive. This scenario mimics the conditions existing during the years large numbers of razorback sucker were produced in lower basin reservoirs as they were filling (Minckley et al. 1991). This study will test the concept of "resetting" floodplains for the first time using stocked larval bonytail.

IV . Study Schedule: 2002–2004

V. Relationship to RIPRAP:
GREEN RIVER ACTION PLAN: MAINSTEM
II. Restore habitat.
II.A. Restore and manage flooded bottomland habitat.
II.A.3. Implement levee removal strategy at high-priority sites.
II.A.3.c. Evaluation.

VI. Accomplishment of FY 2002 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

The spring peak flows of the Green River were very low in 2002, and prevented connection of the floodplains to the river. As a consequence, the original plan of investigating survival of stocked bonytail in multiple wetlands was canceled. An alternate plan of pumping water into a single wetland with enclosures stocked with bonytail and nonnative fishes was adopted. The Stirrup, a 20-acre wetland, was pumped to a maximum depth of approximately 100 cm in the spring between April 25 and May 3, 2002. On May 8, 2002, bonytail were stocked into three enclosures placed in the wetland in the following numbers: 5,250 fish in the control pen (0.01 acres); 21,250 fish in the low-density pen (0.25 acres);and 45,000 in the high-density pen (0.25 acres). In the low-density pen 75 fathead minnow, 42 red shiner, 16 black bullhead, 12 green sunfish and 4 carp were stocked. The high-density pen received 81 fathead minnow, 37 red shiner, 15 black bullhead, 18 green sunfish and 3 carp. Zooplankton densities were monitored biweekly and water quality parameters were monitored over a 24-hour period several days per week between stocking and the end of the experiment on August 13, 2002.

At the end of the experiment, 898, 865, and 363 fish were estimated respectively from the control, high-density, and low-density pens. Survival estimates for the control, high-, and low-density

pens were 22.0%, 1.9%, and 1.7%, respectively. Fish removed from the pens were released into the wetland (outside of the pens). Before initiating collections within the study pens at the end of the study, fyke net collections showed that several thousand bonytail had escaped from the pens and were alive in the wetland at-large. The bonytail that had escaped outside the pen were much larger than the fish inside the pens (i.e., >100 mm). In addition to survival of bonytail in the pens, large numbers of nonnative fishes reproduced and survived. However, the large number of green sunfish, fathead minnow and black bullhead young-of-the-year appeared to be the result of multiple spawns, whereas, versus the finite number of bonytail that had been stocked.

This study included an evaluation of stocked razorback sucker larvae which is reported in another annual report (C-6rz).

VII. Recommendations:

1. Initiate the original plan for this study by stocking bonytail in multiple wetlands to determine which physical and biological features result in the greatest survival and recruitment of bonytail.

2. Maintain water in the Stirrup to allow overwinter survival of remaining bonytail and allow surviving fish to access the Green River in the spring of 2003.

VIII. Project Status:

The project is subject to review prior to continuation.

IX. FY 2002 Budget Status:
A. Funds provided: $67K
B. Funds expended: $67K
C. Difference: -0-
D. Percent of the FY 2002 work completed: 100
E. Recovery Program funds spent for publication charges: -0-

X. Status of Data Submission:

Data will be sent to database manager upon completion of the project in 2002. Data are currently being entered on spreadsheets in Excel.

XI. Signed: ***Tim Modde*** **10 December 2002**
Principle Investigator Date

References:

Jordan, D.S., and B.W. Evermann. 1896. The fishes of north and middle America. Bulletin of the U.S. National Museum 47:1-1240.

Lentsch, L.D, Y.K. Converse, P.D. Thompson, T.A. Crowl, and C.A. Toline. 1996. Bonytail reintroduction plan for the upper Colorado River basin. Final Report, Publication No. 96-14. Utah Division of Wildlife Resources, Salt Lake City, UT.

Minckley, W.L., P.C. Marsh, J.E. Brooks, J.E. Johnson, and B.L. Jensen. 1991. Management toward recovery of the razorback sucker. Chapter 17 in W.L. Minckley and J.E. Deacon eds., Battle against extinction: Native fish management in the American west. University of Arizona Press, Tucson, AZ.

Modde, T. 1997. Nursery suitability and razorback sucker use of a floodplain wetland in the middle Green River. Final Report submitted to the Recovery Implementation Program for the Recovery of Endangered Fishes in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Denver, CO. 70 pp.

Nesler, T. 1998. Five year stocking plan for endangered Colorado River fish species in Colorado. Colorado Division of Wildlife. Denver, CO.

Valdez, R.A., R.J. Ryel, S.W. Carothers. 2001. Recovery goals for the bonytail (*Gila elegans*) of the Colorado River Basin. Draft Final Report submitted to the Recovery Implementation Program for Endangered Fish in the Upper Colorado River Basin. U.S. Fish and Wildlife Service. Denver, CO.