I. Project Title: Determination of factors affecting survival and growth of stocked razorback sucker and bonytail in multiple floodplain wetlands of the middle Green River.

II. Principal Investigator:

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III. Project Summary:

No knowledge on the habitat use of larval and juvenile razorback sucker *Xyrauchen texanus* and bonytail *Gila elegans* exists prior to major physical and biological modifications of the Colorado River Basin in the 20th Century. Given the lack of information on early life history needs of razorback sucker and bonytail, recent research has been directed toward defining the conditions in which razorback sucker and bonytail can survive and recruit in the wild. Specifically, this study tests the use of the 'reset' concept to reduce the impacts of predation on razorback sucker and bonytail larvae in floodplain habitats.

Experimental results to date provide encouragement that the reset approach will result in survival of bonytail and razorback sucker larvae in the presence of nonnative fishes that access floodplain impoundments. The coming year is the last field season.

IV . Study Schedule: 2003-2005

V. Relationship to RIPRAP:

Green River Action Plan: Mainstem
II.A.2.a Identify and evaluate floodplain sites (Restore habitat)
IV.A.1.c. Implement Augmentation Plan (bonytail)

VI. Accomplishments of FY 2003 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: The average daily spring flood flows of the Green River peaked at 19,000 cfs in 2003 and connected with most low-lying floodplains (i.e., connecting at 14,000 cfs) for 16 days (May 21–June 5). The floodplain connected all five (Above Brennan, Bonanza,

Old Charley Wash, L-10 and Johnson Bottom) study floodplains. Water quality parameters and zooplankton numbers were monitored approximately every two weeks beginning in June. Due to the malfunction (seal failure) of the hydrolab, water quality parameters were not measured after mid July. Water quality was sufficient to maintain fish through July, but fish kills were observed in L-10 and Bonanza floodplains in late July. Zooplankton populations showed the typical spring peak and declined through the summer (Figure 1).

Task 2: None of the study ponds contained residual nonnative fish populations at the beginning of the study. Although L-10 was pumped with river water in th fall of 2002, which allowed access of adult fish into the floodplain, no spawning had occurred until the spring of 2003. Just over 200,000 bonytail larvae were stocked into Johnson Bottom, Leota-10 (L-10), and Old Charley Wash floodplains in residual pools on May 2, 2003 (Table 1.). In addition, approximately 12,000 adult bonytail were stocked into all five floodplains (the three listed above and Bonanza and Above Brennan sites) on May 23, 2003. Insufficient razorback sucker larvae were produced at the Ouray National Fish Hatchery in 2003 and only 25,800 were provide (stocked May 23 and June 4). To address the shortfall, approximately 289,000 razorback sucker from 24 Road Hatchery averaging 0.09 g were stocked on June 16 into floodplains. Average densities stocked were 1,931 razorback sucker larvae, 1,236 bonytail larvae and 74 adult bonytail per hectare.

Fish composition was monitored in mid June and late July, and population estimates of surviving razorback sucker and bonytail were made in August. Biomass and abundance of nonnative fishes were similar among floodplains with the exception of Old Charley Wash which had a greater number and biomass of nonnative fishes immediately after flooding than most other floodplains (Figure 2). Minimum estimates of bonytail and razorback sucker were determined in both July and August. Floodplain density estimates in mid July ranged from 0-112 fish/ha, and 1 to 6 fish/ha for bonytail and razorback sucker, respectively and from 0-83 fish/ha and 0-4 fish/ha, respectively for bonytail and razorback sucker in late July and August (Table 2). Survival of bonytail (not accounting for natural reproduction) varied from 1.6 to 13.6% and from a trace (<0.1%) to 2.2% for bonytail and razorback sucker, respectively through July (Table 3). Mean total length at capture for bonytail among floodplains ranged from 50.8 mm to 73 mm in July, and 48.7 mm to 62.6 mm at harvest in August. Average total length at capture among floodplains for razorback sucker ranged from 38.9 mm to 60.8 mm in the July monitoring sample, and 62.9 mm to 86.9 mm at harvest in August. Variance in catch rates suggested that razorback sucker densities may be under-estimated compared to bonytail densities. Bonytail reproduction occurred in at least three floodplains (Above Brennan, Johnson Bottom and L-10). We did not collect any age-0 bonytail from the smallest floodplain, the Bonanza site. Relatively large numbers of bonytail were collected from floodplains in July, but adverse environmental conditions from extended drought reduced the numbers of fish observed in the floodplains in August.
Zooplankton densities did not appear to be related to the abundance of bonytail and

razorback sucker since the floodplains with the lower densities had the highest numbers of fish. Age-0 bonytail abundance was significantly correlated with submergent vegetation during both the July monitoring sample and the late July/August harvest, where as razorback sucker density was only significantly correlated during the latter collection (Figure 3).

Table 1. Area and stocking record of the five floodplain study sites in 2003.

Floodplain	Hectares	RZ larvae Number of larvae	BT larvae	BT adults
Johnson	57	105,304	81,500	2,400
OCW	34	63,800	45,000	2,400
L-10	49	106,719	75,000	3,600
Bonanza	6	12,000		3,480
Above Brennan	17	27,000		120
Total	163	314,823	201,500	12,000

Table 2. Minimum abundance estimates and densities of bonytail and razorback sucker in five study floodplains during 2003.

	Bonytail		Razorback Sucker	
July Monitoring Sample				
	Total No.	Fish/Ha	Total No.	Fish/Ha
Bonanza	0	0.0	17	2.8
Above Brennan	2	0.1	95	5.6
OCW	666	19.6	15	0.4
L-10	2,134	43.6	66	1.3
Johnson Btm.	6,361	111.6	13	0.2
July/August Harvest				
Bonanza	0	0.0	0	0.0
Above Brennan	0	0.1	1	0.1
OCW	34	1.0	15	0.4
L-10	625	12.8	66	1.3
Johnson	4,736	83.1	220	3.9

Table 3. Estimated percent survival of stocked age-0 bonytail and razorback sucker in study floodplains through July, 2003.. T < 0.1%.

	Bonytail Survival		Razorback Sucker Survival	
Bonanza	--		0.1	
Above Brennan	--		0.4	
OCW	1.6		T	
L-10	3.7		T	
Johnson	13.6		2.2	

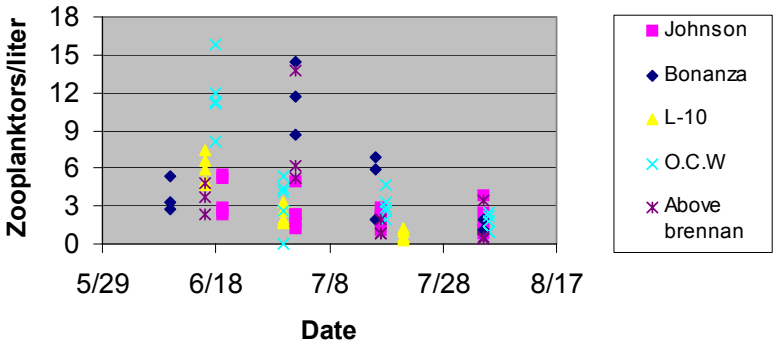

Figure 1. Zooplankton densities in reset study floodplains between May and July, 2003.

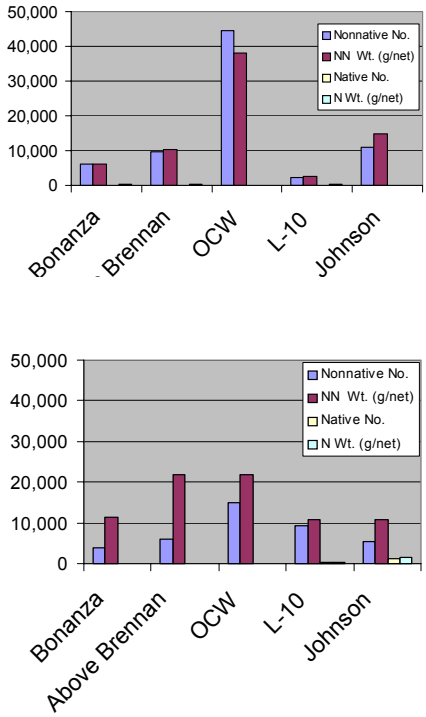

Figure 2. Nonnative fish composition in study floodplains immediately after inundation in June (top) and in mid to late July (bottom), 2003.

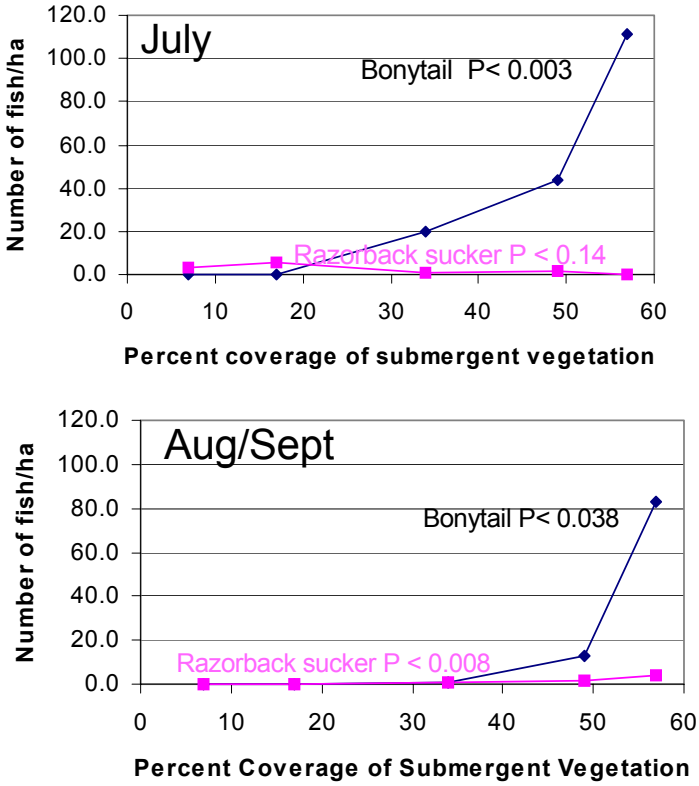

Figure 3. Linear relationship of bonytail and razorback sucker abundance in study floodplains with area of submergent vegetation during the July monitoring sample and the late July/August harvest collection.

VII. Recommendations:

1. Monitor overwinter survival of both bonytail and razorback sucker in sites where they may overwinter.

2. Continue to implement the final year of the study.

VIII. Project Status:

One year of field work remaining.

IX. FY 03 Budget Status:

A. Funds provided: $79.5K
B. Funds expended: 79.5K
C. Difference: -0-

D. Percent of the FY 2003 work completed: 100
E. Recovery Program funds spent for publication charges: -$0-

X. Status of Data Submission: Data will be sent to database manage upon completion of the project in 2005. Data are currently being entered on spreadsheets in excel.

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