I. Project Title: Investigation of larval and juvenile razorback recruitment from riverine flood plains.

II. Principle Investigator:

Kevin Christopherson
Utah Division of Wildlife
152 East 100 North
Vernal, Utah 84078
435-789-3103 fax: 435-789-8343
email: nrdwr.kchristo@state.ut.us

III. Project Summary:

Razorback suckers of various life stages were stocked into three flood plain depression sites of the Green River, Utah. The levees were breached at these sites for the Levee Removal study that was concluded in 1999. They are: The Stirrup (River mile 276.0), Baeser Bend (RM 273.0) and Above Brennan (RM 268.5). The purposes of this study were to: 1) determine if razorback suckers can survive flood plain depressions throughout the year in the presence of abundant non native fish populations; 2) evaluate growth of razorback suckers in flood plain depressions; 3) determine if fish will voluntarily leave the flood plain for the river during flows that connect the sites with the river; and 4) determine what factors trigger movement of fish from the flood plain to the river. Fish were first stocked and monitored under the original Levee Removal project in 1999. Stocked fish were monitored under this project for the first time in 2000 and will continue to 2001. A final report is due in March of 2002.

IV. Study Schedule:

a. Initial year: 2000
b. Final year: 2002

V. Relationship to RIPRAP:

Green River Action Plan: Mainstem
II.A.3 Implement levee removal strategy at high priority sites.
II.A.3.c. Evaluation

VI . Accomplishments of FY 00 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: Stock Larval and Juvenile Fish in selected flood plain wetlands.

Age I juvenile razorback suckers were stocked in each of the three selected sites on April 12, 2000. Each site received 2,511 fish. The average length and weight of these fish was 103.6 mm and 12.8 grams respectively. On May 27, during the first days of the river connection period at the Above Brennan site, several dead razorback suckers from this group had drifted against traps set to monitor movement of fish from the sites. The exact cause of this early mortality is unknown.

No larval fish were stocked.

Tack 2: Field data collection

Field data collection for the 2000 field season was completed following the protocol described in the 2000 SOW. Survival rates for Age I fish one year following the first stocking date (spring 1999 - spring 2000) were estimated at: 49% for The Stirrup; 61% at Baeser Bend; and 72% at Above Brennan. Survival of 57,000 larval fish that were stocked in The Stirrup was not detected. Age I fish stocked in 1999 had tripled in length by the end of the first summer. They averaged 103 mm at the time of stocking and grew to an average of 341 mm in Baeser Bend, 317 mm in The Stirrup, and 310 mm in Above Brennan. This is an average growth rate of 1.3 - 1.4 mm/day. At the end of the second growing season, Age I fish from this stocking averaged 408 mm in Baeser Bend and 410 mm in Above Brennan. Fish in The Stirrup had apparently died. Average weight and the overall condition of fish in Above Brennan was much better than the fish in Baeser Bend. In Above Brennan fish averaged 863 grams, compared to 714 grams at Baeser Bend.

Survival from the second group of Age I fish stocked in the spring of 2000 was poor. Below average spring flows in 2000 and drought conditions that persisted through the summer reduced water quality in the sites. Shallow water depths, high water temperatures 25° C - 32°C and low night time dissolved oxygen levels likely resulted in 100% mortality in Above Brennan and The Stirrup for this group of fish. A partial fish kill (50 - 75 %) also occurred in the Baeser Bend site. Growth rates of fish that survived in Baeser Bend were the same as the previous year at 1.4 mm/day. Because sampling occurred before the end of the growing season in 2000 the average length was only 282 mm, compared to 341 mm the previous year.

Below average spring flows may have affected fish movement from the sites. Low flows in 2000 resulted in a short connection duration and a reduced magnitude of connection. Therefore, fish had very little opportunity to leave the sites. There were about 10 days of connection at Above Brennan, 7 days at Baeser Bend, and only about 3 days at The Stirrup. In addition to the short duration at The Stirrup, the depth of connection was only about 1 - 2 inches. Despite these minimal connections a few fish were caught leaving the sites for the river. Thirty one razorbacks were caught moving to the river at Baeser Bend, 10 at Above Brennan and one at The Stirrup.

Drought conditions that persisted through the summer were a concern. To monitor the conditions regular trips were made to the wetland sites beginning in mid July. Water depth, temperature and dissolved oxygen were recorded during these checks. The shoreline of each site was also visually inspected for evidence of fish kill. During these trips dissolved oxygen readings recorded during the day were near saturation in all the sites and was not a concern. It also appeared initially that water depth would be sufficient for the year. However, in early August, water loss from the sites accelerated. On August 8th the decision was made to pump water from the river into the sites beginning the week of August 14th. This decision was made to improve overall water quality in the sites and reduce the potential for fish mortality. However, before pumping could be initiated a fish kill did occur at Baeser Bend on either August 12th or 13th. On August 14th while checking the site several hundred dead razorback suckers were observed along the shoreline at the site. Sampling revealed this was only a partial fish kill because some had survived. Pumping was then initiated at this site on August 15th. At about this same time a fish kill was also observed at The Stirrup. However, carp were the only species observed dead at this site. No live razorback suckers were collected in the site during sampling efforts. These fish probably died sometime before the July monitoring trips, because evidence of dead razorback suckers was never observed at The Stirrup. No fish kill was observed at Above Brennan except for the dead stocked fish observed earlier in the spring. Sampling efforts revealed fish stocked in 1999 were still alive and appeared to be doing very well in the site. Pumping was still initiated at the site on August 18th to prevent further water loss. Pumps at Above Brennan and Baeser Bend were run discontinuously until September 22. During this period between 6 - 10 inches of water depth was added to each site.

Due to the fish kill that occurred at Baeser Bend just prior to pumping, a decision was made to capture the surviving razorback suckers in Baeser Bend and move them to the river. Because the fish in Above Brennan appeared healthier and no fish kill had been observed in the site, it was decided to release any captured fish back into the site. Fish in Baeser Bend were caught with a trammel net that was checked at 30 minute to 2 hour intervals. A total length was recorded and fish were pit tagged and released into the river. Sampling occurred for a total of 11 days. During this period 520 razorback suckers were caught, six died during handling resulting in the release of 514 into the river. It is estimated that about 100 - 300 fish remain in the site.

The cause of these summer mortalities appears to be low nighttime dissolved oxygen levels. As mentioned earlier, dissolved oxygen levels were not a concern in the sites because daytime readings were near saturation. However, when readings were recorded for 24 hours, dissolved oxygen levels reached critically low levels in the early morning hours just before sunrise. However, these 24 hour readings were not recorded until after the fish kills. Short river-flood plain connection durations, summer drought and high temperatures combined to create conditions lethal to some of the fish.

Task 3 - 4: Data analysis and report preparation

Annual report December 2000 completed

Final report due March 2002

VII . Recommendations:

1. Continue stocking razorback suckers (especially larval suckers) into Green River flood plain wetlands provided that average or better flows are expected.

2. Continue to evaluate growth, survival and movement into/out of the flood plain wetlands.

3. Water quality readings should be recorded weekly for 24 hour intervals beginning in late July or early August depending on summer weather conditions.

VIII . Project Status: On track and ongoing

IX . FY 00 Budget:

A. Funds budgeted: $40,200

B. Funds expended/obligated: $40,200*

C. Difference: -0-

D. Percent of FY 00 work completed: 100%

E. Recovery Program funds spent for publication charges: $0.00

X. Status of Data Submission: In progress

XI . Signed : Kevin Christopherson — Project Manager; December 1, 2000 — Date

* An estimated $16,000 cost to pump water into the sites was absorbed by the UDWR.