COLORADO RIVER RECOVERY PROGRAM
FY 2012 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 160

I. Project Title: **Lower Green River Razorback Sucker Larval and Young-of-Year Monitoring Pilot Study.**

II. Bureau of Reclamation Agreement Number: R09AP40904

Project/Grant Period: Start Date: 10/01/2008
End date: 04/30/2015
Reporting period end date: 09/30/2012
Is this a final report? Yes____ No__X__

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IV. Abstract: Determining the location, timing, extent, and success of razorback sucker spawning is essential for evaluating the effectiveness of the stocking program, identifying recruitment, and guiding future management. This study was designed to determine the presence/absence, distribution, and spawn timing of young of year razorback sucker in the Green River downstream from the town of Green River. The study was prompted by increasing razorback sucker encounters, the presence of multiple age classes, and congregations of ripe razorback sucker (2001-2003 and 2006-2008; UDWR unpublished data) during Colorado pikeminnow surveys. Larval razorbacks have been successfully collected since the beginning of the project by either light trapping and/or seining.

V. Study Schedule: Initial year 2009, final year ongoing.

VI. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

V.	Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
V.A.	Measure and document population and habitat parameters to determine status and biological response to recovery actions.
V.B.2.	Conduct appropriate studies to provide needed life history information.

GREEN RIVER ACTION PLAN: MAINSTEM

V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).

V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions..

V.D. Complete monitoring plan in FY 11 (based, in part, on recommendations from evaluation of stocked razorback sucker report).

VII. Accomplishment of FY 2011 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: Collect light trap samples: Light trip samples were collected at sites between Saleratus canyon (RM 199.6) and Keg Spring Canyon (78.9) during five sampling events from May 5 to July 1, 2012. Due to low water during the spring and summer on the Green River (approximately 30% of 112 year average) and in flooded tributaries, sampling was limited to Green River Valley (RM 120), Keg Spring and Tenmile Canyons (RM 78.9 and 80.3, respectively) and the San Rafael River confluence (RM 97) areas. Millard Canyon (RM 33.5) was inaccessible; however, samples were taken from flooded tributaries similar to Millard Canyon (Tenmile and Keg Spring Canyons). A total of 38 light trap samples were collected and of those, 24 samples were sent to the CSU larval fish lab for identification. During the study, main channel temperatures ranged from 17.0°C to 22.3°C with a mean of 18.9°C. Habitat temperatures ranged from 14.0°C to 24.0°C with a mean of 20.3°C.

The number of razorback sucker larvae captured during 2012 increased from previous years and was the highest to date and was over 500% greater than all the previous years combined (Table 1). As a result of the low water in 2012 the number of available flooded tributaries and backwaters available to larvae was limited. Sampling occurred within almost all the available habitat in the system which may explain the high number of larvae collected ($n>3000$) and the high CPUE which was over 100% greater than all the previous years combined (Table 2).

Larvae were found in all locations sampled and 83% of the samples collected contained razorback sucker larvae; the proportion of samples from previous years containing razorback sucker larvae ranged from 19-64%. Razorback sucker larvae collected via light trapping averaged 11.2 ±1.1 mm total length and were similar in size to those collected in 2009-2010; larvae collected during the high water year of 2011 were smaller ($H=227.251$, $df=2$, $p<0.001$).

Razorback sucker hatching and spawning dates were back calculated from capture dates using formulas developed by Muth et al. (1998) and Bestgen et al (2002). Spawning estimates for razorback sucker in the lower Green River vary depending on water year and temperature. Typically spawning has occurred on the ascending limb of the hydrograph; however, the unusual flow regime of 2012, characterized by very low discharge and numerous small peaks in flow throughout the spring, resulted in earlier spawning when compared to past years in the study (Figure 1). In both 2009 and 2010

the estimated spawning occurred from April 18 to June 2. In 2011, however, high discharge and cold temperatures appear to have delayed spawning (about two weeks) and the majority of spawning occurred from May 5 to June 10. The low water in 2012 resulted in earlier spawning where estimated spawning occurred from April 9 to May 17. All spawning occurred before peak flows in early June (Figure 2).

Task 2: Sample for YOY and age 1+ razorback sucker: Seine samples were collected between river miles 92.5 and 23.2 during one sampling trip from 3 July to 5 July. A second trip was attempted from 25 July to 26 July but due to equipment malfunction was truncated; samples were collected between river miles 95 and 67.5. Low water conditions, as previously mentioned, prevented further sampling in the lower Green River. A total of 968 m^2 was seined and 19 seine samples were collected, 13 of which were sent to the CSU larval fish lab for identification. During the study, main channel temperatures ranged from 23.0°C to 28.0°C with a mean of 26.6°C. Habitat temperatures ranged from 22.5°C to 32.0°C with a mean of 27.2°C.

Sampling for YOY and age 1+ razorback sucker later in the season (2011-2012) in July-August, resulted in higher razorback sucker capture success as well as the collection of larger individuals than sampling early season in May-June (2009-2010). In both 2011 and 2012, razorback sucker were found in 21-26% of samples collected by seine; very few samples (4-6%) taken in 2009-2010 contained razorback. In 2012, captured razorback sucker ranged in total length from 21 mm to 49 mm with a median total length of 26 mm (n=6). Total lengths were similar to 2011 when median total length was 38 mm; razorback sucker captured during sampling in 2009-2010 averaged total lengths between 11.6-13.5 mm. Sampling later in the season, during both the high water year in 2011 and the low water year in 2012 resulted in higher capture efficiency and the collection of larger razorback sucker.

The low water year of 2012 produced an earlier spawn extending the growing season and warm water temperatures potentially increased the growth rates of razorback sucker (Bestgen 2008) in the lower Green River. Both of these factors may contribute to a higher winter survival rate for razorback sucker as individuals may have reached larger body sizes before the winter die-off period. During Project 138 (ISMP; Creighton/Skorupski 2012) in both the lower Green and the lower Colorado Rivers YOY razorback sucker have not been collected; however, two YOY razorback sucker were captured via seining on the lower Green River (TL=88, 81 mm) and three YOY razorback sucker were captured on the lower Colorado River (TL=80, 107, 108 mm). The successful capture of rare YOY razorback sucker in the wild during a low water season may provide support for the notion that low water years, as seen in 2012, may be important for the success of razorback sucker recruitment in these systems.

Task 3: Preliminary sample identification and data entry: All data has been entered. Collected samples were submitted to the CSU Larval Fish Laboratory for identification. Samples were processed and data received from CSU Larval Fish Laboratory.

Task 4: Annual reporting: An annual progress report update summarizing the 2012 data

and comparing it with past monitoring efforts will be submitted by March 1, 2014.

VIII. Additional noteworthy observations: Other native fishes captured during all sampling methods include bluehead sucker, Colorado pikeminnow, unknown chub, and flannelmouth sucker (Table 3). Other nonnative fishes collected during sampling include channel catfish, common carp, fathead minnow, sand shiner, and red shiner.

IX. Recommendations:

- Continue light trap sampling to monitor razorback sucker larval presence.
- Continue sampling late season to more intensively and specifically sample for YOY and age 1+ razorback.
- Consider installing a temperature logger in the lower Green River to obtain accurate water temperatures for the duration of the sample period.

X. Project Status: On track and ongoing.

XI. FY 2012 Budget Status

A.	Funds Provided:	$27,215.00
B.	Funds Expended:	$27,215.00
C.	Difference:	$ 0.00
D.	Percent FY 2012 work completed:	100%
E.	Recovery Program funds spent for publication charges:	$ 0.00

XII. Status of Data Submission: All data will be submitted upon completion of larval identification by CSU.

XIII. Signed: Julie Howard March 1, 2014
Principal Investigator Date

XIV. Literature cited:

Bestgen. K. 2008. Effects of water temperature on growth of sucker larvae. Western North American Naturalist. 68(1): 15-20.

Breen, M.J., J. Skorupski, K. Creighton. 2012. Upper Colorado River basin young-of-year Colorado pikeminnow (*Ptycholcheilus lucius*) monitoring: Summary report 1986-2012. Annual report of Utah Division of Wildlife Resources to Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Table 1: Number of razorback sucker larvae captured using all techniques

Site	2009	2010	2011	2012
Green River Valley	22	70	6	1945
San Rafael	5	122	17	75
Keg Springs/10 Mile		72	8	1602
Millard Canyon	141	428	117	
Other	5	0	3	5
Total	146	428	120	3627

Table 2: Catch per unit effort (# larvae/night) light trapping

Site	2009	2010	2011	2012
Green River Valley	0.55	1.35	2.45	102.37
San Rafael	0.63	2.98	4.76	9.38
Keg Springs/10 Mile		3.13	0.25	141.91
Millard Canyon	15.67	17.12	1.09	
Other	0.63	0.00	0.60	
Overall	2.66	4.64	0.85	94.24

Table 3: Ancillary native species captured via light trapping and seining from 2009-2012

Species	2009	2010	2011	2012
bluehead sucker	111	148	8	17
unknown chub	6	2	0	1
Colorado pikeminnow	18	0	0	106
flannelmouth sucker	101	687	26	85

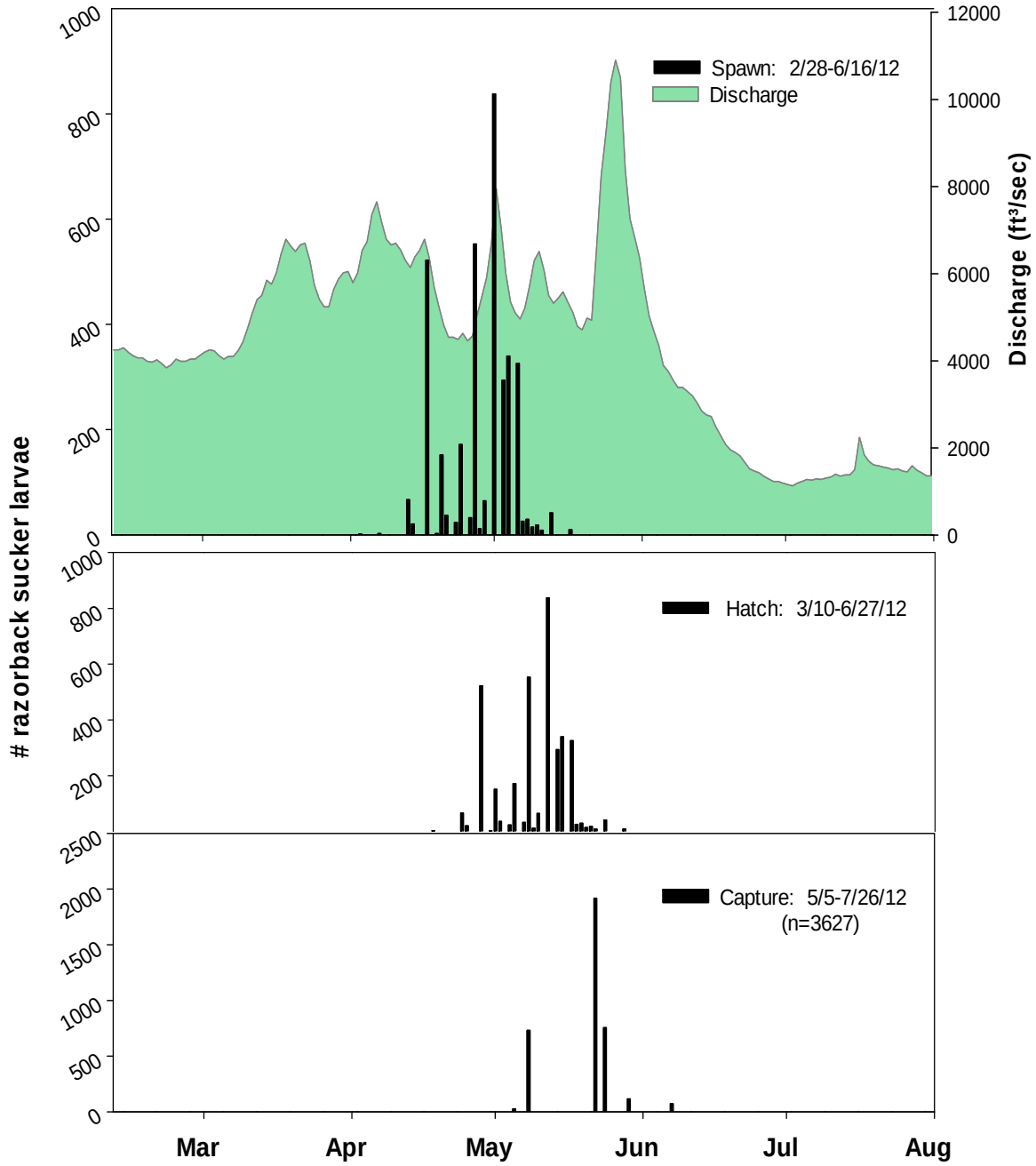

Figure 1: Number of razorback sucker larvae collected using all techniques (bottom), number of individuals per estimated hatching date (middle), and the number of individuals per estimated spawning date (top bars) and the corresponding discharge from the USGS Gauge near Green River, UT

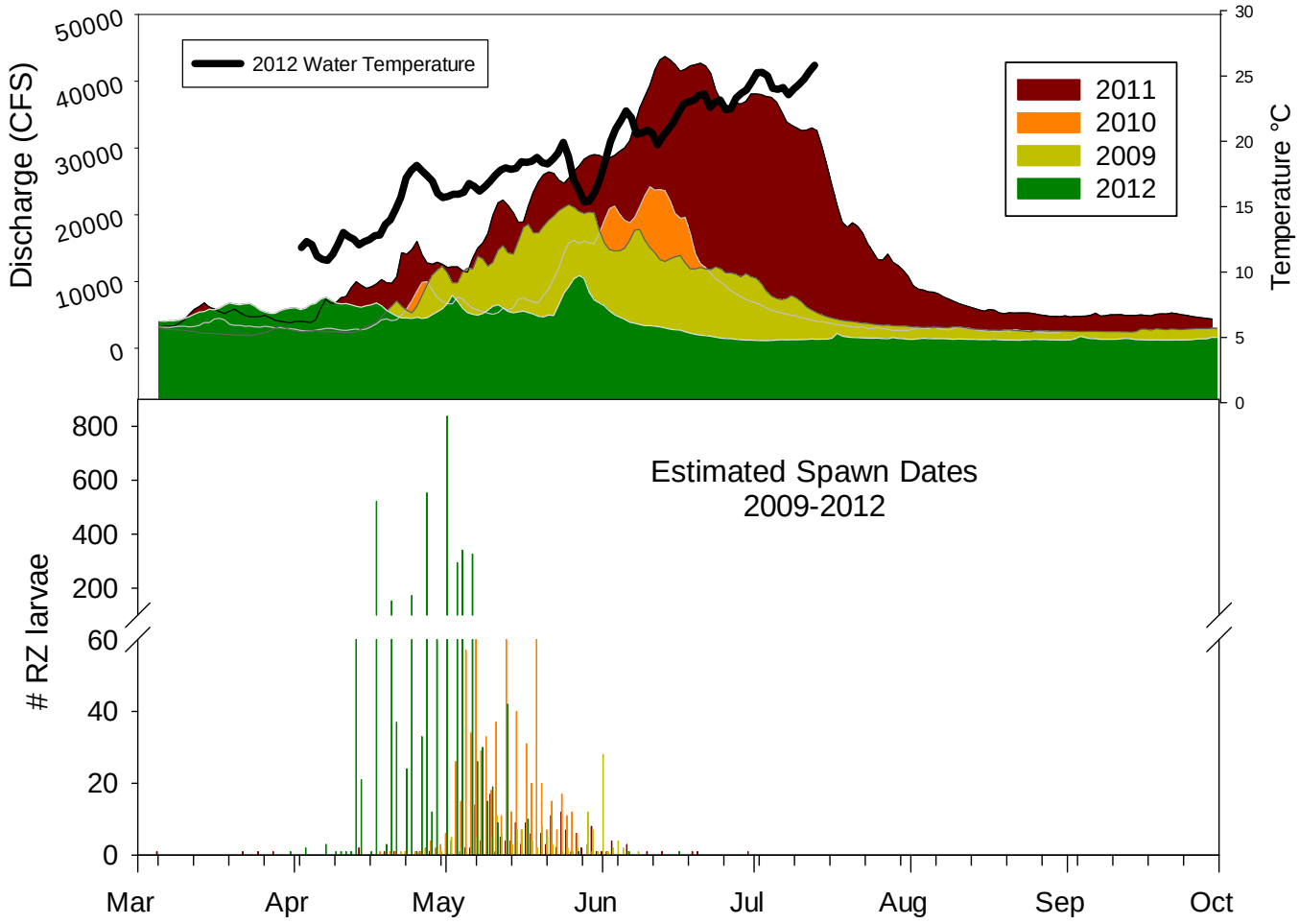

Figure 2: Discharge from the USGS gauge near Green River, UT for 2009-2012 and water temperature from 2012 (USFWS) are shown in the upper figure while the estimated spawning dates from 2009-2012 are shown in the bottom figure. Spawning dates and discharge our color coded by year