

COLORADO RIVER RECOVERY PROGRAM
FY 2014 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 22f

I. Project Title: INTERAGENCY STANDARDIZED MONITORING PROGRAM (ISMP) ASSESSMENT OF ENDANGERED FISH REPRODUCTION IN RELATION TO FLAMING GORGE OPERATIONS IN THE MIDDLE GREEN AND LOWER YAMPA RIVERS-Yampa and middle Green River assessment of Colorado pikeminnow and razorback sucker larvae

II. Bureau of Reclamation Agreement Number(s): R14AP00001

Project/Grant Period: Start date (Mo/Day/Yr): 1 Oct. 2008
End date: (Mo/Day/Yr): 30 Sept. 2018
Reporting period end date: 30 Sept. 2014
Is this the final report? Yes No X

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IV. Abstract: The goal of Flaming Gorge flow and temperature recommendations (Muth et al., 2000) that were implemented in 2006 was to improve the status and prospects for recovery of endangered fish populations in the Green River. A major emphasis of those recommendations was to enhance the reproductive and recruitment success of endangered fishes in the middle Green River, in particular razorback sucker and Colorado pikeminnow. Larvae of razorback sucker *Xyrauchen texanus* and Colorado pikeminnow *Ptychocheilus lucius* were captured in the Green River basin in spring and summer 2014. Razorback sucker sampling was conducted with light traps primarily in the Green River between Jensen and Ouray and Colorado pikeminnow sampling was with drift nets in the lower Yampa River. Sampling was designed to provide a measure of timing of reproduction and a measure of annual reproductive success of each species. Diel variation in abundance of Colorado pikeminnow larvae in the drift was also assessed. This data will be used to assess effects of flow and temperature regimes on reproduction by razorback suckers and Colorado pikeminnow and to correlate abundance of larvae to abundance of juveniles in autumn.

V. Study Schedule: Ongoing in a subsequent agreement, and a new one began in 2013, similar sampling has been conducted since 1990, in most years. Anticipate continued annual sampling.

VI. Relationship to RIPRAP: Relationship to specific RIPRAP items:

Green River Action Plan: Mainstem

- I. Provide and protect instream flows--habitat management.
- I.A. Green River above Duchesne River.
- I.A.1. Initially identify year-round flows needed for recovery while providing experimental flows.
- I.A.2.a. Summer/fall flow recommendations.
- I.A.3. Deliver identified flows.
- I.A.3.a. Operate Flaming Gorge pursuant to the Biological Opinion to provide summer and fall flows.
- I.A.3.d. Operate Flaming Gorge Dam to provide winter and spring flows and revised summer/fall flows, if necessary.
- I.B. Green River below the Duchesne River.
- I.B.1. Initially identify year-round flows needed for recovery while providing experimental flows.
- I.B.2. State acceptance of initial flow recommendations.
- I.B.2.a. Review scientific basis.
- II. Restore habitat--habitat development and maintenance.
- II.A. Restore and manage flooded bottomland habitat.
- II.A.1. Conduct site restoration.
- II.A.1.a. Old Charlie Wash.
- II.A.1.a.(3) Monitor and evaluate success.
- II.C. Enhance water temperatures to benefit endangered fishes.
- II.C.1. Identify options to release warmer water from Flaming Gorge Reservoir to restore native fish habitat in the Green River.
- 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.

Green River Action Plan: Yampa and Little Snake Rivers

- I. Provide and protect instream flows--habitat management.
- I.D. Yampa River below Little Snake River.
- I.D.1. Initially identify year-round flows needed for recovery.
- I.D.2. Evaluate need for instream flow water rights.
- I.D.2.a. Review scientific basis.

Green River Action Plan: Yampa and Little Snake Rivers

- V.A.1. Conduct standardized monitoring.
- V.B.2. Conduct appropriate studies to provide needed life history information.

VII. Accomplishment of FY 2014 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings: Project Objectives

- 1). Determine timing and duration of spawning by razorback suckers and presence and abundance of larvae in the system as measured by capture of larvae in light traps. Sampling was extended to the White River this year. Additional sampling was also conducted in flood plain wetlands in early summer and autumn under this project.
- 2). Determine timing and duration of spawning by Colorado pikeminnow and presence and abundance of larvae in the system as measured by capture of larvae downstream of spawning areas in the lower Yampa River.

Task Description (FY 2014)

- I). Collect light trap samples for razorback suckers. The CRFP office in Vernal was be responsible for this task.
- II). Collect drift net samples for Colorado pikeminnow. The Larval Fish Laboratory was responsible for this task.
- III). Identify light trap and drift net samples. Preliminary identifications will be conducted by the responsible sampling entity, with assistance from the LFL, as samples are collected to provide real-time data. Final specimen identification and curation will be conducted by the LFL.
- IV). Summarize specimen data collection in an annual report.

Accomplishments by Task.

- I). Collect light trap samples for razorback suckers. Light trap samples were collected during May and June, 2014 by the Vernal CRFP. Additional sampling near Green River flood plain wetlands was also conducted in summer 2014.
- II). Collect drift net samples for Colorado pikeminnow. Drift net samples were collected during June to August 2014 by the Larval Fish Laboratory.
- III). Identify light trap and drift net samples.

Middle Green River light trap samples, 2014. Samples were delivered to the Larval Fish Laboratory and are being identified. The duration of the sampling season was 13 May until 20 June, 2014. First razorback sucker larvae of the season were captured on 28 May at Cliff Creek, a date on par with water temperatures and prevailing flows in other years. That date of first appearance was in contrast to 2011 when the first larvae were detected relatively late on 24 June. In 2012 first detection was earlier, 16 May, and in 2013 was later and closer to average when first larvae were detected on 26 May. Flows in 2011 were extremely high and cold, which delayed reproduction by razorback suckers; flows were lower and warmer in 2012 and 2013, and moderately high in 2014. Dates of first appearance of razorback sucker larvae have been successfully used to make decisions regarding Flaming Gorge Dam water management in spring for several years.

We also prepared samples of razorback suckers captured for selenium analysis. Most were from Stewart Lake or just outside of there. Samples were transferred to Recovery Program staff (McAbee) for analysis.

Middle Green River light trap samples, 2013. Samples sent to the Larval Fish Laboratory were identified and measured. Razorback suckers were captured from 26 May-19 June. A total of 7,376 razorback sucker larvae were captured in 2013 and were 9-17 mm TL (Figure 1). This is by far the largest number of razorback sucker larvae ever captured in the history of this sampling program dating back to 1992, and was nearly twice the number captured in 2012, the next largest total. The 2013 sampling furthers the trend of increased reproduction by razorback sucker in the Green River since around 2003.

Seasonal distribution of razorback sucker larvae captured in 2013 in light trap samples indicated a steady rise in abundance after first capture on 26 May to a peak on 4 June (Figure 2). The smallest specimen captured on the last day of 2013 sampling was 10 mm TL, and indicated that spawning may have only recently finished. The 2012 annual report indicated that a “large number (812) of razorback sucker larvae was captured upstream of known spawning areas at Escalante Ranch, and just downstream of the Split Mountain Boat Ramp.” This was in error due to a river mile location interpretation error. Those fish were from and just downstream of Cliff Creek.

Additional 2011 Results. Early life stage sampling was conducted in the White River in late spring and early summer 2011. Results indicated spawning by razorback sucker as well as Colorado pikeminnow. This work has been published in the North American Journal of Fish Management in late 2013. Additional ripe razorback suckers have been reported in the White River each year since 2011 indicating a persistent aggregation of spawning fish.

Lower Yampa River drift net sampling, 2014. Samples were collected in the Yampa River about 0.2 to 0.8 km upstream from the Green River (n = 216 total samples collected in 2013), the same site that samples were collected from in 1990 to 1996 (Bestgen et al. 1998) and in 1998 to 2013. Exploratory sampling occurred on 2 June; regular sampling commenced on 16 June and extended through 18 August. The first Colorado pikeminnow larva was collected on 11 July, a relatively late date for first capture of larvae but not unusual given the cold water temperatures late into summer. However, 2014 appears to be another relatively strong year for reproduction by Colorado pikeminnow as many larvae were captured and the spawning season was long.

Lower Yampa River drift net sampling, 2013. Samples were collected in the lower Yampa River about 0.2 to 0.8 km upstream from the Green River (n = 249 total samples, 2013), the same site that samples were collected from in 1990 to 1996 (Bestgen et al. 1998) and in 1998 to 2012. Regular sampling began on 13 June and ended on 16 August. A total of 2,792 pikeminnow larvae was captured in 2013 (Figure 3). This was the largest number of Colorado pikeminnow larvae captured since sampling began in 1990.

First Colorado pikeminnow larvae were detected on 28 June, an average time of first capture over the period of sampling (Figure 4, Bestgen and Hill 2014). The last pikeminnow captured was on 5 August (9 mm TL), and represents a typical last capture date for this species. Unfortunately, the large number of larvae captured in 2013 resulted in only a modest number of age-0 Colorado pikeminnow captured in autumn 2013 (n = 97) in backwaters of the middle Green River (Recovery Program Project 138).

Most sampling data collected in this program (1990-2012, none in 1997) was recently incorporated into a report entitled "Reproduction, abundance, and recruitment dynamics of young Colorado pikeminnow in the Green River Basin, Utah and Colorado, 1979-2012.

- VIII. Additional noteworthy observations: A total of 15 razorback sucker larvae (9-17 mm TL) were captured in drift nets at the drift net sampling site in 2013. Capture dates ranged from 13-18 June.
- IX. Recommendations: Continue sampling as planned in 2015. Continue to integrate this work into recruitment patterns noted for juveniles.
- X. Project Status: Ongoing and on-track.
- XI. FY 2014 Budget Status
 - A. Funds Provided: \$ 163,339
 - B. Funds Expended: \$ 120,286
 - C. Difference: \$ 40,053 remaining funds for sample analysis that remains.
 - D. Percent of the FY 2014 work completed, and projected costs to complete: About 75% complete.
 - E. Recovery Program funds spent for publication charges: None.
- XII. Status of Data Submission (Where applicable): Data were made available to investigators.
- XIII. Signed: Kevin R. Bestgen 14 November 2014
Principal Investigator Date

APPENDIX: Major recent products based on these data include:

Bestgen, K. R., G. B. Haines, and A. A. Hill. 2011. Synthesis of flood plain wetland information: Timing of razorback sucker reproduction in the Green River, Utah, related to stream flow, water temperature, and flood plain wetland availability. Final report to the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin. U. S. Fish and Wildlife Service, Denver, CO. Larval Fish Laboratory Contribution 163.

Bestgen, K. R., K. A. Zelasko, and G. C. White. 2012. Monitoring reproduction, recruitment, and population status of razorback suckers in the Upper Colorado River Basin. Final Report to the

Upper Colorado River Endangered Fish Recovery Program, U. S. Fish and Wildlife Service, Denver. Larval Fish Laboratory Contribution 170.

- Bestgen, K. R. 2014. Aspects of the Yampa River flow regime essential for maintenance of native fishes. Final Report submitted to the National Park Service, Fort Collins, CO, The Nature Conservancy, Boulder, CO, and Western Resource Advocates, Boulder, CO. Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins. Larval Fish Laboratory Contribution 181.
- Bestgen, K. R., and A. A. Hill. 2014. Reproduction, abundance, and recruitment dynamics of young Colorado pikeminnow in the Green River Basin, Utah and Colorado, 1979-2012. Final report to the Upper Colorado River Endangered Fish Recovery Program, Project FW BW-Synth, Denver, CO. Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins. Larval Fish Laboratory Contribution 183.

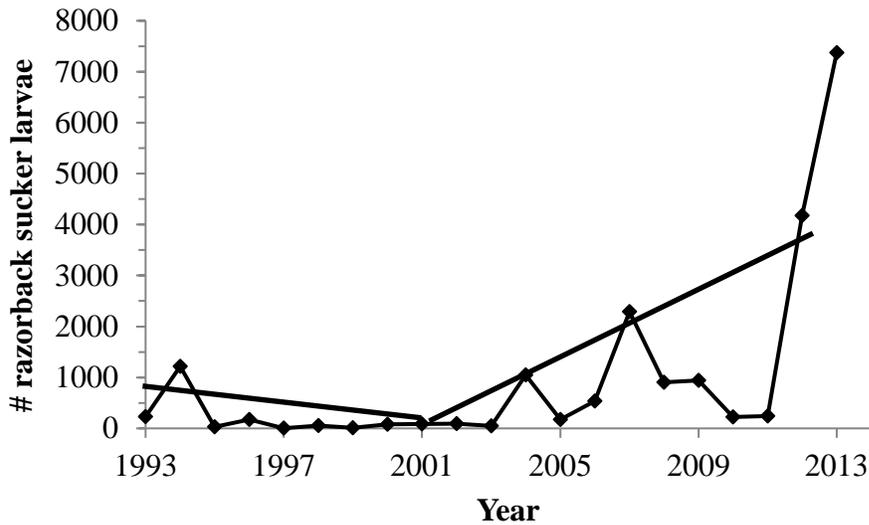


Figure 1. Number of razorback sucker larvae captured from 1993 to 2013 in the middle Green River, Utah, in light traps (all fish including those of questionable taxonomic identity included; 2014 sample identification is underway).

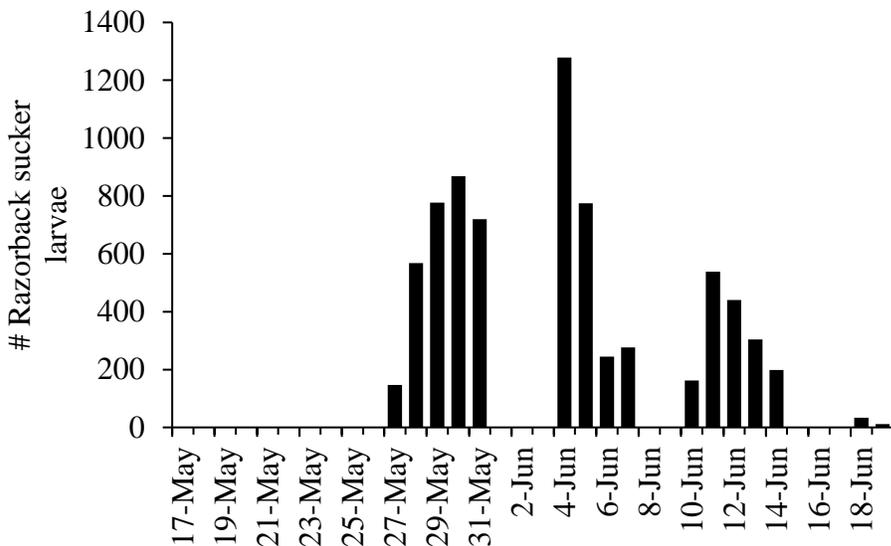


Figure 2. Seasonal distribution of razorback sucker larvae captured in 2013 in middle Green River, Utah, in light traps (all fish including those identified as “razorback sucker ?” were included; 2014 sample identification is underway). Sampling began on 16 May and ended on 19 June. All samples from all locations were combined for each day. Gaps in captures after the first capture of razorback sucker larvae was made indicate lack of sampling rather than absence of the species.

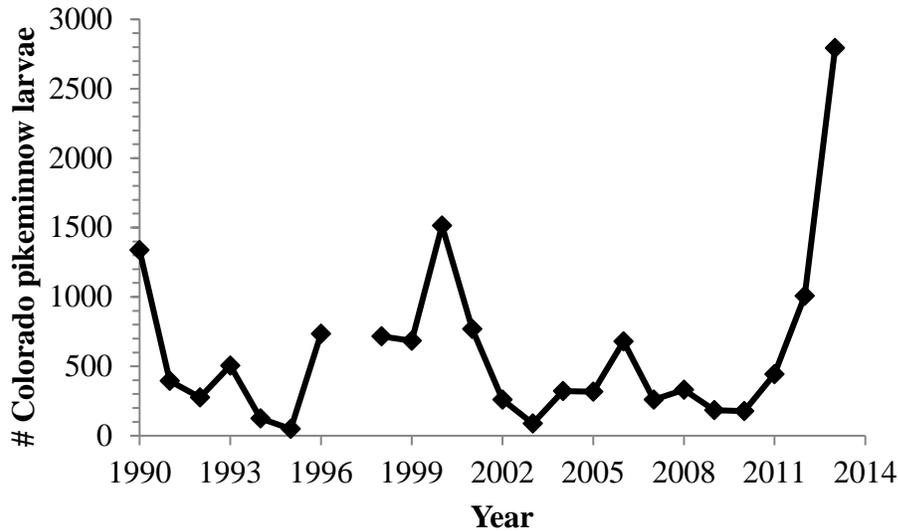


Figure 3. Number of Colorado pikeminnow larvae captured from 1990 to 2013 (no sampling in 1997, includes specimens from all diel samples, 2014 sample identification is underway) in the lower Yampa River, Colorado, during summer in drift nets.

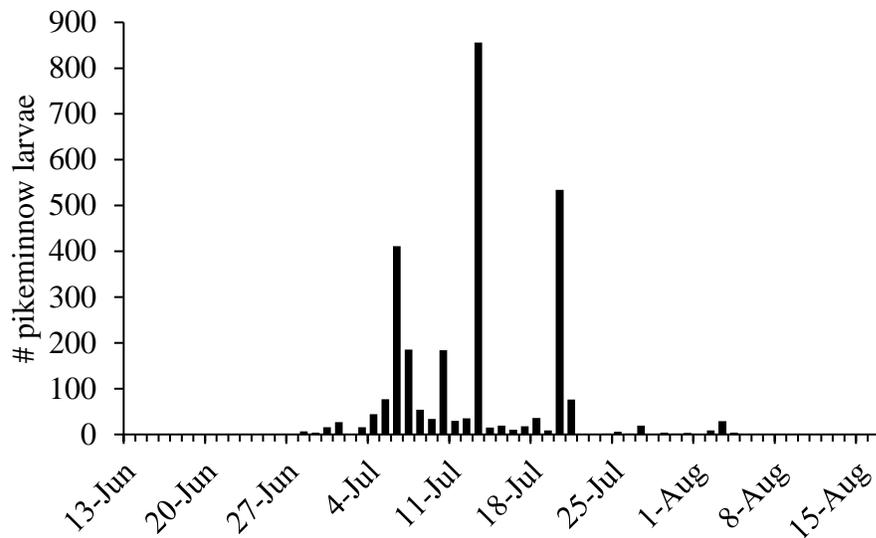


Figure 4. Seasonal distribution of Colorado pikeminnow larvae captured in 2013 drift net samples from the lower Yampa River, Colorado. Sampling began on 13 June and ended 16 August. The three largest capture dates were diel sampling occasions (12 total each day).

For projects where more than one agency/entity receives funds from the Bureau of Reclamation, append one PPR from each agency/entity. Otherwise, delete.

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: R14AP00001

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 22f

Project Title: INTERAGENCY STANDARDIZED MONITORING PROGRAM (ISMP)
ASSESSMENT OF ENDANGERED FISH REPRODUCTION IN RELATION
TO FLAMING GORGE OPERATIONS IN THE MIDDLE GREEN AND
LOWER YAMPA RIVERS.

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Project/Grant Period: Start date (Mo/Day/Yr): 1 Oct. 2008
End date: (Mo/Day/Yr): 30 Sept. 2014
Reporting period end date: 30 Sept. 2014
Is this the final report? Yes _____ No X

Performance: The goal of this project is to document timing and intensity of reproduction by razorback suckers and Colorado pikeminnow in the lower Yampa and middle green rivers. In 2014 we collected 249 drift net samples and additional seine samples in the lower Yampa River. In addition, we identified samples collected by the U. S. Fish and Wildlife Service in 2013 and began sample identification for 2014 samples. Another objective of this project is to summarize data collections. This was done in the attached report.

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: R13PG40020

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 22-F

Project Title: INTERAGENCY STANDARDIZED MONITORING PROGRAM (ISMP) ASSESSMENT OF ENDANGERED FISH REPRODUCTION IN RELATION TO FLAMING GORGE OPERATIONS IN THE MIDDLE GREEN AND LOWER YAMPA RIVERS.

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Project/Grant Period: Start date (Mo/Day/Yr): 10/01/2013
 End date: (Mo/Day/Yr): 9/30/2015
 Reporting period end date (Mo/Day/Yr): 09/30/2014
 Is this the final report? Yes _____ No X

Performance: USFWS completed task 1, collecting larval fish samples from 8 sites in the middle Green River from 13 May 2014 to 20 June 2014. Preliminary identification led to the successful initiation of flood flows from Flaming Gorge and the entrainment of larval razorback sucker into key wetland habitats. Fish samples were delivered to the CSU Larval Fish Laboratory for identification as outlined in the scope of work.