COLORADO RIVER RECOVERY PROGRAM Project#: RZ-RECR
FY 2012-2013 PROPOSED SCOPE OF WORK for:

Razorback emigration from the Stirrup floodplain

Lead Agency: Utah Division of Wildlife Resources

Submitted by: Matt Breen / Steve Keddy
Utah Division of Wildlife Resources
Northeastern Regional Office
152 East 100 North
Vernal, UT 84078
Phone: (435) 781-9453
FAX: (435) 789-8343
E- mail: mattbreen@utah.gov

Date: 25 April 2007: revised 5/30/07 by Pat Nelson, revised 06/18/2008 by Trina Hedrick, revised 2/26/2009 by Trina Hedrick, revised 10/19/2010 by Leisa Monroe, revised 26 January 2011 by Krissy Wilson, revised 14 April 2011 by Matt Breen.

Category:
__Ongoing project
X Ongoing-revised project
__Requested new project
__Unsolicited proposal

Expected Funding Source:
X Annual funds
__Capital funds
__Other (explain)

I. Title of Proposal:

Razorback emigration from the Stirrup floodplain

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- II. Restore habitat (habitat development and maintenance).
- II.A. Restore flooded bottomland habitats.
- II.A.1. Conduct inventory of flooded bottomlands habitat for potential restoration.
- IV. Manage genetic integrity and augment or restore populations (stocking endangered fishes).
- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).

GREEN RIVER ACTION PLAN: MAINSTEM

- II. Restore habitat (habitat development and maintenance).
- II.A. Restore and manage flooded bottomland habitat.

II.A.1. Conduct site restoration.
II.A.2. Acquire interest in high-priority flooded bottomland habitats between Ouray NWR and Jensen to benefit endangered fish.
II.A.2.a. Identify and evaluate sites.
IV. Manage genetic integrity and augment or restore populations (stocking endangered fishes).
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.

III. Study Background/Rationale and Hypotheses:

Floodplain wetlands are presumed to be important rearing habitat for razorback sucker following (*Xyrauchen texanus*; Tyus and Karp 1990; Lentsch et al. 1996; Modde 1996; Muth et al. 1998; Wydoski and Wick 1998). Reproduction by razorback suckers occurs on the ascending limb of the spring hydrograph allowing enough time between hatching and swim up for larvae to enter the system when highly productive floodplain habitats are accessible via entrainment (Muth et al. 1998). Seasonal timing of razorback sucker reproduction indicates possible adaptation for using floodplain habitats for rearing purposes (Muth et al. 1998). However, it is unclear how long razorback sucker stay in floodplain nursery habitats before moving into riverine habitats.

The Green River Floodplain Management Plan (2003) identifies the Stirrup floodplain as a high priority habitat for recovery of the endangered razorback sucker, bonytail (*Gila elegans*), and Colorado pikeminnow (*Ptychocheilus lucius*). The natural levee surrounding the Stirrup was breached at the downstream end in March 1997 in an effort to increase the frequency of connectivity between the floodplain and main channel of the middle Green River. Now the floodplain connects at approximately 14,000 cfs and fills more than 20 acres during spring peak flows (Birchell and Christopherson 2004; Valdez and Nelson 2004). The Stirrup is one of the few floodplains in the middle Green River that retains enough water to overwinter fish, thus making it ideal for maintaining razorback sucker over multiple years.

Because of its potential to overwinter fish and because it is a single breach floodplain, the Stirrup was chosen as a study site to research the timing of razorback sucker emigration from highly productive floodplain habitats to riverine habitats. To determine razorback sucker emigration patterns, a variety of age classes have been stocked in the Stirrup floodplain (excess fish not needed to meet Recovery Program stocking goals) for monitoring purposes. Age-1 and age-2 razorback sucker from the Ouray National Fish Hatchery were stocked in the Stirrup in 2007; young-of-year, age-1 and age-2 fish were stocked in 2008; and age-1 fish were stocked in 2009. All razorback suckers were marked with a Passive Integrated Transponder (PIT) tag for individual identification before

being stocked in the Stirrup floodplain. In spring of 2012, the floodplain breach will be monitored to determine whether these fish choose to remain in the floodplain or move into the river. Information gathered during this study will help identify and revise management considerations for the Stirrup floodplain and for other important floodplain nursery habitats in the middle Green River. Additionally, PIT-tagged age-2 bonytail from Wahweap Fish Hatchery were stocked in the Stirrup in April of 2011, thus providing an additional opportunity to investigate life-history adaptations of this species, which are largely unknown, as well as providing additional information on whether there are benefits for stocking this species in off-channel habitats.

IV. Study Goals, Objectives, End Products:

Goal:

Characterize age of emigration of razorback sucker and bonytail from floodplain wetlands to the Green River.

Objectives:

1. Maintain multiple year-classes of razorback sucker and bonytail in the Stirrup floodplain throughout the study by maintaining sufficient water quality.

2. Determine the average duration (via age class) that razorback sucker and bonytail stay in the floodplain before migrating to the river by installing and maintaining appropriate technology in the floodplain breach during spring peak flows.

End Products:

- Annual reports describing the project and its findings.
- Recommendations based on our findings that focus management strategies for the Stirrup and other floodplain habitats in the middle Green River.

V. Study Area:

The study area is limited to the Stirrup floodplain, which is alongside the middle Green River at river mile 276. When discharge at the Jensen gauge (USGS gauge #09261000) exceeds 14,000 cfs the Stirrup floodplain maintains connection with the main channel of the Green River through a single breach at the downstream end.

VI. Study Methods/Approach:

Previous investigations indicate that razorback sucker remain in floodplains for two winters before entering the river during high spring flows as age-2 fish (K. Christopherson, Utah Division of Wildlife Resources, pers. comm.). However, this

information has not been verified with a sampling design specifically developed for answering this question. The proposed study design is intended to determine the average age class of razorback sucker that move from floodplain to riverine habitats. To this end, young-of-year, age-1, and age-2 razorback sucker (2007–2009) and age-2 bonytail (2009) have been stocked in the Stirrup floodplain. Additional stocking may occur in 2012 and 2013 as determined by the Recovery Program and/or if excess fish become available, which will provide additional information to verify 2008–2010 results.

Water quality will be measured in the Stirrup year-round (2012–2013) to ensure proper depth and dissolved oxygen concentrations for maintaining stocked fish throughout the summer and overwinter. The floodplain completely filled due to high flows in spring 2008 and again in spring 2009; however, if dissolved oxygen falls below 3.5 mg/l or the depth falls below 4.0 feet during any sampling occasion, we will pump water into the floodplain using a 6" trash pump. Additionally, we will pump water into the floodplain in November 2011 and 2012 to raise oxygen levels and increase overwinter survival.

We will sample the Stirrup floodplain to determine whether razorback sucker and bonytail successfully overwinter and to collect pre- versus post-connection population information. Sampling this floodplain has proven difficult in the past due to overall depth and low conductivities; however, multiple gear types (boat electrofishing, fyke nets, trammel nets) will be used in an effort to contact these fish again. In order to better identify the overwintering size of the population, we will attempt a population estimate by mark-recapture methods. If successful, this will help us compare results of the PIT tag reader with the actual number of fish in the Stirrup. This will be done in the spring and summer (2012–2013) to best estimate the number of fish that moved out and the age class of those fish. With three antennas (see below) in the Stirrup breach, we should not miss any tagged fish moving out of the floodplain; however, a population estimate in the floodplain before and after these movements should allow us to confirm whether this was the case.

To monitor fish movement out of (and into) the Stirrup, the Recovery Program has already purchased a Digital Angel FS1001M Reader (MUX). The MUX can run up to six stationary antennas at one time; however, we have identified the need for only three antennas in the Stirrup breach. Multiple antennas allow for determination of directional movement and a probability of detection, and also ensure that nearly all of the tags passing through the antenna are read at least once. If there are multiple fish moving through the breach at the same time, there is a much greater chance that all fish will be picked up with multiple opportunities (antennas) for the tag to be read. We will install this stationary PIT antenna system prior to spring connection, fine-tune the antennas upon connection, and monitor fish movement for the entire duration that the floodplain is breached. Antennas will be powered by two solar panels and four batteries, which will give us 24V and 200 amp-hours. Given that the MUX with three antennas uses about 1 amp per hour; this configuration allows us to leave the system at the Stirrup without ever having to recharge the batteries.

VII. Task Description and Schedule:

Task 1. Pump water from the Green River into the Stirrup floodplain to maintain sufficient water quality. This includes preparation of compliance documents for the Utah Division of Water Rights (the EA for work on BLM property was finalized in 2007).

Fall 2011 and 2012

Task 2. Stock razorback sucker in the Stirrup floodplain

Will occur as requested.

Task 3. Water quality monitoring and fish sampling in the Stirrup floodplain.

Fall 2011 through summer 2013; water quality monitoring will occur year-round and fish sampling will occur in April and June or July.

Task 4. Install stationary PIT reader and antennas prior to peak flows.

April 2012 and 2013

Task 5. Download PIT tag data and monitor PIT tag array.

May–June 2012 and 2013

Task 6. Summarize results and reporting.

November–December 2012 and 2013

VIII. Deliverable, Due Dates, and Budgets by Fiscal Year:

Recovery Program annual progress reports: November 2012–2013.

Budget:

FY 2012

Task 1: Pumping	**Work days**	**Cost**
Labor		
Tech II ($271/day)	7	$1,897
Travel		
Mileage (#11204; 5% of annual usage)		$340
Supplies		$200
Gas, etc.		$2,000
Equipment		
Pump rental	14	$2,000

TOTAL	**$6,437**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.

Gas for pump based on 2010 fall pumping costs (2 weeks of pumping) = $1,798 + inflation.

Temporary water rights must be purchased prior to pumping.

Labor and equipment days do not match because it only takes one half-day to fill the pumps.

Task 2: Stocking (no funding necessary)

Task 3: Monitoring/sampling	**Work days**	**Cost**
Labor		
Leader ($354/day)	8	$2,832
Tech II ($271/day)	4	$1,084
Tech I ($195/day)	4	$780
Travel		
Mileage (#11204; 10% of annual usage)		$680
Supplies		
Gas, etc.		$200
Equipment		
Pump rental		
TOTAL		**$5,576**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.

Task 4: Reader installation	**Work days**	**Cost**
Labor		
Leader ($354/day)	2	$708
Tech II ($271/day)	2	$542
Travel		
Mileage (#12995; 5% of annual usage)		$340
Supplies		$300
Gas, etc.		
Equipment		
Pump rental		
TOTAL		**$1,890**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.

Task 5: Monitor reader	**Work days**	**Cost**
Labor		
Leader ($354/day)	7	$2,478
Tech II ($271/day)	2	$542
Travel		

Mileage (#12995; 15% of annual usage)		$1,020
Supplies		
Gas, etc.		
Equipment		
Pump rental		
TOTAL		**$4,040**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.
Labor and mileage days do not match because checking the reader is done in half-day increments.

Task 6: Summarize results		
Labor		
Leader ($354/day)	8	$2,832
TOTAL		**$2,832**
Grand Total		**$20,775**

FY 2013

Task 1: Pumping	**Work days**	**Cost**
Labor		
Tech II ($271/day)	7	$1,897
Travel		
Mileage (#11204; 5% of annual usage)		$340
Supplies		$200
Gas, etc.		$2,000
Equipment		
Pump rental	14	$2,000
TOTAL		**$6,437**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.
Gas for pump based on 2010 fall pumping costs (2 weeks of pumping) = $1,798 + inflation.
Temporary water rights must be purchased prior to pumping.
Labor and equipment days do not match because it only takes one half-day to fill the pumps.

Task 2: Stocking (no funding necessary)

Task 3: Monitoring/sampling	**Work days**	**Cost**
Labor		
Leader ($354/day)	8	$2,832
Tech II ($271/day)	4	$1,084
Tech I ($195/day)	4	$780
Travel		
Mileage (#11204; 10% of annual		$680

usage)		
Supplies		
Gas, etc.		$200
Equipment		
Pump rental		
TOTAL		**$5,576**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.

Task 4: Reader installation	**Work days**	**Cost**
Labor		
Leader ($354/day)	2	$708
Tech II ($271/day)	2	$542
Travel		
Mileage (#12995; 5% of annual usage)		$340
Supplies		$300
Gas, etc.		
Equipment		
Pump rental		
TOTAL		**$1,890**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.

Task 5: Monitor reader	**Work days**	**Cost**
Labor		
Leader ($354/day)	7	$2,478
Tech II ($271/day)	2	$542
Travel		
Mileage (#12995; 15% of annual usage)		$1,020
Supplies		
Gas, etc.		
Equipment		
Pump rental		
TOTAL		**$4,040**

The State of Utah switched to Automotive Resources Inc. for motor pool operations. It is now easier to calculate the percent of total annual usage that each project requires and multiple that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.
Labor and mileage days do not match because checking the reader is done in half-day increments.

Task 6: Summarize results		
Labor		
Leader ($354/day)	8	$2,832
TOTAL		**$2,832**

Grand Total **$20,775**

IX. Budget Summary

FY 2012	$20,775
FY 2013	$20,775

X. Reviewers:

XI. References:

Birchell, G.J. and K. Christopherson. 2004. Survival, growth, and recruitment of larval and juveniles razorback sucker (*Xyrauchen texanus*) introduced into floodplain depressions of the Green River, Utah. Utah Division of Wildlife Resources, publication no. 04-15, Salt Lake City, Utah.

Christopherson, K. Native Aquatics Project Leader, Utah Division of Wildlife Resources, Northeastern Region, 1998-2006.

Lentsch, L., T. Crowl, P. Nelson, and T. Modde. 1996. Levee removal strategic plan. Utah Division of Wildlife Resources, Salt Lake City, UT. 21 pp.

Modde, T. 1996. Juvenile razorback sucker (*Xyrauchen texanus*) in a managed wetland adjacent of the Green River. Great Basin Naturalist 56:375-376.6

Muth, R.T., G.B. Haines, S.M. Meismer, E.J. Wick, T.E. Chart, D.E. Snyder, and J.M. Bundy. 1998. Reproduction and early life history of razorback sucker in the Green River, Utah and Colorado, 1992 – 1996. Final Report submitted to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Denver, CO. 62 pp.

Tyus, H. M., and C. A. Karp. 1990. Spawning and movements of razorback sucker, *Xyrauchen texanus*, in the Green River basin of Colorado and Utah. Southwestern Naturalist 35:427–433.

Valdez, R.A. and P. Nelson. 2004. Green River Subbasin floodplain management plan. Final report of the Upper Colorado River Endangered Fish Recovery Program, Denver, CO.

Wydoski, R.S. and E.J. Wick. 1998. Ecological value of floodplain habitats to razorback suckers in the Upper Colorado River Basin. Final Report submitted to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Denver, CO. 55 pp.