COLORADO RIVER RECOVERY PROGRAM **Project No.:** FR165
FY 2012-2013 PROPOSED SCOPE-OF-WORK for:

Use of the Stewart Lake floodplain by larval and adult endangered fishes

Lead Agency: Utah Division of Wildlife Resources

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

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

I. Title of Proposal:

Use of the Stewart Lake floodplain by larval and adult endangered fishes

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

II.A.1. Conduct inventory of flooded bottomlands habitat for potential restoration.
V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).

GREEN RIVER ACTION PLAN

I.A.3.d.1. Conduct real-time larval razorback and Colorado pikeminnow sampling to guide Flaming Gorge operations.
I.D.1. Develop study plan to evaluate flow recommendations.
I.D.1.a. Evaluate survival of young and movement of sub-adult razorback suckers from floodplains into the mainstem in response to flows.
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.

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 recognized as important habitats for early life-stages of razorback sucker (*Xyrauchen texanus*; Wydoski and Wick 1998; Muth et al. 1998; Lentsch et al. 1996; Modde 1996; Tyus and Karp 1990). 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 main channel drift when highly productive floodplain habitats are accessible (Muth et al. 1998). Seasonal timing of razorback sucker reproduction indicates possible adaptation for entrainment and use of floodplain habitats for rearing purposes (Muth et al. 1998). However, it is unclear how long young razorback sucker stay in floodplains before moving into riverine habitats. In addition, other endangered fishes have been documented using floodplain habitat, but enumeration is limited.

The Green River Floodplain Management Plan identifies Stewart Lake wetland as a priority habitat for endangered fishes. Stewart Lake is the third largest of 16 identified priority wetlands, thus providing greater area and depth for potential nursery habitat for larval razorback sucker (i.e., overwinter survival) and other native and endangered fishes (Valdez and Nelson 2004). Additionally, it is approximately 11 miles downstream of a known razorback sucker spawning bar, allowing for potential entrainment (Valdez and Nelson 2004). In comparison to other floodplains, Stewart Lake is an ideal study area given that the structural design provides flexibility in water management; this feature allows for: (1) management of inlet and outlet structures to maximize entrainment during floodplain connectivity, (2) timing and control of outlet releases to monitor escapement, and (3) complete draw down to control nonnative abundance and reset the system any given year. Moreover, previous findings show that entrainment greatly increases in this system when operated as a flow-thru wetland (Hedrick et al. 2009), which is something that can be manipulated to answer questions regarding wetland habitat use. Stewart Lake has never been adequately sampled to determine its use as larval or adult native fish habitat. However, 42 bonytail (*Gila elegans*) and three Colorado pikeminnow (*Ptychocheilus lucius*) were documented leaving the floodplain in August 2009 when a stationary PIT-antenna was installed at the outlet canal (UDWR, unpublished data). Likewise, stationary PIT antennas used in other single-breach monitoring efforts have provided a wealth of information on wetland habitat use by several endangered species (Breen 2011).

Recent findings by Bestgen et al. (2011) indicate that further investigations are needed regarding the timing of Flaming Gorge Dam releases and larval razorback sucker entrainment. Therefore, a study plan to examine larval razorback sucker

occurrence in the Green River as a trigger for Flaming Gorge operations is currently being developed. In response to this effort, we are proposing that the Stewart lake wetland, a floodplain we have the ability to manipulate, is an ideal setting to conduct a comprehensive study of fishes that immigrate into the wetland habitat during floodplain connection, utilize the habitat post connection, and emigrate from the wetland during draw down. Using various sampling techniques during different stages of floodplain use (i.e. entrainment, retention, escapement), we will greatly increase our chances of characterizing use of floodplain wetlands by wild-spawned razorback sucker and other endangered fishes. However, information compiled from a single sampling season may limit our ability to draw final conclusions due to confounding environmental factors (i.e., annual peak flows), thus a multi-year study will provide a more complete evaluation for guiding future floodplain management decisions.

IV. Study Goals, Objectives, End Product:

Goal: Characterize use of a controlled flow-thru floodplain wetland by larval and adult endangered fishes, emphasizing razorback sucker.

Objectives: 1) Monitor entrainment of larval and adult endangered fishes during high-flow connection of riverine and wetland habitats. 2) Examine fish community composition and habitat characteristics in the Stewart Lake wetland following floodplain connection to assess summer survival. 3) Monitor escapement (fish moving out of the wetland) of native and nonnative fishes entrained in Stewart Lake during a controlled release.

End Product: An annual report describing how Stewart Lake functions as habitat for larval and adult endangered fishes. We will provide information on: (1) larval razorback sucker entrainment, (2) endangered and large bodied nonnative fishes entering the floodplain during high-flow connection, (3) fish community composition, water quality parameters, and wetland habitat characteristics thru time following the connection period, and (4) species-specific information on emigration of fishes during the draw down period, including additional information on fishes emigrating from the floodplain. In addition, multiple captures/detections of the same fish from more than one component of our study with allow us to investigate overall use and survival during the course of a single season of entrainment.

V. Study Area:

Stewart Lake, which is located in the middle Green River at river mile 300, begins flooding at 7,500 cfs and inundates approximately 570 acres (Valdez and Nelson 2004). Low flow connection relative to other wetland habitats allows for research opportunities across a range of flow conditions. Water enters the wetland through a single breach inlet and exits through a single outlet canal. Timing and extent of

floodplain inundation and draw down can be manipulated via floodgate operations which can be regulated to meet multiple research objectives.

VI. Study Methods/Approach:

Topics of interest in the upcoming larval trigger study plan to assess Flaming Gorge Dam releases will be addressed in accordance with our proposed Stewart Lake study. Specifically, razorback sucker larval entrainment and nonnative fish diversity and abundance in floodplain wetlands. In addition to the larval trigger topics, information on adult endangered species (immigration, entrainment and emigration) using the floodplain habitat will be evaluated. Below we have outlined our proposed plans to systematically examine the Stewart Lake wetland and outlet from the point of floodplain connection to draw-down.

To monitor larval and adult fishes entering the Stewart Lake wetland we will sample with a picket weir that we will install at the outlet structure and light traps within the wetland. Through continuous operation (24 hours a day), the weir will monitor fish movement for the entire duration that the floodplain is breached. The traps will be checked hourly or less frequently depending on fish entrainment to reduce stress to native fishes. Pickets will be spaced by 0.25 inches, which will capture the majority of fish entering the wetland, but will allow larval razorback sucker and small-bodied fishes to move into the wetland freely. This will determine if adult endangered fish are immigrating into Stewart Lake or only utilizing the habitat for the duration of floodplain connection. It will also allow for the monitoring and removal of large bodied nonnatives during inundation, which will reduce competition and predation on larval razorback sucker within Stewart Lake.

Twenty to 25 light-traps will be positioned in the inlet and in the main body of the wetland at the point of floodplain connection. Daily sampling will initiate following larval detection in the main channel (project 22f), and continue for the duration of larval drift (approximately 3-6 weeks) or conclude due to floodplain disconnection from the main channel. All larval fish present in the traps will be collected and preserved for later identification by the Larval Fish Lab (costs included in project #15 budget). Habitat parameters, mainly discharge measurements, will be recorded at the inlet and outlet structures during floodplain inundation (not feasible at extremely high flows).

We will utilize various sampling techniques to evaluate fish community composition and we will monitor water quality and habitat parameters in the Stewart Lake wetland following floodplain connection. Following floodplain inundation and disconnection, the wetland will be systematically sampled biweekly to evaluate fish community composition through time (until wetland is drained–4 sample periods). Once the wetland is completely drained (see below), we will conduct a final sweep to determine fishes that did not escape during water release. During bi-weekly fish sampling, cross-sectional profiles and area

estimates will be conducted using a hand-held GPS, depth finder and range finder. We will also monitor water quality parameters (dissolved oxygen, pH, conductivity and temperature) during bi-weekly sampling.

The picket weir will monitor the escapement of native and nonnative fishes retained in the Stewart Lake wetland following high flow connection. Wetland draw down will be coordinated with the UDWR habitat manager (timing and duration of release), to monitor fishes leaving the wetland. This will allow us to affectively sample fish leaving the wetland (tagged and untagged).

VII. Task Description and Schedule:

Our timeline is subject to change for tasks 1-3 based on the timing and duration of peak flows.

Task 1: Install, operate and maintain a picket weir in the Stewart Lake outlet; May–June

Task 2: Sample the fish community in the Stewart Lake wetland and monitor post-connection water quality and habitat parameters; June–August

Task 3: Sample fishes exiting the Stewart Lake outlet with a picket weir during draw-down; September

Task 4: Data entry, analysis and reporting; October–November

VIII. FY 2012 Work and Budget – see FY12-13 SOW

IX. FY 2013 Work:

Deliverables/Due Dates: Complete annual report in November 2013.

Budget:

Task 1: Picket weir operation (outlet)	**Work days**	**Cost**
Labor	14 days of operation; 6 to build	
Biologist ($342/day)	10	$3,420
Tech II ($250/day)	14	$3,500
Tech II ($271/day)	6	$1,626
Tech I ($195/day)	24	$4,680
Travel		
*Mileage (#12995; 10% of annual usage)		$680
Equipment		$2,946
**Weir construction		
TOTAL		**$16,852**

*The State of Utah uses Automotive Resources Inc. for motor pool operations; calculation = percent of total annual usage multiplied by total annual cost.

**The cost is for the construction of a seven-foot tall directional aluminum picket weir. The cost of aluminum is 0.93 cents/ft, $1.13/ft and $2.92/ft (rods, flat strap and angle aluminum, respectively).

Task 2: Wetland sampling	Work days	Cost
Labor	16 days; bi-weekly sampling	
Project Leader ($354/day)	6	$2,124
Biologist ($342/day)	10	$3,420
Tech II ($250/day)	16	$4,000
Tech I ($195/day)	24	$4,680
Travel		$1,360
*Mileage (#11204; 20% of annual usage)		
Supplies		$2,000
Gas/oil, repairs, alcohol, sample jars, batteries, spare bulbs		
TOTAL		**$17,584**

*The State of Utah uses Automotive Resources Inc. for motor pool operations; calculation = percent of total annual usage multiplied by total annual cost.

Task 3: Outlet sampling	Work days	Cost
Labor	4 day draw-down	
Biologist ($342/day)	2	$684
Tech II ($250/day)	4	$1,000
Tech I ($195/day)	8	$1,560
Travel		
Mileage (#11204; 5% of annual usage)		$340
TOTAL		**$3,244**

*The State of Utah uses Automotive Resources Inc. for motor pool operations; calculation = percent of total annual usage multiplied by total annual cost.

Task 4: Summarize results	Work days	Cost
Labor		
Project Leader ($354/day)	2	$708
Biologist ($342/day)	8	$2,736
Tech II ($250/day)	8	$2,000
Travel		
Meeting/conference costs		$300
TOTAL		**$5,744**

X: Program Budget Summary:

FY 2013: $43,424

XI: Reviewers:

XII: References:

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,

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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.

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