Project Title
Matheson Preserve Larval Razorback Sucker Entrainment

Bureau of Reclamation Agreement Number:
R14AP00059

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Abstract:
This project aims to operate an enhanced wetland to provide rearing habitat for larval razorback sucker during most water years, and evaluate success by enumerating and releasing young of the year to the Colorado River. 2020 marked the first operation of the water control structure and fish screens. Preliminary larval identifications indicate successful entrainment of razorback sucker in the wetland. However, the incomplete status of supplemental water pipeline prevented maintenance of suitable water quantity and quality into summer months, and the gate was reopened in late June to allow entrained native fish to access to improved water quality. Sampling conducted during draining indicates possible early juvenile razorback sucker recruitment (sample identifications pending), and successful exclusion of large-bodied non-native fishes.

Study Schedule:
2019-Ongoing

Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

III.A. Reduce negative interactions between nonnative and endangered fishes.
V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).

COLORADO RIVER ACTION PLAN: MAINSTEM

II.A. Restore and manage flooded bottomland habitat
II.A.7. Matheson
II.A.7.d. Operate and maintain

Accomplishment of FY 2020 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: Inlet sampling for larval razorback arrival.

Larval fish samples were collected from the wetland inlet channel from 05 May to 09 June 2020 using quadrafoil light traps. May 5 was the first date when river conditions inundated the channel, allowing for light trap sampling. Sampling typically consisted of two to four deployed at pre-determined stations spaced longitudinally along the channel between its mouth at the Colorado River and the water control structure at its interface with the wetland pond. A total of 30 light trap samples were collected from the inlet, all of which contained larval fishes which were preserved for identification at Colorado State University Larval Fish Lab (CSU LFL). A revised version of this report will be submitted when identification data are available.

In order to determine presence or absence of razorback sucker larvae in the inlet channel, preliminary identification of larval suckers was conducted at UDWR Moab with remote consultation by CSU LFL. Identifications were not exhaustive; i.e. catostomid larvae were keyed out to species until the author was confident in positive identification of at least five individual razorback sucker *Xyrauchen texanus* specimens from each light trap sample. Remote consultation occurred via emailed photos of larval specimens for confirmation. These preliminary identifications indicated presence of razorback sucker flexion mesolarvae in the inlet channel from first sampling on 05 May 2020.

Task 2: Operations, wetland fish sampling, and water quality monitoring.

Wetland Filling

The objective of this task is to hold Colorado River flood water out of the wetland until larval razorback sucker presence is determined in the inlet channel, then open the gate and flood the wetland with river water containing larvae while deploying a fish screen to exclude large bodied non-native fishes from the wetland. In addition to the relatively low magnitude spring runoff (Figure 1), unanticipated wetland hydrology and substantial leakage of water through the closed gate caused considerable difficulty achieving the desired entrainment dynamics in 2020.

Unanticipated filling of the wetland from inland water sources occurred both prior and subsequent to Colorado River height reaching the elevation of the gate, filling the pond prior to opening of the gate. An increase of wetland pond elevation by 5 feet was observed between 13 and 17 April 2020, in spite of water leakage through the gate toward the river. The gate was subsequently re-opened to drain the wetland pond and maintain capacity for flood water entrainment.

Colorado River elevation reached the bottom of the gate on approximately 05 May. At this point the gate--which had been opened to drain unanticipated early wetland flooding from inland sources--was again closed. As Colorado River height increased, water elevations on either side of the gate remained near equilibrium—even when closed fully. This phenomenon was likely caused by the leakage of water at the gate, flows from inland surface water sources, and subsurface flow from the river. As a result, minimal hydraulic "head" was generated on the river side of the gate during initial stages of larval razorback sucker presence, preventing managed entrainment of large volumes of river flood water into the wetland.

In the absence of hydraulic pressure to drive wetland flooding and entrainment, the tactic of opening the gate prior to periods of anticipated flow increase was adopted. Timing of entrainment events was determined via Colorado Basin River Forecast Center (CBRFC) projections. The water control structure

was opened and fish screen deployed for two discrete time periods: 18-22 May and 29 May-03 June. Timing of these entrainment events was concurrent with both presence of larval razorback sucker in the inlet channel and distinct peaks in Colorado River discharge (Figure 1).

Water quality and wetland draining
Dissolved oxygen concentrations and temperatures in the wetland were measured continually via two submerged MiniDOT loggers (Figure 2). As wetland elevation declined, these parameters were also manually via a handheld sensor to gain real-time data and avoid fish mortality. By 12 June, when maximum depth in the wetland had receded to approximately 1.5 feet and dissolved oxygen concentration fell below 4 mg/L, the gate was reopened. As river and wetland elevations were very close, this management action did not constitute immediate draining of the wetland *per se*, but rather continued mixing of river and wetland water and—hypothetically—allowing for movement of entrained native fish through the fish screen into more suitable water quality in the inlet channel and/or river.

Post-entrainment fish community sampling
In order to confirm presence of razorback sucker larvae in the wetland, additional larval light trap sampling occurred inside the pond from 19 May to 11 June 2020. Larval razorback sucker were preliminarily identified from samples collected within the wetland on 19 May—shortly after opening the gate.

Due to the rapid decline of water quality and quantity in the month of June, we conducted early and abbreviated surveys of small bodied fishes in the preserve during wetland draining on 18 and 29 June, respectively. Twelve seine hauls were collected. Six of these hauls contained YOY suckers preserved for identification. In general, the vast majority of these seine hauls contained small bodied nonnative cyprinids common in other off-channel habitats. Ancillary fish captures are reported in Table 1.

Notably, no large bodied non-native fishes were present in any seine hauls. One adult centrarchid believed to be *Micropterus sp.* was observed within the pond, but none were captured or observed during draining. Two hypotheses were developed explaining this observation. First, the individual may have entered the pond at a size small enough to pass the fish screen and subsequently grown. Second, *Micropterus sp.* have been observed in low densities in nearby private ponds from which a fish could conceivably move during rare flood events large enough to create temporary connectivity with the wetland. However, this was an isolated observation, and a problematic invasion by large-bodied centrarchids was not apparent in sampling.

Task 3: Data entry, analysis and reporting

- Larval and juvenile fish collections and accompanying data were transferred to CSU LFL in September 2020.
- FY20 Submersible PIT antenna data will be submitted to the STReaMS database by the end of January, 2021.

Additional noteworthy observations:

- Installation of supplemental water pipeline is in progress as of October 2020 and is expected to be complete in November 2020. Use of the pipeline to bring fresh water into the wetland is expected to extend the duration of suitable water quality and quantity of the wetland pond through the summer.
- Two submersible PIT tag antennas were deployed in the inlet channel immediately adjacent to

the water control structure. In contrast to 2019 when 88 fish were detected (74 bonytail *Gila elegans*, 9 razorback sucker and 5 unidentified), only two tags were detected during the months of May and June 2020. Both tags detected in 2020 are attributed to bonytail in the STReaMS database.

Recommendations:

- Adjust gate position and seal to better control water before and after entrainment. An attempt was made to improve water storage in 2020 deploying a pond liner against the gate, but due to a corroded winch cable crews were unable to access the gate in a timely and safe manner. New, corrosion-resistant winch cables will be installed this off-season, and manufacturer recommendations of gate and seal position adjustment will also be implemented. Continued use of pond liner may further seal the gate if necessary.
- Use new supplemental water conveyance to maintain wetland water quantity and quality in future years.
- Consider shipping of larval specimens to CSU LFL for rapid identification for time-sensitive management decisions (e.g. 2020 operations in which only brief, low magnitude flow peaks were available for flooding).
- Otherwise continue operations as outlined in FY2021 SOW.

Project Status:
On track & ongoing.

FY 2020 Budget Status:
Funds Provided: $30,538
Funds Expended: $30,538
Difference: -0-
Percent of the FY 2020 work completed, and projected costs to complete: 100%
Recovery Program funds spent for publication charges: -0-

Status of Data Submission:
Submersible PIT antenna data will be uploaded into STReaMS by the end of December, 2020.

Signed:
Zachary Ahrens
Principal Investigator
30 October 2020

Table 1.
Ancillary fish captures from wetland seine hauls, June 18 & 29, 2020.

Species	Number of fish	Average length (mm)
green sunfish *Lepomis cyanellus*	55	106
western mosquitofish *Gambusia affinis*	11	-
largemouth bass *Micropterus salmoides*	5	50
black bullhead *Ameiurus melas*	3	133
smallmouth bass *Micropterus dolomieu*	3	37
black Crappie *Pomoxis nigromaculatus*	1	47
fathead minnow *Pimephales promelas*	uncounted	-
red shiner *Cyprinella lutrensis*	uncounted	-
sand shiner *Notropis stramineus*	uncounted	-

Figure 1.
Colorado River Cisco gage hydrograph, 2020. Managed wetland flooding (shaded vertical bars) occurred during dual peaks in discharge in late May and early June. Figure courtesy of U.S. Geological Survey.

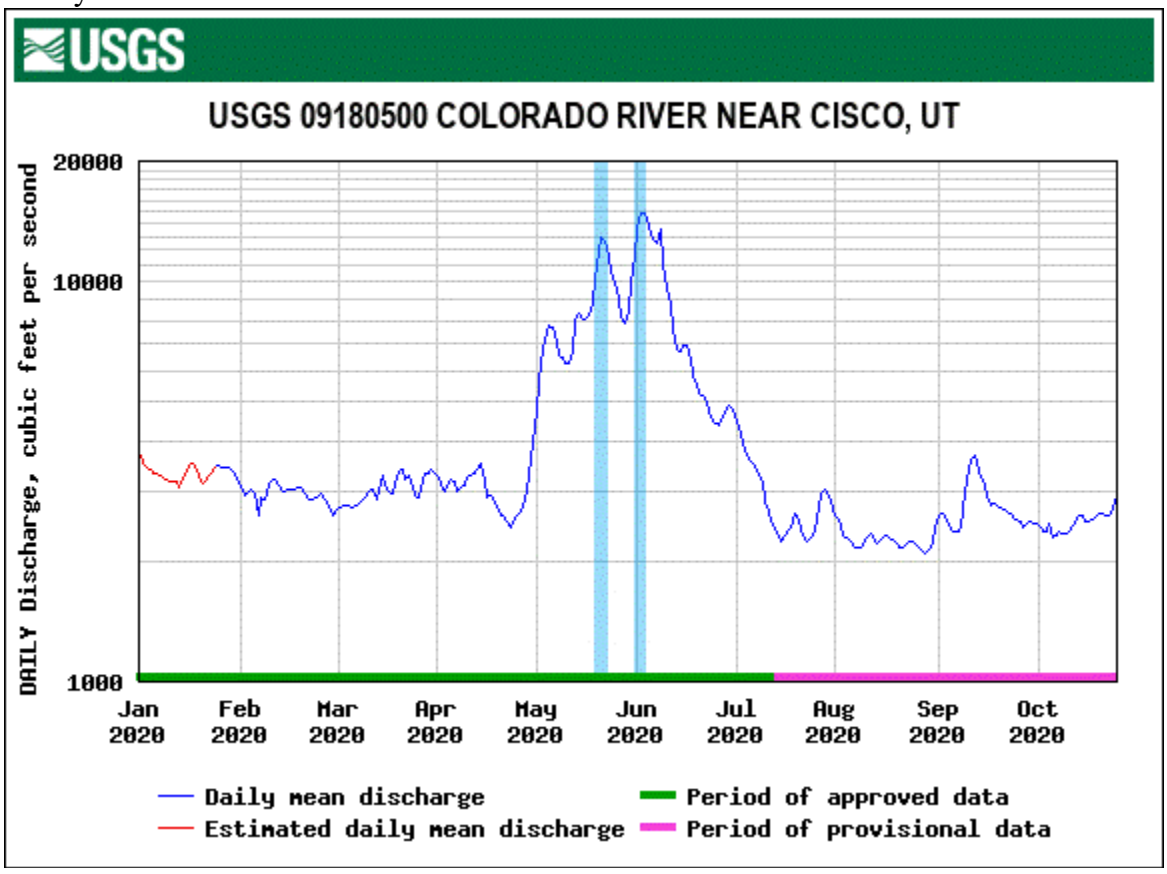

Figure 2.
Wetland dissolved oxygen concentration (top) and temperature (bottom) measured via MiniDOT logger, May through June 2020. Note dissolved oxygen concentration decreasing to near-zero levels in late May and early June. Low dissolved oxygen concentration and rapidly declining water volume triggered wetland draining on 12 June 2020.