

I. Project Title: Young-of-the-year Colorado pikeminnow monitoring

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III. Project Summary:

This project monitors populations of endangered fishes in Utah. The following objectives have been outlined for young-of-the-year (YOY) Colorado pikeminnow:

1. Determine size and relative numbers of YOY Colorado pikeminnow at the end of their first growing season to complement larval and juvenile sampling data.
2. Using new and existing data, determine relationship between larval and YOY Colorado pikeminnow CPE abundance estimates with respect to flow and temperature.

3. Using new and existing data, develop predictive model that relates larval and YOY Colorado pikeminnow abundance.
4. Using new and existing data, determine relationship between YOY and juvenile Colorado pikeminnow CPE abundance estimates with respect to YOY size, flow, and temperature.
5. Using new and existing data, develop predictive model that relates YOY and juvenile Colorado pikeminnow abundance.

IV. Study Schedule:

- a. Initial year: 2006
- b. Final year: 2010

V. Relationship to RIPRAP:

GENERAL RECOVERY 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.

VI. Accomplishment of FY 2008 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings

Task Description (FY 2008):

1. Middle Green River (reach 4) Seine backwaters and low velocity habitats to collect data for endangered, native, and nonnative fish. Collect physical habitat data.
2. Lower Green River (reach 3) Seine backwaters and low velocity habitats to collect data for endangered, native, and nonnative fish. Collect physical habitat data.
3. Lower Colorado River (reach 1) Seine backwaters and low velocity habitats to collect data for endangered, native, and nonnative fish. Collect physical habitat data.

#### Task 1 : Middle Green River: Reach 4

Annual monitoring for YOY Colorado pikeminnow began on 22 September and was completed on 2 October 2008. Seining began at the uppermost subreach near river-mile 320 (Split Mountain) and continued down-river by sampling two backwater habitats within every 5-mile subreach and concluded near river-mile 215 (Sand Wash). Two backwaters were sampled in each subreach unless that subreach did not contain two backwaters. A total of 36 of the possible 42 backwaters were sampled (ones less than in 2007). Main channel temperatures ranged from 14.0°C to 20.8°C. Backwater temperatures ranged from 14.0°C to 24.4°C. Green River discharge (as measured at the Jensen gauge) ranged from 2,110 cfs (at the start) to 2,060 cfs (at the end – lag time not accounted for) during the sampling period and did not seem to fluctuate drastically between days. These flows are quite close to the mean daily values for this time of year based on the period of record for this gauge (1947 – 2007).

Eighteen YOY Colorado pikeminnow were captured, measured, and released during the 2008 field sampling activities for YOY Colorado pikeminnow monitoring. Two additional pikeminnow were captured for the Native Fish Response project (#144); please see the annual report for this project for total Colorado pikeminnow numbers. YOY Colorado pikeminnow averaged 43.9mm. This is slightly less than the 10-year average for this reach (1998-2008). Lengths ranged from 36 – 56 mm (Table 1). Sixteen of the 18 Colorado pikeminnow were captured in the third seine haul of one backwater. This backwater was located at RM 221.7, below the confluence with the White River.

Additional YOY native species collected include: flannelmouth sucker (n = 10), bluehead sucker (n = 12), and Gila *spp.* (n = 3). Seine samples continue to be dominated by nonnative cyprinids including red shiner, fathead minnow and sand shiner. However, total catch of these species was dramatically reduced from 2007 (see annual report for project #144 for specifics). There were a total of 14 nonnative species collected in seine samples (one more species than in 2007, although two new species were observed (killifish and yellow bullhead)). Nonnative species collected include fathead minnow (n = 603), channel catfish (n = 7), carp (n = 221), green sunfish (n = 436), red shiner (n = 2787), smallmouth bass (n = 7), sand shiner (n = 2058), white sucker (n = 20) black crappie (n = 61), black bullhead (n = 20), plains killifish (n = 1), yellow bullhead (n = 1), gizzard shad (n = 27), and white sucker x flannelmouth sucker hybrid (n = 32). We did not collect any bluegill this year. From 2005 to 2006, we saw an overall decrease in the number and diversity of natives, from 38 total natives representing five species in 2005 to 21 total natives representing only two species in 2006. In 2007, we saw more natives in terms of both numbers and diversity. In 2007, we captured 45 total natives representing four species (does not include two flannelmouth x bluehead sucker hybrids). In 2008, we again saw four species, but did not capture as many total numbers of each species as in 2007, although numbers are not likely significantly different.

Table 1. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m<sup>2</sup>), by year for Colorado pikeminnow caught during young-of-year monitoring on the middle Green River (Reach 4), 1990-2007.

Year	Colorado Pikeminnow Caught	Mean Length (mm)	Length Range (mm)	Total Area Sampled (m <sup>2</sup> )	CPUE (Fish/100m <sup>2</sup> )
1990	341	45.4	28 – 80	5093	5.5
1991	524	38.2	21 – 65	5077	10.3
1992	183	43.1	26 – 133	4697	3.9
1993	305	36.4	21 – 59	3960	7.7
1994	15	67.2	60 – 80	4356	0.3
1995	75	34.5	21 – 48	3792	2.0
1996	79	39.4	25 – 60	3912	2.0
1997	22	36.0	28 – 49	3734	0.6
1998	73	38.5	22 – 61	4986	0.9
1999	12	33.7	25 – 45	3897	0.3
2000	31	50.9	37 – 76	3798	0.8
2001	8	46.9	36 – 67	4496	0.2
2002	0	N/A	N/A	5202	0
2003	2	52	52 – 52	4696	0.04
2004	60	43.8	31 – 63	4686	1.28
2005	8	48.6	35 – 60	4190	0.2
2006	5	45.8	36 - 50	7490	0.07
2007	3	73.3	69 – 76	5782	0.05
2008	18	43.9	36 – 56	4994	0.36

Task 2 & 3 : Lower Green River (Reach 3), Colorado River (Reach 1)

Annual monitoring for YOY Colorado pikeminnow began on September 16 and was completed on September 19, 2008. One group of 2-4 researchers seined the Colorado River (reach 1) from river-mile 110 (Cisco Landing) to river-mile 16.7 (Indian Creek). The group sampled two backwater habitats within every 5-mile sub-reach, as available. A second group of three researchers sampled from river-mile 120 (Green River State Park) to river-mile zero (confluence with the Colorado River) of the Lower Green River (reach 3). The group also sampled river-miles 0-16.7 (confluence to Indian Creek) of the Colorado River (reach 1). Backwaters were sampled in 13 of 20 sub-reaches in the Colorado River and 23 of 24 sub-reaches in the lower Green River. In the Colorado River, water temperatures ranged from 17 to 20 °C in the main channel and 17 to 25 °C in backwaters. In the Green River, water temperatures ranged from 18 to 23 °C in the main channel and 20 to 32 °C in backwaters. Discharge for the sampling on the Colorado River decreased from 5000 cfs to 4600 cfs over the four days. Discharge for

the sampling on the Green River decreased from 2900 cfs to 2600 cfs over the four days.

In the Colorado River, zero YOY Colorado pikeminnow were captured. The number of Colorado pikeminnow captured is lower than in 2007 when 24 YOY Colorado pikeminnow were captured and considerably lower than the ten-year average of 36.9 fish. The ten-year average CPUE is 0.89 fish/100m<sup>2</sup>.

In the lower Green River, 60 YOY and one JUV Colorado pikeminnow were captured and measured. Forty-nine of these were released alive, while 12 were moved to Dexter National Fish Hatchery. Eighteen additional Colorado pikeminnow were collected and moved to Dexter National Fish Hatchery, although not part of the data set. All fish were sorted, identified and enumerated in the field. The number of YOY Colorado pikeminnow captured was much lower than in 2007 (632) but seems to fit into the cyclical pattern of catches over the past 16 years (Table 3). The CPUE this year was 2.97 fish/100m<sup>2</sup>, lower than the ten-year average of 7.16 fish/100m<sup>2</sup> (Table 3). The average length of YOY Colorado pikeminnow was 31.6 mm which is also below the ten-year average length (1998-2008) of 45.9 mm (Table 3). The Colorado pikeminnow were distributed throughout the entire 120 miles of the Green River. Sixty-three percent of the fish were found in the middle third of the reach (river-miles 40-80).

Other native species captured in the Colorado River included 4 flannelmouth suckers and 5 bluehead suckers. In the lower Green River 8 flannelmouth suckers were captured.

Nonnative captures were enumerated during the first seine haul in each primary habitat. Total catches in both reaches were once again dominated by nonnative cyprinids. In the Colorado River, eleven nonnative species were captured keeping with the eleven nonnative species captured in 2007. These included red shiners (n = 536), fathead minnows (n = 280), gizzard shad (n = 63), sand shiners (n = 5), common carp (n = 5), black crappie (n = 4), largemouth bass (n = 3), yellow bullheads (n = 1), channel catfish (n = 1), gambusia (n = 1), and white suckers (n = 5). In the lower Green river, nine nonnative species were captured compared to the six captured in 2007. These included red shiners (n = 4,458), fathead minnows (n = 1,074), sand shiners (n = 250), common carp (n = 116), channel catfish (n = 13), yellow bullhead (n = 6), black crappie (n = 2), gizzard shad (n = 1), and largemouth bass (n = 1).

Table 2. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m<sup>2</sup>), by year for YOY Colorado pikeminnow caught during young-of-year monitoring on the lower Colorado River (Reach 1), 1993-2008.

Reach 1 Year	YOY Colorado Pikeminnow Caught	Mean Length (mm)	Length Range (mm)	Total Area Sampled (m <sup>2</sup> )	CPUE (Fish/100m <sup>2</sup> )
1993	142	32.28	22-47	2905	4.88
1994	138	64.07	32-96	3186	4.33
1995	84	20.46	11-35	2890	2.9
1996	866	39.6	20-81	4160	20.81
1997	12	18.3	13-34	2760	0.43
1998	88	34.5	20-60	4710	1.87
1999	8	25	19-43	4790	0.17
2000	170	45.7	25-82	6717	2.53
2001	15	42.3	23-65	3832	0.39
2002	25	57.2	32-87	3070	0.81
2003	0	N/A	N/A	2884	0
2004	16	47	33-63	1616	0.99
2005	19	36.1	28-48	1722	1.1
2006	4	42	27-53	1646.4	0.24
2007	24	37.2	28-47	2802	0.83
2008	0	0	0	2193	0

Table 3. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m<sup>2</sup>), by year for YOY Colorado pikeminnow caught during young-of-year monitoring on the lower Green River (Reach 3), 1993-2008.

Reach 3 Year	YOY Colorado Pikeminnow Caught	Mean Length (mm)	Length Range (mm)	Total Area Sampled (m <sup>2</sup> )	CPUE (Fish/100m <sup>2</sup> )
1993	1211	37.36	14-74	4574	26.47
1994	315	49.98	23-99	3844	8.19
1995	57	24.94	13-45	2722	2.09
1996	410	41.4	19-75	2981	13.75
1997	40	33.1	19-40	2821	1.41
1998	250	32.1	18-68	3235	7.79
1999	304	26.8	15-38	4102	7.41
2000	619	37.9	21-88	3704	16.71
2001	14	43.2	30-68	6015	0.23
2002	22	64.9	22-90	4662	0.47
2003	121	60.1	30-96	4052	2.98
2004	80	46	26-84	1974	4.05
2005	63	31.2	23-41	2937	2.14
2006	331	40.3	23-80	4936	6.71
2007	632	44.8	26-95	3138	20.14
2008	60	32.13	20-46	2018	2.97

Task 4: Analyze past and current data to determine relationships between larval and YOY Colorado pikeminnow CPE abundance estimates and YOY and juvenile Colorado pikeminnow abundance estimates.

Database development and management - Fall 2008-2009

Data analysis - Fall/Winter 2008-2009

Task 5: Develop and refine predictive models.

Model development - Winter 2008-2009

Model refinement - Winter 2008-2009

Task 6: Report Preparation

Annual reports November 2008 - 2009

Draft Final report to recovery program coordinator: May 31, 2010

VII. Recommendations:

- a. Continue to monitor annual relative abundance of post-larval Colorado pikeminnow in the middle Green River, lower Green River and lower Colorado River to develop indices and determine the relationships between these indices and stream flow, water temperature, abundance of sympatric fishes, and physical characteristics of backwaters.
- b. Protocols for species identification of captured YOY Gila spp. need to be developed in order to detect successful reproduction by hatchery-reared stocked bonytail. This may include preserving a sub-sample of captured YOY Gila spp. for laboratory identification.
- c. Abundance of gizzard shad seems to be increasing in backwaters sampled. This possible trend should be confirmed through analysis of past data and addressed in a new removal scope of work if deemed necessary.
- d. Comparisons of data from the inception of the project to current show a precipitous decline in numbers of Colorado pikeminnow sampled. The causes for this decline should be researched and subsequently addressed.

VIII. Project Status:

On track and ongoing

IX. FY 2008 Budget Status

- A. Funds Provided: \$94,511
- B. Funds Expended: \$85,060
- C. Difference: \$ 9451
- D. Percent of the FY 2008 work completed: 90%
- E. Recovery Program funds spent for publication charges: \$0

X. Status of Data Submission: Task 1-3 data has been submitted to Paul Badame

XI. Signed: Paul Badame & Trina Hedrick October 21, 2008  
Investigators Date