

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

II. Principal Investigator(s):

Patrick Goddard /Paul Badame/Julie Howard
Utah Division of Wildlife Resources
Moab Field Station
1165 S. Highway 191 - Suite 4
Moab, UT 84532
435-259-3780; fax: 435-259-3755
email: patrickgoddard@utah.gov

Trina Hedrick/Leisa Monroe
Utah Division of Wildlife Resources
152 East 100 North
Vernal, UT 84078
435-789-3103; fax: 435-789-8343
email: trinahedrick@utah.gov
leisamonroe@utah.gov

Dr. Kevin Bestgen
Larval Fish Laboratory
Department of Fishery and Wildlife Biology
Room 33 Wagar Building
Colorado State University
Fort Collins, CO 80523-1474
970-491-1848/(fax) 970-491-5091
kbestgen@lamar.colostate.edu

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: 2008

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 2007 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings

Task Description (FY 2007):

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.
4. Analyze past and current data to determine relationships between larval and YOY Colorado pikeminnow CPUE abundance estimates and YOY and juvenile Colorado pikeminnow abundance estimates. Report due in FY 2007

5. Develop and refine predictive models.

Model Development – Winter 2006-2007

Model Refinement – Winter 2006-2007

6. Report Preparation:

Annual Report November 2006-2007

Draft report to recovery program coordination – May 31, 2008

Draft final report to peer reviewers and Biology Committee - June 30, 2008

Final report to Biology committee – August 15, 2008

Task 1 : Middle Green River: Reach 4

Annual monitoring for YOY Colorado pikeminnow began on 24 September and was completed on 5 October 2007. Seining began at the uppermost sub-reach near river-mile 320 (Split Mountain) and continued down-river by sampling two backwater habitats within every 5-mile sub-reach and concluded near river-mile 215 (Sand Wash). Two backwaters were sampled in each sub-reach unless that sub-reach did not contain two backwaters. A total of 37 of the possible 42 backwaters were sampled (three fewer than in 2006). Main channel temperatures ranged from 10°C to 18°C. Backwater temperatures ranged from 10°C to 19°C. Green River discharge (as measured at the Jensen gauge) ranged from 1,250 cfs to 1,490 cfs during the sampling period, but seemed to be around 1,340 cfs on most sampling days. These flows are below the mean and median values for this time of year based on the period of record for this gauge (1947 – 2007). Efforts in 2007 were slightly different than in 2006. In comparison, sampling in 2006 began on 13 September and ended on 3 October. Temperatures over this time ranged from 7°C to 22°C in the main channel and 9°C to 23°C in the backwaters. Green River discharge ranged from 1100 – 1800 cfs during the period of sampling in 2006.

Three YOY Colorado pikeminnow were captured, measured, and released during the 2007 field sampling activities for YOY Colorado pikeminnow monitoring. 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 73.3mm. This is longer than the 10-year average for this reach (1996-2006). Lengths ranged from 69 – 76 mm (Table 1). One pikeminnow was captured just below Sportsman's Drain (RM 267.9), in the upper part of the reach and the other two were captured in the lower part of the reach between the Ouray Bridge and Sand Wash (RM 238.7 & 236.8).

Additional YOY native species collected include: flannelmouth sucker (n = 17), bluehead sucker (n = 22), and roundtail chub (n = 2). Seine samples continue to be dominated by nonnative cyprinids including red shiner, fathead minnow and sand shiner. However, red shiner numbers appeared to be down dramatically from 2006 (see annual report for project #144 for specifics). There were a total of 13 nonnative species collected in seine

samples (in comparison to nine in 2005 and 12 in 2006). Nonnative species collected include fathead minnow (n = 751), channel catfish (n = 18), carp (n = 130), green sunfish (n = 23), red shiner (n = 9528), smallmouth bass (n = 18), sand shiner (n = 8331), white sucker (n = 26) black crappie (n = 41), black bullhead (n = 26), bluegill (n = 1), gizzard shad (n = 8), and white sucker x flannelmouth sucker hybrid (n = 8). 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. However, in 2007, we did see 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).

Table 1. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m²), 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 ²)	CPUE (Fish/100m ²)
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

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

Annual monitoring for YOY Colorado pikeminnow began on September 3 and was completed on September 7, 2007. One group of three researchers began seining the Colorado River (reach 1) at the uppermost sub-reach near river-mile 110 (Cisco Landing) and continued down-river by sampling two backwater habitats within every 5-mile sub-reach, as available, concluding near river-mile 16.5 (Indian Creek). Backwaters were sampled in 16 of 19 sub-reaches in the Colorado River. Sub-reaches within miles 15-0 (below Indian Creek) were minimally sampled due to time constraints and limited backwater habitats; two backwaters in that reach were seined. Another group of three researchers sampled RM 120-0 of the lower Green River (reach 3). Backwaters were sampled in 21 of 24 sub-reaches in the lower Green River. In the Colorado River, water temperatures ranged from 21 to 25 °C in the main channel and 21 to 29 °C in backwaters. In the Green River, water temperatures ranged from 23.5 to 26 °C in the main channel and 23 to 30 °C in backwaters. Discharge for the sampling on the Colorado River fluctuated between 3400 cfs and 3200 cfs. Discharge for the sampling on the Green River held steady at about 1150 cfs for the first three days of sampling (through September 6) then increased slightly to about 1400 cfs.

In the Colorado River, 24 Colorado pikeminnow were captured, measured and released. All fish were sorted, identified and enumerated in the field. The number of Colorado pikeminnow captured is higher than in 2006 but seems to fit into the fluctuating pattern of numbers caught over the past eleven years (Table 2). The average length of the Colorado pikeminnow was 37.2 mm, which is similar to the ten-year average (1997-2007) length of 40.8 mm (Table 2). Colorado pikeminnow were found in the second half of the stretch; none were found upstream of mile 60 (Moab bridge).

In the lower Green River, 632 Colorado pikeminnow were captured, measured and released. All fish were sorted, identified and enumerated in the field. The number of Colorado pikeminnow captured was much higher than every year with the exception of the first sampling year (1993) when 1211 fish were captured (Table 3). The CPUE this year was 20.14 fish/100m². This year's CPUE is very high compared to every year but the CPUE of the initial year (1993) at 26.47 (Table 3). The average length of Colorado pikeminnow was 44.8 mm which is slightly below the ten-year average length (1997-2007) of 46.04 mm (Table 3). The Colorado pikeminnow were distributed throughout the entire 120 miles of the Green River, with 54% of the fish found in the lower half of the reach.

Other YOY native species captured in the Colorado River included a flannelmouth sucker. Two bonytail were captured in the Green River as well as one additional *Gila* spp.

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 (in comparison to 12 in 2006).

These included red shiners (n = 1,227), fathead minnows (n = 645), common carp (n = 5), black bullheads (n = 1), largemouth bass (n = 1), smallmouth bass (n = 1), channel catfish (n = 1), gizzard shad (n = 103), and gambusia (n = 26), white suckers (n = 6). One other nonnative that was observed but not enumerated was plains killifish. In the lower Green river, six nonnative species were also captured (in comparison to nine in 2006). These included red shiners (n = 8,807), sand shiners (n = 35), gizzard shad (n = 6), fathead minnows (n = 2,183), channel catfish (n = 23). One other nonnative that was observed but not enumerated was largemouth bass. No gizzard shad were found on either reach in 2006.

Table 2. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m²), by year for Colorado pikeminnow caught during young-of-year monitoring on the lower Colorado River (Reach 1), 1993-2007.

Year	Colorado Pikeminnow Caught	Mean Length (mm)	Length Range (mm)	Total Area Sampled (m ²)	CPUE (Fish/100m ²)
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

Table 3. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m²), by year for Colorado pikeminnow caught during young-of-year monitoring on the lower Green River (Reach 3), 1993-2006.

Year	Colorado Pikeminnow Caught	Mean Length (mm)	Length Range (mm)	Total Area Sampled (m ²)	CPUE (Fish/100m ²)
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

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 began in November 2006. Data analysis specific to relationships between larval, YOY, and juvenile abundance began in the winter of 2006.

Task 5: *Develop and refine predictive models.* Development of predictive models began in the winter of 2006 and is ongoing.

Task 6: *Report Preparation.* Preparation to begin in winter of FY 2007.

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 nonnative cyprinid species appears to be increasing in backwaters sampled. This possible trend should be confirmed or refuted through analysis of past data and addressed in a new removal scope of work if deemed necessary.
- d. Abundance of gizzard shad seems to be increasing in backwaters sampled. This possible trend should be confirmed or refuted through analysis of past data and addressed in a new removal scope of work if deemed necessary.

VIII. Project Status:

On track and ongoing

IX. FY 2007 Budget Status

- A. Funds Provided: \$64,652
- B. Funds Expended: \$55,022
- C. Difference: \$9,630
- D. Percent of the FY 2007 work completed: 80%
- 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: Julie L. Howard November 6, 2007
Investigator Date