

I. Project Title: **Monitoring the Colorado Pikeminnow Population in the Mainstem Colorado River via periodic Population Estimates**

II. Bureau of Reclamation Agreement Number(s): R13PG40018

Project/Grant Period: Start date (6/3/2013):
End date: (9/30/2017):
Reporting period end date: 9/30/2014
Is this the final report? Yes _____ No X

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IV. Abstract:

The Interagency Standardized Monitoring Program (ISMP) was developed in 1986 to monitor population trends of Colorado pikeminnow and humpback chub in the Colorado River basin using catch per effort (CPE) indices. ISMP was expanded in 1998 to include mark-recapture population estimates of the major Colorado pikeminnow and humpback chub populations. For Colorado pikeminnow in the upper Colorado River, population estimates were conducted annually during 1991-1994, 1998-2000, 2003-2005, and 2008-2010. The current three-year field sampling effort began in 2013 and is scheduled to be completed in 2015.

A draft report that presents the results of this three-year effort and puts these findings into context with those from previous efforts is scheduled to be ready for peer review on 30 August 2016, with a draft final report scheduled to be ready for approval consideration by 31 October 2016. This report is scheduled to be finalized by 31 December 2016.

V. Study Schedule: *2013-2017*

- VI. Relationship to RIPRAP:
 - Colorado River Action Plan:
 - Colorado River Mainstem
 - V. Monitor populations and habitat and conduct research to support recovery actions.
 - V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

- VII. Accomplishment of FY 2014 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Sampling occurred from 24 March to 27 June 2014. Five passes were completed in the upper Colorado River reach (Government Highline dam to Westwater Wash), and four passes in the lower Colorado River reach (Cisco boat launch to the confluence with the Green River). Pass 1 sampling took place from 24 March to 14 April, pass 2 from 1 April to 15 May, pass 3 from 14 April to 5 June, pass 4 from 9 May to 19 June, and pass 5 from 9 June to 27 June. Pass 5 only sampled only the upper Colorado River reach. Date for sampling passes overlap as sampling occurs simultaneously in both the upper and lower reaches.

A total 263 capture events of Colorado pikeminnow occurred during sampling in 2014 with 235 individual Colorado pikeminnow being captured. Captured Colorado pikeminnow ranged from 210 mm to 911 mm total length (TL). The largest Colorado pikeminnow captured in 2014 (911 mm TL) was also the largest Colorado pikeminnow captured in 2013. All Colorado pikeminnow captured in 2014 exceeded the minimum size for PIT tagging (150 mm TL; Figure 1). Capture locations ranged from river mile (RM) 183.1 (2.4 miles downstream of Riverbend Park in Palisade, CO) to RM 1.0.

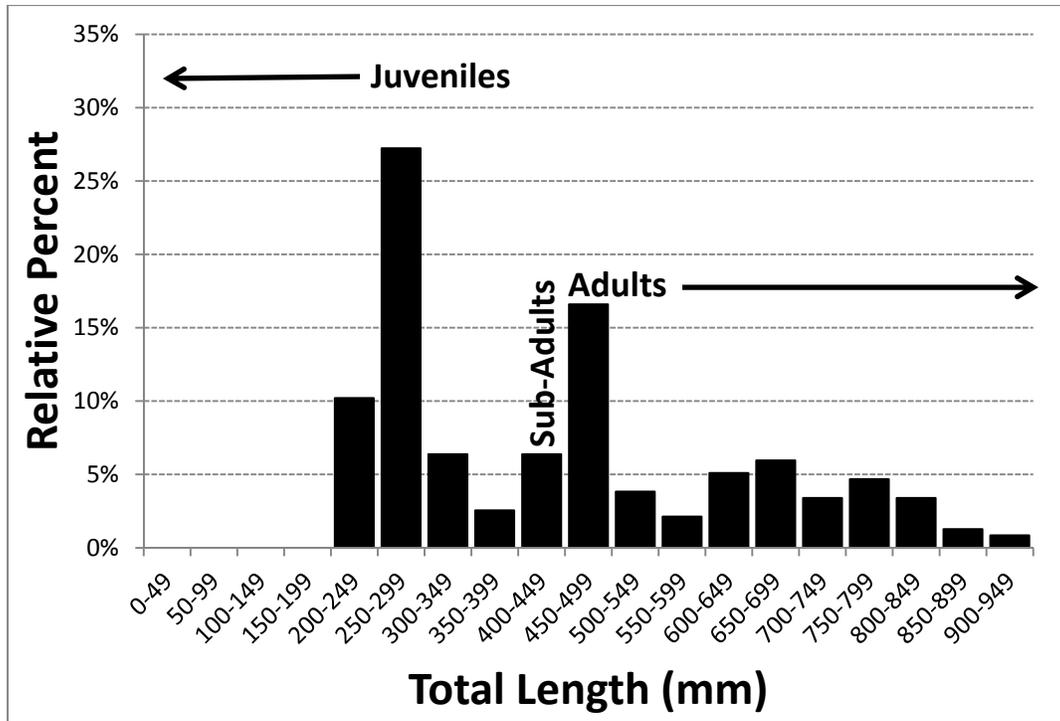


Figure 1. Length-frequency distribution of all 235 individual Colorado pikeminnow captured in 2014. For Colorado pikeminnow captured on multiple occasions in 2014, only the total length from the first capture occasion in 2014 is displayed.

Of the 235 Colorado pikeminnow collected in 2014, 109 (46.4%) were juvenile fish (<399 mm TL). Of the 109 juvenile fish, 88 were 200–299 mm TL and 21 were 300-399 mm TL. Fifteen (6.4%) of the 235 individual fish were sub-adults (400–449 mm TL). The remaining 111 individual Colorado pikeminnow captured in 2014 were adult size (>450 mm TL). The adult Colorado pikeminnow ranged from 451 mm TL to 911 mm TL. No Colorado pikeminnow were collected in 2014 that were below the minimum size (150 mm TL) to be PIT tagged. The absence of Colorado pikeminnow < 150 mm TL in the collections from 2014 suggests spawning success and/or recruitment to age-1 and age-2 has been poor the previous two years, although the gear types we employed may also explain the lack of these sizes of fish in our samples.

Of the 235 individual Colorado pikeminnow, 68 were collected during pass 1 (55 in the lower reach, 13 in the upper reach), 84 were collected during pass 2 (66 in the lower reach, 18 in the upper reach), 27 were collected during pass 3, (15 in the lower reach, 12 in the upper reach), and 12 were collected during pass 5). Twenty-eight Colorado pikeminnow were captured multiple times during 2014 sampling. Fourteen recaptures occurred in both the lower reach and the upper reach. The 28 total within-year recaptures included: 6 juvenile Colorado pikeminnow (all recaptured in the lower reach), 3 sub-adult Colorado pikeminnow (two recaptured in the lower reach and one recaptured in the upper reach), and 19 adult Colorado pikeminnow (six recaptured in the lower reach and 13 recaptured in the upper reach).

Table 1. Total number of Colorado pikeminnow > 250 mm TL captured in each sampling pass and year in the Colorado River study area, Colorado and Utah, 1991-2014. Totals include recaptures of the same fish caught in previous passes of the same year (in parentheses). Captures are partitioned by reach.

Year	Lower Reach Sampling Passes					Upper Reach Sampling Passes				
	1	2	3	4	5	1	2	3	4	5
1991	37	---	---	---	---	23	17 (4)	25 (2)	---	---
1992	18	15 (1)	---	---	---	21	24 (2)	23 (2)	---	---
1993	51	41 (4)	---	---	---	31	31 (6)	33 (11)	---	---
1994	47	22 (3)	---	---	---	28	37 (3)	38 (6)	---	---
1998	31	56 (6)	---	---	---	47	73 (8)	55 (16)	---	---
1999	38	24 (2)	---	---	---	52	65 (8)	54 (18)	---	---
2000	31	19 (1)	---	---	---	51	52 (8)	28 (6)	---	---
2003	11	16 (0)	44 (0)	40 (2)	---	11	15 (0)	16 (2)	11 (1)	---
2004	28	36 (1)	27 (0)	---	---	19	16 (2)	48 (8)	---	---
2005	26	50 (3)	46 (7)	36 (6)	34 (5)	22	30 (4)	26 (4)	46 (5)	38 (9)
2008	13	29 (0)	35 (3)	23 (7)	---	17	15 (0)	17 (1)	20 (2)	16 (2)
2009	11	35 (0)	28 (3)	21 (4)	---	10	13 (0)	32 (0)	15 (2)	23 (9)
2010	19	14 (1)	35 (5)	37 (6)	---	14	19 (1)	15 (1)	22 (3)	17 (2)
2013	17	31 (0)	25 (4)	---	---	15	10 (1)	12 (1)	14 (5)	---
2014	45	60 (4)	16 (4)	35 (6)	---	13	18 (0)	16 (4)	21 (7)	15 (3)

All data from 2014 has been entered. However, the capture-recapture matrix for Colorado pikeminnow collections in 2014 has not yet been developed. The combined three-year capture-recapture matrix, as well as yearly point estimates (N-hat), confidence interval, probability of capture (p-hat), and coefficient of variation (CV) values will be completed once the third year of sampling in the three year rotation has been completed in 2015.

The recent final report from the Grand Junction FWS CRFP field station on status of Colorado pikeminnow in the Colorado River presented results through 2010. Doug Osmundson and Dr. Gary White have updated the Colorado pikeminnow capture history matrix with capture data from 2013, with associated 95% confidence intervals (Figure 2). The results indicate the adult population continued its decline from the high point reached in 2005 (when abundance was estimated at 889 individuals) through the last reported estimate of 493 in 2010. The most recent analysis indicates an adult population in 2013 of only 335 adults. This is the lowest number on record since abundance estimates began in 1992, when abundance was first estimated at 440 adults. Thus the population declined by 62% in eight years.

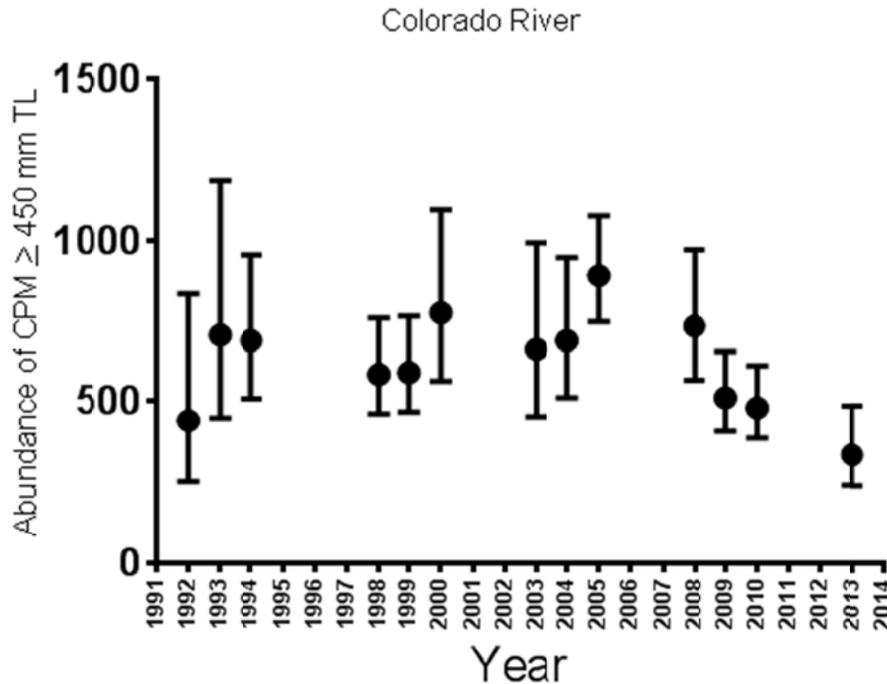


Figure 2. Point estimates and 95% confidence intervals for Colorado pikeminnow in the Colorado River, 1992–2013.

Length frequency analysis of Colorado pikeminnow captured from the lower reach study area (Green River confluence to the lower end of Westwater Canyon) in 2013 indicates that a strong year class may have been produced in 2007. Many of these fish should be recruiting to the adult population in 2014 and we expect abundance in 2014 to be higher than the 2013 estimate. If so, this would represent another instance whereby the Colorado pikeminnow population may end up being 'rescued' again at the 11th hour by a relatively strong year class after a string of weak year classes.

VIII. Additional noteworthy observations:

No within year movement of Colorado pikeminnow between the upper and lower reaches was documented during this study in 2014. A 505 mm TL Colorado pikeminnow captured on May 8th, 2014 at RM 99.8 (approximately 10 miles below Cisco Landing, UT) was later captured in the Redlands fish passage on the Gunnison River on September 2nd. This fish had moved approximately 73 miles from the initial capture location. A PIT tag had been implanted in the fish when it was captured on May 8th.

Seventeen additional untagged Colorado pikeminnow (range 403–543 TL) were also captured at the Redlands fish passage (RM 3.0) on the Gunnison River in the summer of 2014, after the completion of this year's pikeminnow population estimate sampling. All 17 of these Colorado pikeminnow were transported 39.7 RM upstream to the BLM's

Escalante boat launch (at RM 42.7) on the Gunnison River before being released. It's hoped that this will help encourage long-term retention of these fish in the Gunnison River

Bonytail, humpback chub, razorback sucker, and razorback sucker X flannelmouth sucker hybrids were also collected during the 2014 Colorado pikeminnow population estimate study. A total of 45 individual bonytail (122–380 mm TL) were collected from RM 3.5–183.1. Forty-three of the 45 individual bonytail were captured in the lower reach. Only one of the 45 individual bonytail was recaptured within 2014. Forty-three of the 45 individual bonytail contained a PIT tag at the time of capture. The two bonytail that did not contain PIT tags were the smallest (122 mm TL) and the largest (380 mm TL) bonytail captured in 2014. The 122 mm TL bonytail was released without a PIT tag as it was too small to be tagged. Of the 43 individual bonytail captured that contained a PIT tag, 41 (95%) were stocked in the Dolores River on May 21st 2014 at the Rio Mesa Center.

Five individual humpback chub (221–349 mm TL) were captured during sampling in 2014. One of the individual humpback chub was also recaptured during the year. Two of the humpback chub were captured in the lower reach (RMs 3.0 and 23.0). The remaining three humpback chubs were collected within the Ruby/Horsethief Canyons (Black Rocks area) of the upper reach (RMs 130.7, 136.5, and 140.3).

In 2014, 835 individual razorback suckers were captured during sampling. Sixty-one of the 835 individual razorback suckers were recaptured within the year. No movement of recaptured razorback suckers between the upper and lower reach occurred within the year. Total length of razorback suckers ranged from 270–621 mm. Captures occurred throughout the study reaches (RM 0.2–193.3). All razorback suckers captured in 2014 had been in the river for at least one over-winter period.

In 2013, 39 suspected wild razorback suckers (106–240 mm TL) were captured in the lower reach. Twenty-three of the 39 razorbacks were implanted with a PIT tag in 2013 with the remaining 16 being too small to PIT tag. None of the 23 suspected wild razorbacks PIT tagged in 2013 were captured in 2014. In 2014, only one razorback sucker less than 300 mm TL not containing a PIT tag was captured during this project.

Thirteen razorback sucker X flannelmouth sucker hybrids (235–560 mm TL) were captured during 2014 sampling. Ten of the razorback sucker X flannelmouth hybrids were collected in the lower reach from RM 3.5–94.2. Three additional razorback sucker X flannelmouth sucker hybrids were captured in the upper reach from RM 127.2–165.3. None of the razorback sucker X flannelmouth sucker hybrids captured in 2014 contained a PIT tag at the time of capture.

In addition to these endangered fish collections, a large number of nonnative fish were encountered during the study in 2014. These included: 9 black crappie, 9 bluegill, 3 grass carp, 41 green sunfish, 155 gizzard shad, 15 largemouth bass, 8 northern pike, 168 smallmouth bass, and 109 walleye. All walleye captures occurred in the lower reach, and

the majority (92%) of smallmouth bass captures occurred in the upper reach. Capture locations of the other nonnative species captured during 2014 were distributed throughout both the upper and lower reaches.

The total number of walleye captured in 2014 was lower than the total number captured during this project in 2013 (259 walleye). While the number of walleye captured during pikeminnow sampling in 2014 decreased compared to 2013, the number of walleye captured in 2014 was considerably higher than any year from 2003 to 2010 (2–46 walleye per year).

The relatively new threat to the survival and persistence of endangered fish in the Colorado River from the invasion of walleye is very real. On June 5th, 2014 (during the Colorado pikeminnow population estimate study), a recently stocked bonytail was found in the stomach of a walleye captured at RM 75.0. The bonytail was stocked on May 21st in the Dolores River.

Additional electrofishing effort was expended in the fall of 2014 (after the completion of the 2014 Colorado pikeminnow population estimate study) to remove additional walleye. During fall 2014 sampling, two walleye were captured with relatively large (289 mm; 323 mm) Colorado pikeminnow in their stomachs. Future population estimates of adult Colorado pikeminnow survival will not be able to accurately reflect this new source of mortality since it's likely only impacting smaller size-classes. However, recruitment strength from strong year classes will likely suffer as walleye densities increase.

Walleye data from the additional fall 2014 electrofishing effort, as well as for walleye collected during 2014 Colorado pikeminnow population estimate sampling will be combined and presented in more detail at the nonnative workshop and in the annual report for project 126a.

IX. Recommendations:

- Continue the current schedule of three years of active sampling followed by a two-year rest period. Four passes per year continues to be the sampling goal, with a fifth pass recommended (if river flows allow).
- Continue to identify and remove problematic nonnative fish species encountered during the Colorado pikeminnow population estimate study. As in 2013, use the data from the spring Colorado pikeminnow sampling effort to help make adaptive management decisions about if and how to modify nonnative fish removal efforts. Data gathered on Colorado pikeminnow sampling trips can be used to help guide reallocation and/or addition of nonnative fish removal efforts in the summer and fall (specifically what sections of river may need to be targeted for nonnative species of concern).

X. Project Status: On track and ongoing

XI. FY 2014 Budget Status

- A. Funds Provided: \$210,147
- B. Funds Expended: \$210,147
- C. Difference: \$0.00
- D. Percent of the FY 2014 work completed, and projected costs to complete: 100%
- E. Recovery Program funds spent for publication charges: \$0.00

XII. Status of Data Submission: Data from the 2014 field season has been entered, checked for accuracy, and will be submitted to the database manager.

XIII. Signed: Darek Elverud 11/14/2014
Principal Investigator Date