

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

II. Bureau of Reclamation Agreement Number(s): R15PG00083

Project/Grant Period: Start date (10/1/2014):
End date: (9/30/2019):
Reporting period end date: 9/30/2015
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 was 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 2015 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Sampling occurred from 24 March to 2 July 2015. 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 6 May, pass 2 from 8 April to 11 May, pass 3 from 24 April to 5 June, pass 4 from 26 May to 30 June, and pass 5 from 9 June to 2 July. Pass 5 sampled only the upper Colorado River reach. Dates for sampling passes overlap as sampling occurs simultaneously in both the upper and lower reaches.

A total 223 Colorado pikeminnow capture events occurred during sampling in 2015 with 203 individual Colorado pikeminnow being captured. Captured Colorado pikeminnow ranged from 301 mm to 928 mm total length (TL). All Colorado pikeminnow captured in 2015 exceeded the minimum size for PIT tagging (150 mm TL; Figure 1). Capture locations ranged from river mile (RM) 184.3 (Palisade, CO) to RM 0.9.

Of the 203 individual Colorado pikeminnow collected in 2015, 81 (40%) were juvenile fish (<399 mm TL). All of the 81 individual juvenile Colorado pikeminnow were between 300-399 mm TL. Twenty (10%) of the 203 individual Colorado pikeminnow were sub-adults (400–449 mm TL). The remaining 102 individual Colorado pikeminnow captured in 2015 were adult size (>450 mm TL). The adult Colorado pikeminnow ranged from 451 mm TL to 928 mm TL. No Colorado pikeminnow were collected in 2015 that were below the minimum size (150 mm TL) to be PIT tagged. The absence of Colorado pikeminnow < 300 mm TL in the collections from 2015 suggests spawning success and/or recruitment to age-1, age-2, and age-3 has been poor during the previous three years.

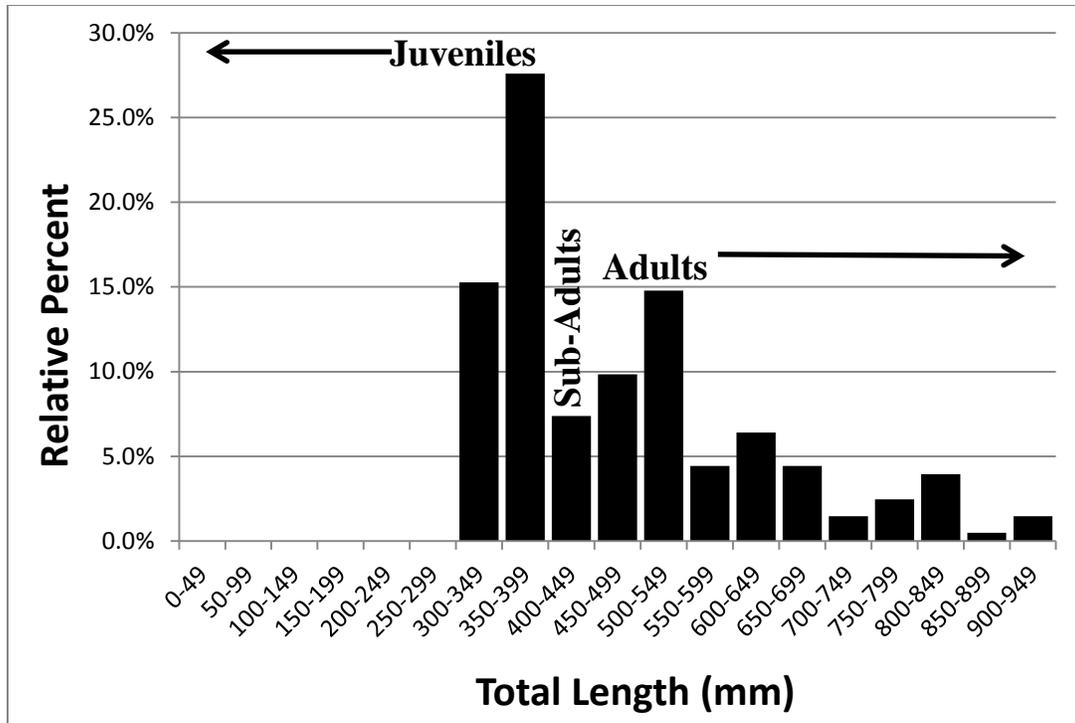


Figure 1. Length-frequency distribution of the 203 individual Colorado pikeminnow captured in 2015. For Colorado pikeminnow captured on multiple occasions in 2015, only the total length from the first capture occasion in 2015 is displayed.

Of the 203 individual Colorado pikeminnow, 44 were collected during pass 1 (34 in the lower reach, 10 in the upper reach), 57 were collected during pass 2 (45 in the lower reach, 13 in the upper reach), 56 were collected during pass 3, (40 in the lower reach, 16 in the upper reach), 34 were collected during pass 4 (23 in the lower reach, 11 in the upper reach), and 11 were collected during pass 5. Twenty Colorado pikeminnow were captured multiple times during 2015. Eight recaptures occurred in the upper reach and 12 occurred in the lower reach. The 20 total within-year recaptures included: seven juvenile Colorado pikeminnow (all recaptured in the lower reach), one sub-adult Colorado pikeminnow recaptured in the upper reach, and 12 adult Colorado pikeminnow (four recaptured in the lower reach and eight recaptured in the upper reach).

Table 1. Total number of Colorado pikeminnow > 250 mm TL captures in each sampling pass by year in the Colorado River study area, Colorado and Utah, 1991–2015. Within-year recaptures are included 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)
2015	34	45 (0)	45(5)	30 (7)	---	10	15 (2)	16 (0)	15 (4)	13 (2)

All data from 2015 has been entered and checked for accuracy. 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 included in the final report for the 2013 to 2015 sampling rotation due in 2016. While the 2015 data has yet to be utilized to calculate a population estimate, abundance estimates from data collected in 2014 and prior years are presented in Figure 2.

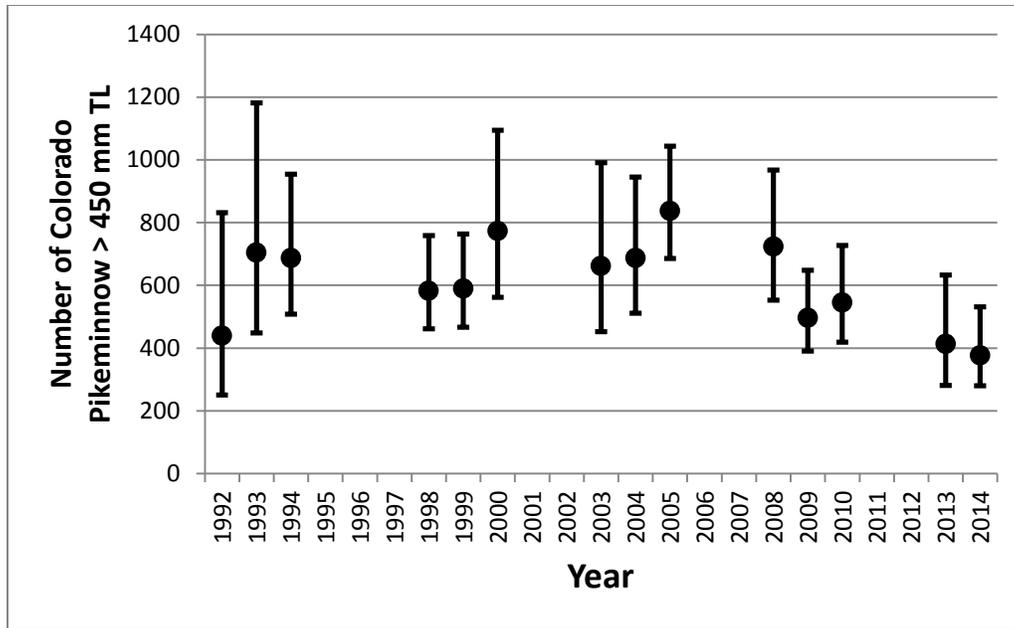


Figure 2. Point estimates and 95% confidence intervals for adult Colorado pikeminnow in the Colorado River, 1992–2014.

The 95% confidence intervals for the 2014 adult abundance estimate do not overlap confidence intervals for years 2000, 2005 and 2008 indicating a decrease in the number of adult Colorado pikeminnow. Confidence intervals from the 2014 estimate overlap with all other years. The point estimate from 2014 is also lower than all previous years.

VIII. Additional noteworthy observations:

No within year movement of Colorado pikeminnow between the upper and lower reaches was documented during the sampling period in 2015. Six Colorado pikeminnow (384-475 mm TL) were captured at Redlands fish passage in 2015. Three of the six Colorado pikeminnow contained a PIT tag when captured at Redlands fish passage. One of the three fish captured at Redlands fish passage was initially tagged about 10 miles below the Colorado and Gunnison Rivers confluence in June 2015. Another of the three fish was initially tagged in the upper reach in 2014 and subsequently recaptured in June 2015 near Cisco boat landing at the upper end of the lower reach. The third fish was initially tagged in Cataract Canyon in 2013. An additional PIT tagged Colorado pikeminnow was also captured at Government Highline fish passage. This fish was initially tagged in 2014 at RM 20 in the lower reach.

Bonytail, humpback chub, razorback sucker, and razorback sucker X flannelmouth sucker hybrids were also collected during the 2015 Colorado pikeminnow population estimate study. A total of 106 individual bonytail (151 – 358 mm TL) were collected from RM 1.5 – 169.3. Ninety-four (89%) of the 106 individual bonytail were captured in the lower reach. One of the 106 individual bonytail was recaptured twice within 2015. No other recaptures of bonytail occurred in 2015. The 106 individual bonytail captured included 12 bonytail (11.3%) that did not contain a PIT tag when captured.

The untagged bonytail ranged from 151 mm to 270 mm TL. The origin of the untagged bonytail is unknown.

The majority (88%) of the bonytail captured in 2015 were also stocked in 2015. While only 13 of the bonytail captured in 2015 had been stocked prior to 2015, in a typical year only 1 or 2 bonytail are often captured from stockings in previous years. The 13 bonytail captured from previous years' stocking efforts were from stocking in both the upper and lower reaches and also included one fish stocked at Green River State Park.

Five individual humpback chub (181–291 mm TL) were captured during sampling in 2015. Three of the humpback chub were captured in the lower reach (RMs 8.8, 16.5 and 41.9). The remaining two humpback chub were collected within the Ruby/Horsethief Canyons of the upper reach (RMs 136.1 and 149.5).

In 2015, 1202 individual razorback suckers were captured during sampling. Fifty-one of these were recaptured within the year. No movement of razorback suckers between the upper and lower reach occurred within the sampling period. Total length of razorback suckers ranged from 226 – 603 mm. Captures occurred throughout the study reaches (RM 0.0 - 193.3).

In 2013, 39 suspected wild razorback suckers (106 - 240 mm TL) were captured in the lower reach. Twenty-three of the 39 razorback sucker were implanted with a PIT tag in 2013 with the remaining 16 being too small to PIT tag. One of the 23 suspected wild razorback sucker PIT tagged in 2013 was captured in 2015 but was determined to be a razorback X flannelmouth hybrid. In 2015, no razorback suckers less than 300 mm TL and not containing a PIT tag were captured. Of the 1202 individual razorback suckers captured, 83 (7%) did not contain a PIT tag. The seven percent of razorback suckers captured did not contain a PIT tag could either be wild produced fish or stocked fish that shed their PIT tag post stocking. Eighteen of the 1202 razorback suckers contained only a 400 kHz PIT tag indicating they have not be captured since being stocked prior to 2005.

Twenty-five individual razorback sucker X flannelmouth sucker hybrids (340–568 mm TL) were captured during 2015 sampling. Twenty-four of the razorback sucker X flannelmouth hybrids were collected in the lower reach from RM 6.0 – 107.9. The two additional razorback sucker X flannelmouth sucker hybrids were captured in the upper reach from RMs 154.8 and 163.4. One of the razorback sucker X flannelmouth sucker hybrids captured in 2015 was recaptured within the year. Only two of the 25 razorback X flannelmouth sucker hybrids contained a PIT tag when captured in 2015.

In addition to these endangered fish collections, a large number of nonnative fish were encountered during the study in 2015. These included: eighteen black crappie, 46 bluegill, 3 grass carp, 45 green sunfish, 177 gizzard shad, 31 largemouth bass, 3 northern pike, 144 smallmouth bass, and 83 walleye. All walleye captures occurred in the lower reach, and the majority (89%) of smallmouth bass captures occurred in the upper reach. Capture locations of the other nonnative species captured during 2015 were distributed throughout both the upper and lower reaches.

The total number of walleye captured in 2015 (83) was lower than the number captured in 2014 (109) or 2013 (259). While the number of walleye captured during Colorado pikeminnow sampling in 2015 decreased compared to 2013 and 2014, the number of walleye captured in 2015 was considerably higher than any year from 2003 to 2010 (2–46 walleye per year).

In 2015, all walleye captured during the Colorado pikeminnow population estimate sampling were scanned for the presence of a PIT tag. Three PIT tags were detected in walleye. All three tags were implanted in bonytail released into the Colorado River. Two of the PIT tags were implanted in bonytail stocked in 2015 and the third PIT tag was implanted in a bonytail released in 2014.

Additional electrofishing effort was expended in the fall of 2014 and 2015 to remove additional walleye. During fall 2014 sampling, two walleye were captured with relatively large (289 mm; 323 mm) Colorado pikeminnow in their stomachs.

Walleye data from the additional fall 2015 electrofishing effort, as well as for walleye collected during 2015 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 2014, 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 2015 Budget Status

- A. Funds Provided: \$216,080
- B. Funds Expended: \$216,080
- C. Difference: \$0.00
- D. Percent of the FY 2015 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 2015 field season has been entered, checked for accuracy, and will be submitted to the database manager.

XIII. Signed: Darek Elverud 11/13/2015
Principal Investigator Date