

I. Project Title: **Annual Operation and Maintenance of the Fish Passage Structure at the Redlands Diversion Dam on the Gunnison River**

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III. Project Summary:

The purpose of this project is to collect and summarize annual data on the number of large-bodied fish, different fish species, and seasonal distribution of fish that use the fish passageway at the Redlands Diversion Dam on the Gunnison River. In 2007, the Redlands passageway was operational from 17 April to 10 October. This is the twelfth year that the fish passageway at Redlands has been operated since it was completed in late-June 1996. In these 12 years, 102 sub-adult and adult Colorado pikeminnow, 24 razorback sucker, and one bonytail have ascended the fish passageway. Twenty-one adult Colorado pikeminnow and four previously stocked razorback sucker used the fish passageway in 2007. Six thousand nine hundred sixty three fish were collected in the fish trap during 2007; 83% were native fish. Native fishes comprised about 92% of this total for each of the first 5 years. However, in 2002 and again in 2003, the percentage of native fish declined to about 66 and 68%, respectively. However, in 2004, 2005, 2006, and 2007 this trend was reversed. Flannemouth sucker comprised 54% of the total fish in the fish trap in 2007 followed by bluehead sucker (22%). Channel catfish were the most numerous nonnative fish collected (7% of the total) followed by white sucker (2%) and white sucker X flannemouth sucker hybrids (2%). Channel catfish numbers increased slightly from 2006 while white suckers, white sucker X flannemouth sucker, and white sucker X bluehead sucker numbers declined. In 2007, black bullhead numbers increased 3-fold (140 vs. 45) from 2006. And, while the number of smallmouth reached a high of 21 in 2005, none were captured in 2006 or in 2007. All channel catfish captured in the fish trap were returned alive downstream from the dam in 2007. All other nonnative fish, except salmonid species, were removed. Since its completion in 1996, 102,334 fish have used the fishway.

IV. Study Schedule:

- A. initial year: 1996
- b. final year: Ongoing

V. Relationship to RIPRAP:

- Colorado River Action Plan: Gunnison River
- II.B.1.c. Operate and maintain fish ladder.
- II.B.1.d. Monitor and evaluate success.

VI. Accomplishment of FY 2007 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

A. FY-2007 Tasks and Deliverables:

Task 1. Routine O & M of the fish ladder and fish trap which includes monitoring, sorting, enumerating all fish in addition to cleaning trash and debris from trash racks, bar screens, fish trap, and fishway entrance.

Task completed.

Task 2. Compile, computerize, and summarize fish use data; prepare annual progress report.

Task completed.

B. Findings (2007 Highlights)

Fish Passage

1. Twenty-one sub-adult and adult Colorado pikeminnow were collected in the fish trap of the fish passageway at the Redlands Diversion Dam during 2007 (Appendix; Table 1). This brings the total number of Colorado pikeminnow that have been captured in the fish trap at the passageway of the Redlands Dam to 102 from 1996 through 2007 (Appendix; Table 2). This marks the second highest annual number of Colorado pikeminnow collected in the Redlands fish trap. In 1998, 23 Colorado pikeminnow were collected. Eighteen were collected during 1997. Eleven pikeminnow used the fishway in July, 7 in August, and one each during May, June, and September. Colorado pikeminnow have used the passageway almost exclusively in August (49; 48% use) and July (46; 44% use) over this 12-year monitoring period. Three pikeminnow each have been found in the fish trap in June and September. The first time that a Colorado pikeminnow was found in the fish trap in May occurred in 2007.

Two of the pikeminnow collected in the fish trap in 2007 had previously ascended the fishway. One pikeminnow that had ascended the fishway on September 27, 2006, did so again almost one year later to the day on September 26, 2007. The other pikeminnow that ascended the fish ladder on June 15, 2007 had previously been found in the fish trap 4 years earlier on July 30, 2003. This is not an uncommon occurrence. Over the 12-year operational period of monitoring the catches of Colorado pikeminnow in the Redlands fish trap, this now includes 10 fish that have single repeated passage use, and one double repeat passage.

2. Four razorback sucker were found in the fish trap during 2007. Two razorback sucker used the fishway in July, one each during April and May. To date, 24 razorback sucker have been captured in the fish trap at the passageway of the Redlands Dam (Appendix; Table 2).
3. Six thousand nine hundred sixty three fish were counted in the trap of the Redlands Diversion Dam fishway between 17 April and 10 October 2007. This averaged to about 57 fish per day that were processed in the fish trap. Native fishes comprised 83% of the total number of fishes collected in 2007, compared to 94% in 1996 and 1997, 93% in 1998 and 1999, 92% in 2000, 83% in 2001, 66% in 2002, 68% in 2003, 77% in 2004, 74% in 2005, and 85% in 2006. From 2001–2003, there was a significant downward trend in the relative percentage of native fishes compared to the first 5 years that the ladder was operated and monitored when the relative percentage of native fishes was somewhat constant at about 92% per year (Appendix; Table 3). The relative percentage of native fish has continued to steadily increase since 2003.

Flannelmouth sucker comprised 54% of the catch and bluehead sucker 22% during 2007. The numbers of white sucker (631) that used the fish ladder in 2006 (631) declined by about 58% from 2005 (1,520) and further declined during in 2007 (168). There was a 16% increase (432 in 2006 vs. 501 in 2007) in channel catfish numbers. The number of green sunfish (9) in 2007 was similar to those in 2006 (6) but was markedly lower than 2005 (35) and from the numbers from 2004 (61), 2003 (330), and 2002 (256). And surprisingly, no smallmouth bass were collected in 2006 nor 2007 compared to the highest ever recorded in the fish trap during 2005 (21)(Appendix; Table 4, Figure 1).

4. Adult gizzard shad continued to be collected in the fish trap during 2007. The number of adult gizzard shad was considerably higher in 2007 (43) from that of 2006 (3). During the 2007 smallmouth bass marking and removal study, 135 adult and one young-of-year gizzard shad were collected in the Grand Valley portion of the Colorado and Lower Gunnison rivers.

5. All fish found in the fish trap were counted and sorted by species. All native fish including rainbow and brown trout were released upstream of Redlands Diversion Dam. All channel catfish were returned alive immediately downstream from the dam. All other nonnative fish plus hybrid suckers, except salmonid species, were removed.

#### Operation and Maintenance

1. Maintenance to remove sediment and debris in the forebay area of the fishway delivered by the 2007 runoff flows in the Gunnison River was performed during mid-June immediately following runoff. A diesel-powered air compressor furnished by the Bureau of Reclamation was used to accomplish this work.

#### VII. Recommendations:

A. Biological: Continue to collect information on the number of fish, by species, in the fish trap of the Redlands Dam fish passageway in 2008 starting about 15 April and running through mid-October.

B. Operation and Maintenance:

1. To maintain optimum performance of the fish passageway, sediment maintenance is on-going. For the past 3 years, FWS personnel have removed sediment and debris from the forebay of the fishway to prevent buildup and compaction of sediment. Use of compressed air has proven to be a useful tool in alleviating build-up of sediment and small debris. Unfortunately, this has proven to be only a short-term “fix”.

A long-term and more efficient solution is required to remove sediment that constantly accumulates far out into the river in front of the forebay of the fishway. Current sediment removal equipment and techniques preclude FWS crews from reaching and therefore removing this sediment. Two years ago, with the cooperation and coordination of Redlands Water and Power Company, about 12 to 15 flashboards on the fish passage side of the river were lowered during the fall when Redlands was conducting canal maintenance and repair. This action allowed sluicing of the sediment in the pond behind the dam on that side of the river, much like what occurs when Redlands open their sluice gates on the far side of the river to sluice debris and sediment downstream.

The Recovery Program with guidance and direction from qualified engineers should investigate the possibility of placing a sluice gate on the fish passage side of the Redlands Diversion Dam to aid in removing and sluicing sediment that builds up from year to year. Management from the Redlands Water and Power

Company have expressed their desire for consideration of cost sharing such an endeavor with the Federal government.

VIII. Project Status:

On track and ongoing.

IX. FY 2007 Budget Status

- A. Funds Provided: \$ 46,100
- B. Funds Expended: \$ 46,100
- C. Difference: \$ -0-
- D. Percent of the FY 2007 work completed, and projected costs to complete: 100%.  
Recovery Program funds spent for publication charges: \$ -0-

X. Status of Data Submission:

The 21 Colorado pikeminnow and 4 razorback sucker captured in the fish trap of the passageway at the Redlands Diversion Dam during 2007 were all checked for a PIT tag. Nine Colorado pikeminnow and four razorback sucker had been previously PIT tagged. PIT tags were not detected in 12 Colorado pikeminnow. These 12 fish were PIT tagged (134 khz) prior to release. For one adult razorback sucker, neither a 400 khz nor 134 khz frequency PIT tag could be detected. This fish was inserted with a 134 khz PIT tag.

The following data were collected from all T & E fish prior to their being released: total length (mm), weight (g), reproductive condition, and date and location of capture. These data have been computerized. The total number of fishes that were collected in the fish trap at Redlands fish passageway was also computerized. These completed, computerized data will be provided to the UCRB database coordinator upon his request.

XI. Signed: Bob D. Burdick                      10/23/2007  
Principal Investigator                      Date

APPENDIX:

- A. More comprehensive/final project reports. If distributed previously, simply reference the document or report.

Burdick, B. D. 2001. Five-year evaluation of fish passage at the Redlands Diversion Dam on the Gunnison River near Grand Junction, Colorado: 1996-2000. Recovery Program Project Number CAP-4b. Final Report prepared for the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin. U. S. Fish and Wildlife Service, Colorado River Fishery Project, Grand Junction, Colorado. 57 pp. + appendices.

- B. Appendix: 4 tables and 1 figure attached.

APPENDIX

Table 1. Total number of juvenile and adult fish captured in the fish trap of the passageway at the Redlands Diversion Dam from 17 April to 10 October 2007.

| <u>Common Name</u>                       | <u>Number of Fish</u> | <u>Percent of Total Fish</u> |
|--|-----------------------|------------------------------|
| <b>NATIVE FISH</b>                       |                       |                              |
| bluehead sucker                          | 1,507                 | 21.6                         |
| flannelmouth sucker                      | 3,730                 | 53.6                         |
| razorback sucker                         | 4                     | < 0.1                        |
| roundtail chub                           | 528                   | 7.6                          |
| Colorado pikeminnow                      | 21                    | < 0.3                        |
| bonytail                                 | 0                     | 0                            |
| speckled dace                            | 2                     | < 0.1                        |
| TOTAL                                    | 5,792                 | 83.2                         |
| <b>NONNATIVE FISH</b>                    |                       |                              |
| black bullhead                           | 140                   | 2.0                          |
| brown trout                              | 16                    | 0.2                          |
| channel catfish                          | 501                   | 7.2                          |
| common carp                              | 55                    | 0.8                          |
| gizzard shad                             | 43                    | 0.6                          |
| green sunfish                            | 9                     | < 0.1                        |
| largemouth bass                          | 2                     | < 0.1                        |
| bluegill                                 | 3                     | < 0.1                        |
| rainbow trout                            | 1                     | < 0.1                        |
| white sucker                             | 168                   | 2.4                          |
| TOTAL                                    | 938                   | 13.5                         |
| <b>HYBRID FISHES</b>                     |                       |                              |
| bluehead sucker X<br>flannelmouth sucker | 9                     | 0.1                          |
| bluehead sucker X<br>white sucker        | 61                    | 0.9                          |
| flannelmouth sucker X<br>white sucker    | 163                   | 2.3                          |
| TOTAL                                    | 233                   | 3.3                          |
| -----                                    |                       |                              |
| <b>ALL TOTALS</b>                        | <b>6,963</b>          | <b>100.0</b>                 |

APPENDIX (cont.)

Table 2. Number of Colorado pikeminnow, razorback sucker, and bonytail captured in the fish trap of the Redlands passageway between 1996 and 2007.

| <u>Year</u> | <u>No. of Colorado pikeminnow</u> | <u>No. of Razorback sucker<sup>a</sup></u> | <u>No. of Bonytail<sup>a</sup></u> |
|-------------|-----------------------------------|--|------------------------------------|
| 1996        | 1                                 | 0  | 0                                  |
| 1997        | 18                                | 0  | 0                                  |
| 1998        | 23                                | 0  | 0                                  |
| 1999        | 5                                 | 0  | 0                                  |
| 2000        | 4                                 | 0  | 0                                  |
| 2001        | 1                                 | 5  | 0                                  |
| 2002        | 7                                 | 1  | 0                                  |
| 2003        | 3                                 | 0  | 1                                  |
| 2004        | 5                                 | 3  | 0                                  |
| 2005        | 4                                 | 6  | 0                                  |
| 2006        | 10                                | 5  | 0                                  |
| 2007        | 21                                | 4  | 0                                  |
| Totals      | 102                               | 24   | 1                                  |

<sup>a</sup> all razorback sucker and bonytail captured in the fish trap were from fish originally stocked in the Colorado and Gunnison rivers.

Table 3. Comparison of the total number of fish, total native vs. nonnative fishes, and percent composition of native and nonnative fish captured in the fish trap of the Redlands passageway between 1996 and 2007.

| <u>Year</u> | <u>Total Number of Fish</u> | <u>Total Native</u> | <u>Total Nonnative</u> | <u>Percent Composition</u> |                         |
|-------------|-----------------------------|---------------------|------------------------|----------------------------|-------------------------|
|             |                             |                     |                        | <u>Native Fishes</u>       | <u>Nonnative Fishes</u> |
| 1996        | 8,375                       | 7,885               | 490                    | 93.9                       | 6.1                     |
| 1997        | 12,233                      | 11,547              | 686                    | 94.4                       | 5.6                     |
| 1998        | 7,589                       | 7,060               | 529                    | 92.8                       | 7.2                     |
| 1999        | 8,264                       | 7,654               | 610                    | 92.6                       | 7.4                     |
| 2000        | 6,662                       | 6,157               | 505                    | 92.3                       | 7.7                     |
| 2001        | 6,317                       | 5,221               | 1,096                  | 82.6                       | 17.4                    |
| 2002        | 4,454                       | 2,956               | 1,498                  | 66.3                       | 33.7                    |
| 2003        | 7,259                       | 4,909               | 2,350                  | 67.6                       | 32.4                    |
| 2004        | 11,720                      | 9,011               | 2,709                  | 76.9                       | 23.1                    |
| 2005        | 11,403                      | 8,414               | 2,989                  | 73.8                       | 26.2                    |
| 2006        | 11,095                      | 9,384               | 1,711                  | 84.5                       | 15.5                    |
| 2007        | 6,963                       | 5,801               | 1,162                  | 83.4                       | 16.6                    |
| Totals      | 102,334                     | 85,999              | 16,335                 | 84.0                       | 16.0                    |

APPENDIX (cont'd)

Table 4. Number of smallmouth bass collected in the fish trap of the Redlands fish passageway, 1996–2007. See Figure 1 below.

| Year |     |     |     |     |     |     |     |     |     |     |     |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| '96  | '97 | '98 | '99 | '00 | '01 | '02 | '03 | '04 | '05 | '06 | '07 |
| 1    | 0   | 0   | 0   | 0   | 0   | 13  | 6   | 9   | 21  | 0   | 0   |

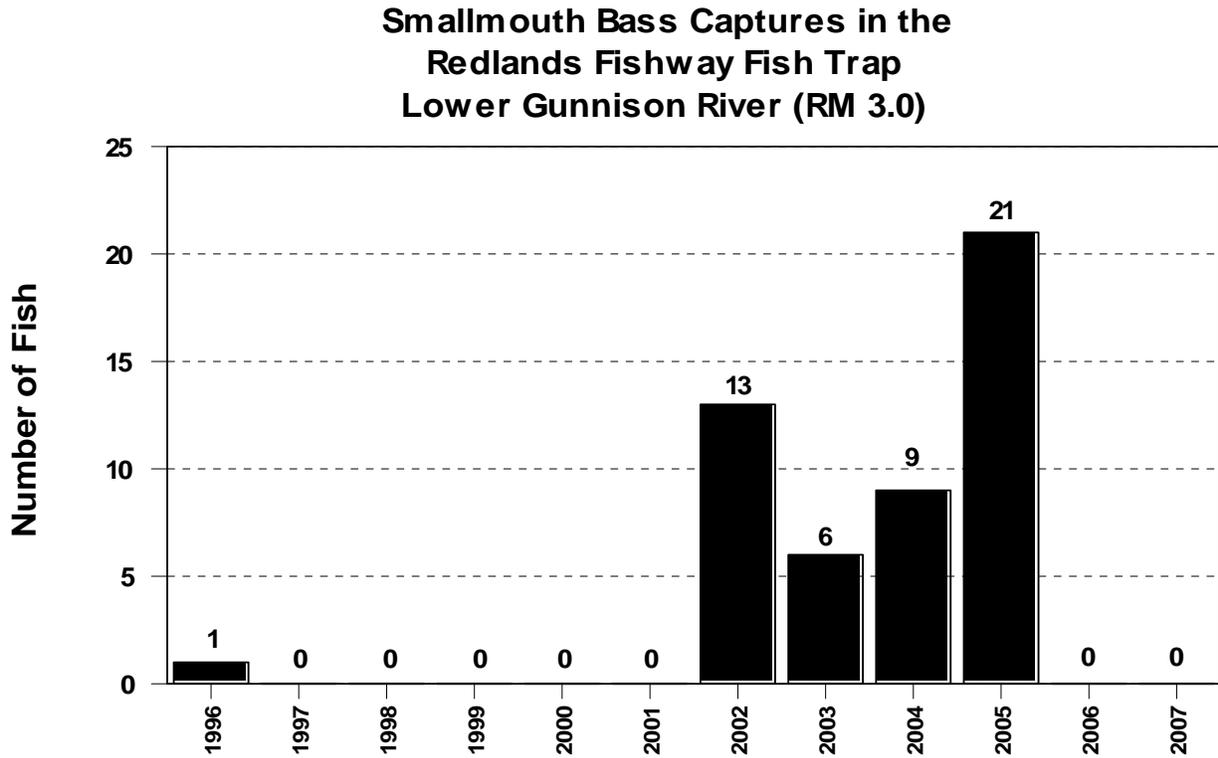


Figure 1. Number of smallmouth bass collected in the fish trap of the Redlands fish passageway, 1996–2007.