I. Project Title: a. Evaluation of the Effectiveness of the Fish Passage Structure at the Redlands Diversion Dam and Flow Requirement in the 2.3-mile Reach of the Lower Gunnison River

and

b. Movement of Sub-adult and Adult Colorado Pikeminnow Following Passage Through the Redlands Fishway and Identification of Colorado Pikeminnow Spawning Sites in the Gunnison River

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III. Project Summary:

The overall goal of this project is to evaluate use by endangered fishes of the fish ladder at the Redlands Diversion Dam on the Gunnison River. This is the fourth year that the fish passageway at Redlands has been operated since it was completed in June 1996. In these four years, forty seven sub-adult and adult Colorado pikeminno have ascended the fish passageway. In 1999, five sub-adult and adul Colorado pikeminnow were collected in the fish trap--four of these were implanted with LOTEK® radio transmitters and released upstream of the dam. In 1998, 23 sub-adult and adult Colorado pikeminnow ascended the fish passageway compared to 18 in 1997 and only one adult Colorado pikeminnow in 1996. Pikeminnow have used the ladder almost exclusively in July and August over the past four years: 13 i July and 33 in August. However, in 1999, one pikeminnow was found i the fish trap 9 September. Six different pikeminnow have ascended the fish passageway twice. Eight thousand two hundred and sixty-fou fish were collected in the fish trap in 1999. Ninety-three percent were native fishes, including 54% bluehead sucker and 29% flannelmouth suckers. Since its completion in 1996, 36,457 fish hav used the fishway. Native fishes have comprised about 93% of this total for each of these 4 years. The project will continue through FY2000; a final report is due in early FY 2001 (December 2000).

IV. Study Schedule:
a. initial year:
1996
b. final year2000

V. Relationship to RIPRAP:
A. Colorado River Action Plan: Gunnison River: II.B.1.d. Monitor an evaluate success of the fish passage structure at the Redlands Diversion Dam.

VI. Accomplishment of FY 99 Tasks and Deliverables, Discussion of Initia

Findings and Shortcomings:
A. FY-99 Tasks and Deliverables: Tasks 1-5.

Task 1a. Capture juvenile and adult Colorado pikeminnow; implant radio transmitters.

Task 1b. Radiotag up to five adult Colorado pikeminnow caught in the Redlands Diversion Dam fishway trap or from the 2.3-mile reach of th lower Gunnison River immediately downstream of the Redlands Diversio Dam (added on for 1998).

Task 1b completed: 4 Colorado pikeminnow implanted with radio transmitters.

Task 2. Deploy automated radiotelemetry system, monitor movements of radiotagged fish, download and operate radiotelemetry system.

Task completed.

Task 3. Monitor fish trap; sort, examine, and enumerate all fish; clean trash and debris from trash racks, bar screens, fish trap, and fishway entrance.

Task completed.

Task 4. Assess physical habitat available as a function of water depth and discharge.

Task Discontinued in FY98

Task 5. Analyze and evaluate data; prepare annual progress report.

Task completed.

B. Findings (1999 Highlights)

Fish Passage

1. Five sub-adult and adult Colorado pikeminnow were collected in the fish trap of the fish passageway at the Redlands Diversion Dam. One fish was collected in late-July, three in August, and one in early-September (Table 1). This use pattern was similar to that in 1996, 1997, and 1998 in which 12 fish were found in the fish trap in July and 30 in August.

2. Four pikeminnow that were found in the fish trap in 1999 were recaptures. Two pikeminnow found in the fish trap in 1997 were again found in the trap in 1999 and two pikeminnow that ascended the fish ladder in 1998 again used the ladder in 1999. Two pikeminnow found in the fish trap in 1997 were again found in the fish trap in 1998. In the four years that the fish passageway has been operated and the fish trap monitored, this now brings the total to six pikeminnow that have ascended the fish ladder more than once. However, none of these six pikeminnow that ascended the fish ladder the

second time did so the same year.

3. One Colorado pikeminnow that ascended the fish ladder 17 July 1998 was recaptured with electrofishing 16 September 1999 approximately 5 miles upstream in the Gunnison River. Another pikeminnow was recaptured at river mile 32.8 on 27 July 1999. However, this fish had not obviously ascended the fish ladder at Redlands because it had been originally captured 3 May 1993 at the mouth of Kannah Creek (Gunnison River--river mile 18.2).

Table 1. Summary statistics for the five Colorado pikeminnow captured in the fish trap of the passageway at th Redlands Diversion Dam in 1999.

Length (mm)	Weight (g)	Capture Date	Recapture Yes	Recapture No	Former Captures Date	Former Captures River	Former Captures RMI
451	634	Jul 29		X	--	--	--
557	1,308	Aug 5	X		8/ 6/98	GU	3.0[ab]
			X		5/18/98	CO	160.3
605	1,692	Aug 20	X		7/15/98	GU	3.0[ab]
			X		5/18/98	GU	0.9
			X		4/28/94	CO	168.6
522	1,150	Aug 30	X		7/22/97	GU	3.0[ab]
586	1,736	Sep 9	X		8/ 3/97	GU	3.0[ab]
			X		6/ 7/94	CO	16.5
Mean 516	---						
Range 451-605	---						

[a] caught in the passageway fish trap
[b] implanted with a radio transmitter

4. Eight-thousand, two-hundred sixty-four fish were trapped and counted in the trap of the Redlands Diversion Dam fishway between 8 March and 13 October (Appendix; Table 2). The total number of all fishes that used the fish ladder was similar to the total number that used the fish passageway in 1996 and about a 9% increase over 1998. Native fishes comprised 93% of the total number of fishes collected in 1999, compared to 94% to that each in 1996 and 1997 and 93% in 1998. Bluehead sucker comprised 54% of the catch, and flannelmouth sucker 29%, almost identical to 1998. The numbers of channel catfish that used the fish ladder in 1999 continued to increase from the previous three years. White sucker usage decreased for the second year in a row. One northern pike and one new nonnative fish, a grass carp, were captured.

5. All fish found in the fish trap were counted and sorted by species. All native fish and all rainbow and brown trout were released upstream of Redlands Diversion Dam. All nonnative species plus hybrid suckers found in the trap were removed.

Radiotracking

1. Four of the five Colorado pikeminnow (total lengths: 767, 719, 682, 594), that ascended the fish ladder and were captured in the fish trap were surgically implanted with 10.3 gram, LOTEK® radio transmitters and released immediately upstream of the Redlands Dam (Table 1). This was conducted to determine 1) the fate of Colorado pikeminnow that had passed through the fish ladder and released upstream of the diversion dam, and 2) if these radiotagged fish would lead us to sites upstream in the Gunnison River where other pikeminnow may be spawning in 2000.

2. The spatial and temporal movements of radiotagged adult Colorado pikeminnow were monitored by tracking fish from boats and from three semi-permanent, land-based tracking stations located on the Gunnison River. These stations were located at the Redlands Diversion Dam, at Whitewater (river mile 15.3), and another further upstream at river mile 33.6.

3. Two of the pikeminnow radiotagged in August and released immediately upstream of the Redlands Dam were contacted by boat 29 September 1999. One fish was contacted at Gunnison river mile 7.8 and the other at 10.4. One other fish radiotagged 30 August remained upstream of the dam but then moved downstream over the Redlands Dam 26 days later. One other fish has not been contacted since being released.

VII. Recommendations:

A. Continue to collect movement data from land-based tracking stations and from boat tracking on adult Colorado pikeminnow radiotagged in 1999 during the fall of 1999 and winter, spring, and summer of 2000.

B. Commence operation of the fishway in late-March or early-April 2000 and continue through October. Continue to monitor the species and number of fish collected in the fish trap during 1999. Compare results with 1996, 1997, 1998, and 1999.

VIII. Project Status:

A. Movements of Colorado pikeminnow radiotagged in the summer of 1999 will continue to be collected and logged in FY2000 until late summer of 2000 with three land-based tracking stations in the Gunnison River and by boat. Routine operation and maintenance of the fish passageway will resume in March or April 2000.

B. Project is ongoing and is "on-track".

C. The project will continue through FY2000; a final report is due in early FY 2001 (December 2000).

IX. FY 99 Budget

A. Funds Provided: $ 71,000

B. Funds Expended: $ 71,ØØØ
C. Difference: $ Ø
D. Status of Work--Percent of Work Completed (if BR-funded project)
100% Completed.
E. Publication Costs: $ Ø

X. Status of Data Submission:

All five Colorado pikeminnow captured in the fish trap of the fish passageway at Redlands Diversion Dam were checked for a PIT-tag. Fish previously not captured were PIT-tagged and the following data collected from all fish prior to their being released: total length (mm), weight (g), reproductive condition, and date and location of capture. Four pikeminnow were radiotagged. These data have been computerized. The total number of fishes that were collected in the fish trap at Redlands fish passageway has also been computerized.

XI. Signed: Bob D. Burdick — 99/12/Ø3
Principal Investigator — Date

APPENDIX:

A. More comprehensive/final project reports. If distributed previously, simply reference the document or report. None

B. Attached: Appendix A: one table.

Prepared and compiled by Bob D. Burdick, 99/12/Ø3
PASSRPT.99

Appendix

Table 2. Comparison of the total number of juvenile and adult fish capture in the fish trap of the passageway at the Redlands Diversion Dam, 1996 (24 June to 25 October), 1997 (27 March to 24 October), 1998 (16 March to 28 October), and 1999 (8 March to 13 October).

Common Name	Number of Fish				Percent of Total Fish			
	1996	1997	1998	1999	1996	1997	1998	1999
NATIVE FISH								
bluehead sucker	3,786	5,029	4,211	4,488	45.29%	41.10%	55.42%	54.31%
flannelmouth sucker	3,486	5,260	2,249	2,378	41.70%	42.99%	29.60%	28.78%
roundtail chub	588	1,235	569	766	7.03%	10.09%	7.49%	9.27%
Colorado pikeminnow	1	18	23	5	0.01%	0.15%	0.30%	0.06%
mountain whitefish	0	2	1	2	0.00%	0.02%	0.01%	0.02%
speckled dace	5	2	1	13	0.06%	0.02%	0.01%	0.16%
TOTAL	7,871	11,546	7,054	7,652	94.15%	94.37%	92.84%	92.59%
NONNATIVE FISH								
black bullhead	50	110	52	80	0.60%	0.90%	0.68%	0.97%
bluegill	1	0	1	0	0.01%	0.00%	0.01%	0.00%
brown trout	17	62	36	50	0.20%	0.51%	0.47%	0.61%
channel catfish	24	94	157	196	0.29%	0.77%	2.07%	2.37%
common carp	108	94	94	71	1.30%	0.77%	1.24%	0.86%
grass carp	0	0	0	1	0.00%	0.00%	0.00%	0.01%
green sunfish	9	32	5	12	0.11%	0.26%	0.07%	0.15%
largemouth bass	1	1	0	0	0.01%	< 0.01%	0.00%	0.00%
rainbow trout	3	15	9	13	0.04%	0.12%	0.12%	0.16%
smallmouth bass	1	0	0	0	0.01%	0.00%	0.00%	0.00%
northern pike	1	0	0	1	0.01%	0.00%	0.00%	0.01%
white sucker	189	253	103	81	2.27%	2.07%	1.36%	0.98%
TOTAL	404	661	457	505	4.83%	5.40%	6.01%	6.12%
HYBRID FISHES								
bluehead sucker X flannelmouth sucker	16	1	6	2	0.19%	< 0.01%	0.08%	0.02%
bluehead sucker X white sucker	32	12	32	41	0.38%	0.01%	0.42%	0.50%
flannelmouth sucker X white sucker	37	15	49	64	0.44%	0.12%	0.64%	0.77%
TOTAL	85	28	87	107	1.02%	0.23%	1.15%	1.29%
ALL TOTALS	8,360	12,235	7,598	8,264	100.00%	100.00%	100.00%	100.00%