

I. Project Title: Interagency Standardized Monitoring - Utah

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III. Project Summary:

This project monitors populations of endangered fishes in Utah. The following objectives have been outlined for post-larval, late juvenile/adult Colorado pikeminnow:

1. Develop annual indices of relative abundance.
2. Determine population trends.
3. Determine relationships between these trends and other environmental parameters.
4. Determine annual indices of relative abundance of sympatric species.

Monitoring for the last several years has seen an increase in the catch rates of adult, and particularly, juvenile Colorado pikeminnow in all reaches. Catch rates since 1991 have been elevated above those in the late 1980's. This trend continued in 1999. However, through 1998, the percentage of recaptures had been increasing each year in the Colorado River, but the overall catch and recapture rate dropped in 1999. In the Green River, the recapture rate remained low and variable. In all reaches, non-native cyprinids continued to dominate the catch.

Catch rates for YOY pikeminnow in all reaches continue to be low. The number of YOY pikeminnow caught in the middle Green River were the lowest since monitoring began. However, the pikeminnow were well distributed throughout the reaches. In the middle Green River, chubs were the most numerous native species encountered. These were followed by flannelmouth suckers, bluehead suckers, and speckled dace.

Annual monitoring of humpback chub populations in Westwater, Desolation, and Cataract

Canyons was continued in 1999. A total of 11 humpback were collected in Desolation (July 21-25), 49 in Westwater (Oct 3-8), and two in Cataract Canyon (Sep 29 - Oct 1). Three humpback chub population estimate passes in Westwater Canyon were completed in the fall of 1999. The results of those trips are summarized; population estimates will require the assistance of a statistician and will be run at a later date.

IV. Study Schedule:

- a. Initial year: 1986
- b. Final year: ongoing

V. Relationship to RIPRAP:

General Recovery Program Support Action Plan  
V.A.1. Conduct standardized monitoring program.

VI. Accomplishments of FY 99 Tasks and Deliverables, Discussion of Initial Finding and Shortcomings:

Collection and computerization of adult/juvenile and YOY sampling as delineated in the ISMP handbook.

Task 1 Baseline ISMP efforts (current sampling protocols).

1999 ISMP Summary Lower Green and Colorado rivers

*Adult/Subadult*

The 1999 annual ISMP adult Colorado Pikeminnow electrofishing was conducted from May 3 through May 20 on the Colorado and Green Rivers. The elective, or wildcard, reach (WC) for 1999 was designated CO RM 27-15. Three elective reaches (one on the Colorado and two on the Green River) have been standardized, and from now on will be sampled every third year. Flows were lower than the previous three years, which were higher than much of the preceding sampling. Sampling during higher water levels usually allows us to effectively sample many of the flooded tributary mouths that pikeminnow inhabit during high flows. However, the tributary mouths were not as accessible this year.

A total of 59 adult/juvenile Colorado pikeminnow were captured in reaches 4 and 5 on the Green River. On the Colorado River, 10 were captured, and 3 more in the elective reach. An additional 28 pikeminnow were observed but not collected in the 4 official reaches, and 1 was missed in the elective reach. Of the total captured, 1 was a juvenile too small to PIT tag, at 79 mm TL. All others received PIT tags, except one juvenile

that escaped. The fish ranged from 79 to 608 mm, with the average size increasing upstream (Table 1). Results from 1998 are given for comparison (Table 2).

Several year classes were apparent in the length-frequency graphs in the years 95-98(see 1998 annual report). Because fewer fish were collected this year, year classes are more difficult to distinguish (Figure 1). Through 1998, the percentage of recaptures had been increasing each year in the Colorado River, but the overall catch and recapture rate dropped in 1999. In the Green river, the recapture rate remained low and variable(Table 3). Of the 10 recaptured fish, 6 have been found in Utah's database. Movement of 5 of these fish between captures varied from 0.1 to 1.9 miles. One fish moved 42.5 miles.

All fish were collected and counted in the first mile of each of 8 subreaches within all reaches. In this subsample, non-native fishes were more abundant than natives in both the Green and Colorado rivers (Figure 2). In addition to the one-mile sample, 6 walleye and 2 northern pike were collected in the Green, and 2 largemouth bass were collected in the Colorado River in the elective reach. Three walleye and two northern pike stomachs were examined. Three walleye were empty, and one northern pike gut contained two fathead minnows. All pike and walleye were large adults.

Table 1. Summary of ISMP adult electrofishing, 1999.

Reach	River		Date	Flow (CFS)	# of CS			Mean TL (mm)
	Miles				AD.	Juv	# Recaps	
Colorado								
7	99-86	MAY	3-4	8200	1	0	0	467
8	68-49	MAY	5-6	8400	9	0	1	453
WC	27-15	MAY	19-20	9000	3	0	0	428
Green								
4	115-96	MAY	9-10	11500	42	1	8	409
5	56-40	MAY	11-12	9600	16	0	1	363

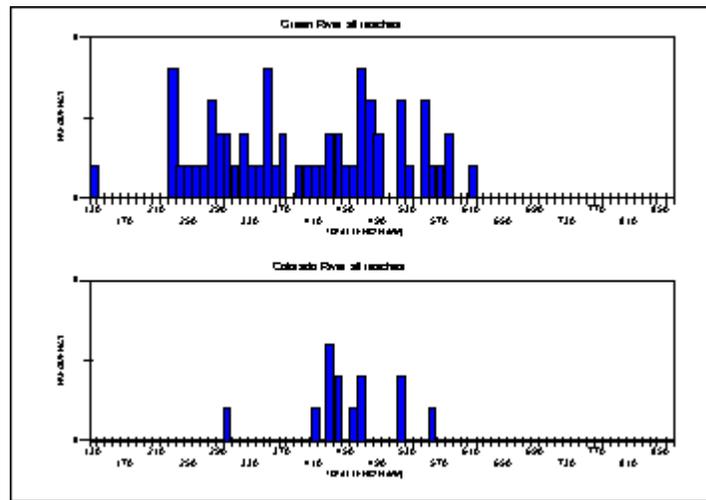
Table 2. Summary of ISMP adult electrofishing, 1998.

Reach	River		Date	Flow (CFS)	# of CS		# Recaps	Mean TL (mm)
	Miles				AD.	Juv		
Colorado								
7	99-86	MAY	12-13	20500	5	0	3	512
8	68-49	MAY	14-15	21000	19	0	7	476
Green								
4	115-96	MAY	5-6	17000	76	0	11	394
WC	83-68	MAY	7-9	20500	42	8	3	300
5	56-40	MAY	8-10	20500	25	6	1	294

Table 3. Numbers of Colorado pikeminnow, recaptured fish (in parentheses), and percent recaptured, collected during ISMP sampling 1991-1999.

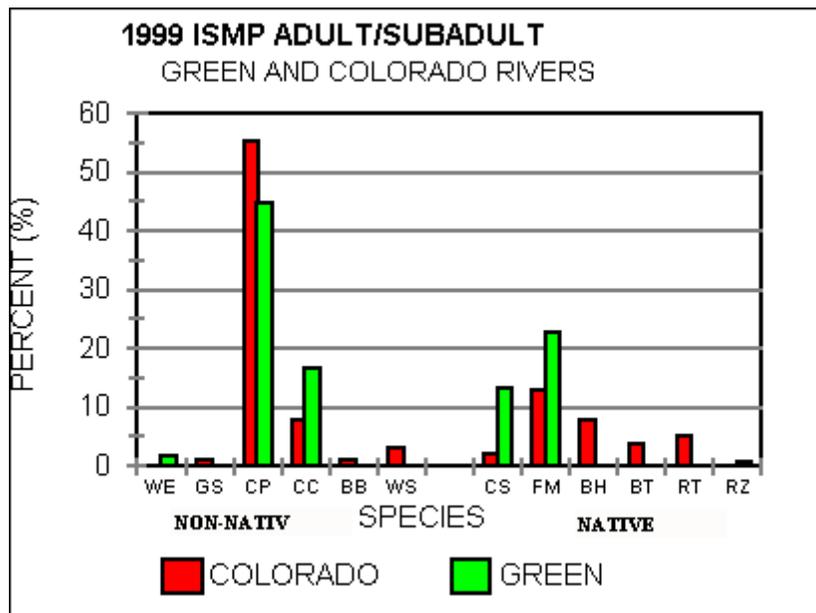
River	1991	1992	1993	1994	1995	1996	1997	1998	1999
CO	9 (0)	27 (0)	20 (2)	28 (7)	30 (9)	33(13)	26(11)	24 (10)	10(1)
(%)	<b>0</b>	<b>0</b>	<b>10.0</b>	<b>25.0</b>	<b>30.0</b>	<b>39.4</b>	<b>42.3</b>	<b>41.7</b>	<b>10.0</b>
GR	50 (3)	57 (5)	52 (2)	44 (7)	56 (7)	82 (5)	51 (6)	101 (15)	59(9)
(%)	<b>6</b>	<b>8.8</b>	<b>3.8</b>	<b>15.9</b>	<b>12.5</b>	<b>6.1</b>	<b>11.8</b>	<b>14.8</b>	<b>15.3</b>
WC (%)	n/a	n/a	n/a	5 (0) GR	15 (0) GR	11 (0) CO	11 (0) GR	42 (2) <b>4.8</b> GR	3 (0) CO

Figure 1. Length juvenile/collected spring 1999.



frequency of late adult pikeminnow during ISMP electrofishing,

Figure 2. Species



composition and relative abundance in ISMP sampling, 1998. WE=walleye, GS=green sunfish, CP=carp, CC=channel catfish, bb=black bullhead, WS=white sucker, CS=Colorado pikeminnow, FM=flannelmouth sucker, BH=bluehead sucker, RT=roundtail chub, BT=bonytail, RZ=razorback sucker.

## YOY

The 1999 annual Interagency Standardized Monitoring Program (ISMP) for sampling young-of-year (YOY) Colorado pikeminnow in the fall was conducted the week of September 13<sup>th</sup>. Two teams of researchers sampled the Colorado River RM 110-0 (reach 1) and the Green River RM 120-0 (reach 3), meeting at the confluence of the two rivers.

In the Colorado River, 8 YOY pikeminnow were captured and released, two of these were probably juveniles (92 and 102 mm). In the Green River, 304 YOY pikeminnow were released. No juvenile pikeminnow were captured. Although we believe all pikeminnow were identified and released, some samples were preserved in the field and may contain unidentified pikeminnow (12 from the Colorado, 8 from the Green River). These samples were transferred to the Larval Fish Laboratory in November for identification.

The average length of the pikeminnow was 26.8 mm in the Green River, and 25.0 mm in the Colorado River, below the average for the period of 1991-1998, which is 36.4 mm (Figure 3, Table 4). The pikeminnow were well distributed over the 120 miles of the Green River, although most were collected above RM 80.0 (Figure 4). In the Colorado River, no fish were collected above RM 45, and all of the fish were collected in three seine hauls.

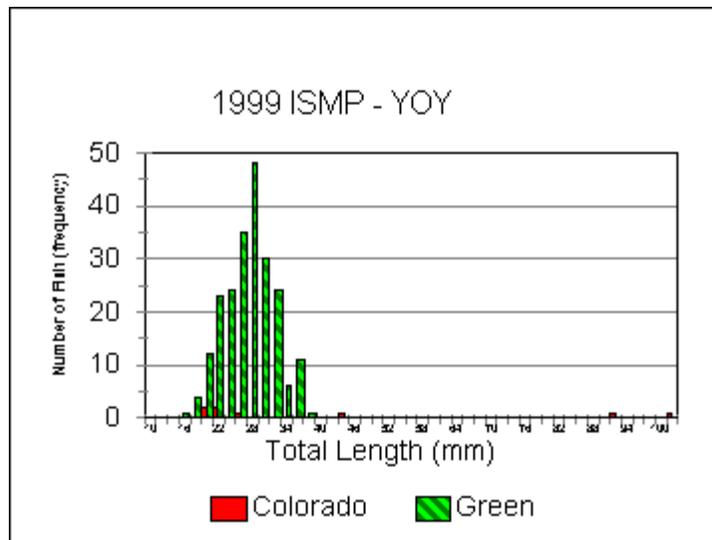


Figure 3. Length Distribution of young-of-year Colorado pikeminnow in the Green and Colorado Rivers, ISMP 1999.

Table 4. Total numbers, lengths and mean catch-per-unit-effort (CPUE; fish/100m ), by year, for Colorado pikeminnow caught during young-of-the-year monitoring on the Colorado and Green Rivers, 1991-1999.

Year	Colorado Pikeminnow Caught	Mean Length (mm)*	Length Range (mm)*	Total Area Sampled (m <sup>2</sup> )	Mean CPUE (Fish/100 m <sup>2</sup> )
1991					
Total	311	36.65	19-58	5278	5.89
Reach 3	190	36.71	22-58	3007	6.31
Reach 1	121	36.54	19-56	2271	5.32
1992					
Total	286	36.80	16-93	8948	3.19
Reach 3	134	40.61	16-93	5100	2.62
Reach 1	152	33.54	20-68	3848	3.95
1993					
Total	1355	36.83	14-74	7479	18.11
Reach 3	1211	37.36	14-74	4574	26.47
Reach 1	142	32.28	22-47	2905	4.88
1994					
Total	453	54.26	23-99	7030	6.44
Reach 3	315	49.98	23-99	3844	8.19
Reach 1	138	64.07	32-96	3186	4.33
1995					
Total	141	22.11	11-45	5612	2.51
Reach 3	57	24.94	13-45	2722	2.09
Reach 1	84	20.46	11-35	2890	2.90
1996					
Total	1276	42.7	19-75	7269	17.55
Reach 3	410	41.4	19-75	2981	13.75
Reach 1	866	39.6	20-81	4160	20.81
1997					
Total	52	29.8	13-40	5581	0.93
Reach 3	40	33.1	19-40	2821	0.10
Reach 1	12	18.3	13-34	2760	0.03
1998					
Total	340	32.4	18-68	7945	4.28
Reach 3	250	32.1	18-68	3235	7.79
Reach 1	88	34.5	20-60	4710	1.87
1999					

Total	312	26.7	15-43	8892	3.51
Reach 3	304	26.8	15-38	4102	7.41
Reach 1	8	25.0	19-43	4790	0.17

Reach 3: Green River, RM 120 to RM 0 (Confluence with the Colorado River)

Reach 1: Colorado River, RM 110 to RM 0 (Confluence with the Green River)

\*Does not include fish over 100 mm. (Or 1@92 mm in 1999)

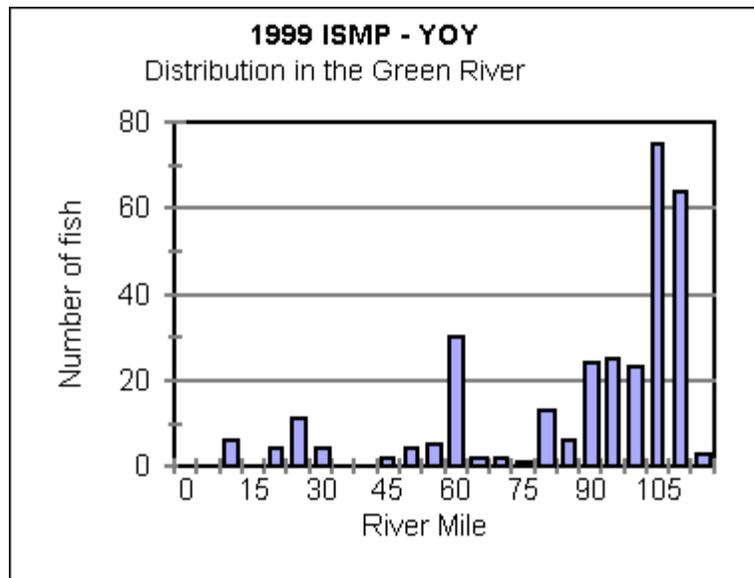


Figure 4. Longitudinal distribution of young-of-year Colorado pikeminnow in the Green River, ISMP 1999.

#### 1999 ISMP Summary Middle Green River

##### *Adult/Subadult*

Electrofishing in the four standardized reaches began on 20 April and was completed on 11 June. One of the four standardized or an elective reach (upper White River) was sampled each week during this period. Twenty miles of the White River was sampled as the Elective Reach. This section included the reach of river from river-mile 57.0 to 26.0. Within this reach, four 5-mile subreaches were sampled.

A total of 84 adult and juvenile Colorado pikeminnow (CS) were captured during monitoring activities (Table 5). Twelve of these were recaptures. An additional 48 CS were observed, but were not netted. The catch rate was 1.92 fish/hour. Captured CS ranged in size from 335 to 760 mm TL (mean = 516; Figure 5.) and 262 to 4050 g (mean = 1164). Of note, six were caught at the confluence of Bitter Creek, a tributary to the White River (RM 30.6).

Four razorback suckers were captured, all in reach 2 (Jensen) (Table 5). One was captured on razorback bar (RM 311) and the others approximately 2 miles below the

spawning bar (RM 309). Three of these fish were recaptures with PIT tag numbers indicating they were stocked from the Ouray National Fish Hatchery. These fish ranged from 361 to 510 mm TL and weighed from 460 to 1610 g respectively. The largest fish was a wild fish that had not previously been captured. Also, one razorback was observed but not captured in the White River (RM 27.3).

Five roundtail chubs were netted, two in Reach 1 (Island Park), one in Reach 3 (Ouray) and two in the elective reach of the White River. Roundtail chubs ranged from 92 to 408 mm and ranged in weight from 6 to 500 g. The largest chub (408 mm) was collected in the Island Park reach.

Channel catfish, bluehead sucker, flannelmouth sucker, and carp were captured throughout all reaches. Northern pike were encountered throughout all reaches of the Green River with the highest occurrence in the Jensen reach. Five northern pike were collected in the mouth of Brush Creek (RM 304.6). Smallmouth bass (n = 6) were encountered in the Ouray and Jensen reaches. Brown trout (n = 2) were caught in the Island Park and Jensen reaches. Rainbow trout were collected in the Island Park reach (n = 3) and the elective reach of the White River (n = 3).

Table 5. Numbers of endangered fish captured (C), observed (O) and rate of capture (#/hr) for ISMP post-juvenile/ adult monitoring, middle Green and White Rivers 1999.

Reach	RM	Dates	CS			RZ		
			#C	#O	#/hr	#C	#O	#/hr
1	334-326.7	5/6	4	2	1.2	0	0	0.0
2	316.0 -298.0	4/26 & 4/27	14	12	1.4	4	0	0.2
3	262.0 - 245.0	4/21 & 4/22	41	10	4.1	0	0	0.0
13	21.3 - 0.0	5/19 & 5/20	12	13	1.1	0	0	0.0
(Elective White R.)	57.0 - 26.0	5/26 & 6/11	13	11	1.4	0	1	0.0
		Total	84	48		4	1	
		Average	1.84			0.04		

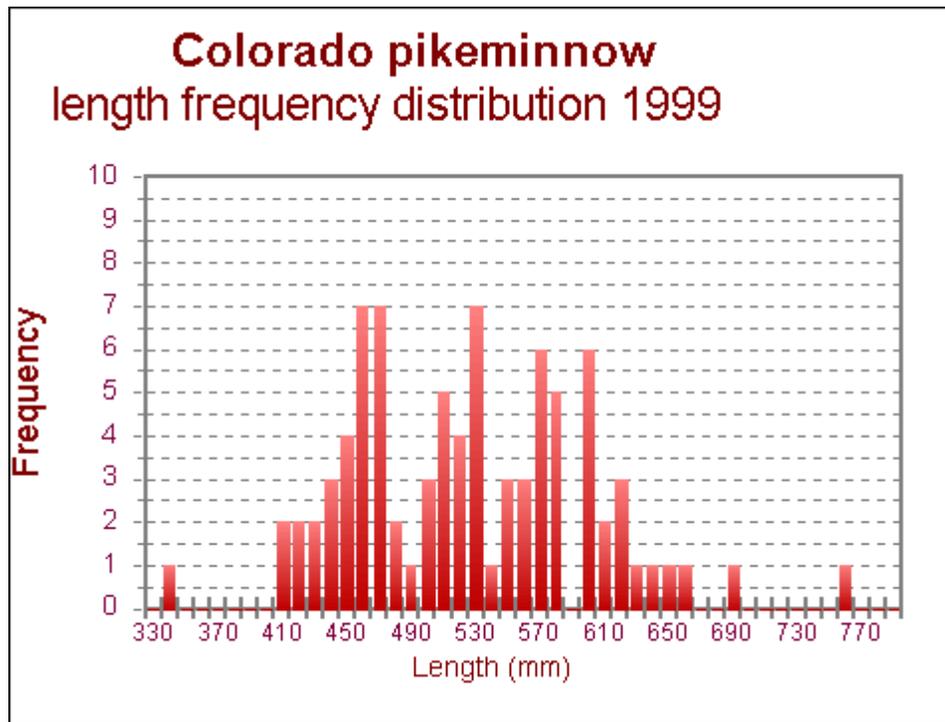


Figure 5. Length frequency of late juvenile/adult Colorado pikeminnow collected during ISMP electrofishing, middle Green and White Rivers 1999.

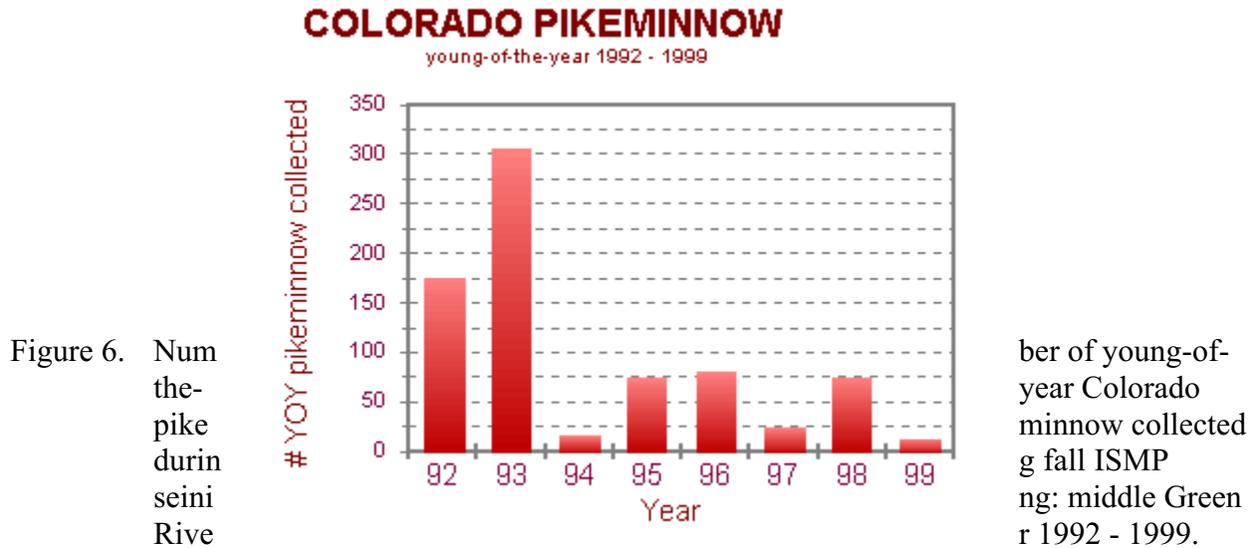
*YOY*

Annual ISMP fall sampling for YOY Colorado pikeminnow on the middle Green River was conducted from 21 - 23 September. Suitable backwaters were found in all but one subreach for a total of 41 backwaters sampled. The weather was mostly clear and sunny over the three days. Main channel temperatures ranged from 12 - 19 °C and sampled backwater habitat temperatures ranged from 15 - 21 °C. A total of 16 species were collected during 1999 sampling and a summary of the catch statistics follow.

Twelve Colorado pikeminnow were captured in 6 different backwaters. This is the lowest catch rate for YOY pikeminnow since monitoring began. Other low catch rates occurred in 1997 (n = 23) and 1994 (n = 15; Figure 6). The first pikeminnow was collected at river mile 264.1 (Johnson bottoms) and the last one was collected in the last sampled backwater near river mile 215 (Sandwash).

Chubs were the most numerous native species encountered. A total of 42 chubs were caught in 8 different backwaters. All chubs were caught between river-mile 316 (Split Mountain) and river-mile 264 (Johnson bottoms). Most chubs on which dorsal/anal ray

counts were made had a ratio of 9/9, indicating they were likely roundtail chubs.



A total of 98 suckers were captured during sampling: 31 bluehead, 39 flannelmouth and 28 unidentified. These were encountered in 14 backwaters with highest frequency in the upper reaches from river-mile 316.0 (Split mountain) to river-mile 295.0 (Spring Hollow).

Speckled dace were represented by 36 individuals. Twenty-one were collected in one backwater at river-mile 313.5. They were captured primarily in the area between river-mile 316.0 (Split Mountain) and river-mile 300.0 (Stewart Lake). Captures of speckled dace were up from last years' 17.

Red shiners, fathead minnows, and sand shiners continue to dominate the catch. In addition to these, 5 other introduced fishes were encountered: 24 carp, 197 green sunfish, 9 black crappie, 166 black bullhead catfish, and 1 northern pike. All green sunfish were collected in 7 backwaters from river-mile 294.0 to 276.9 (Stewart Lake to the Stirrup flooded bottom). Observations of black bullhead catfish and green sunfish in river habitats indicates a rapid increase in these populations over the past two years. The number of black bullhead catfish and green sunfish collected in 1998 was only 7 and 17 respectively.

Task 3 Complete 3 sampling trips (one in Desolation/Gray, Westwater, and Cataract canyons) in July/August for humpback chub monitoring.

Humpback chub populations were monitored in Desolation / Gray (Deso/Gray), Westwater and Cataract Canyons. Sampling consisted of fishing six trammel nets (75' x 6'; 1" mesh), shoreline electrofishing and hoop netting, and seining to sample all life stages of fish present at each sampling location. Four trend sites were sampled in Deso/Gray on July 21-25, 1999. Three trend sites were sampled in Westwater Canyon on October 3-8, 1999. Four trend sites were sampled in Cataract Canyon September 26 - October 1, 1998. Refer to the revised ISMP handbook for specific sampling methodologies.

#### *Desolation Canyon*

Desolation Canyon sampling occurred as Green River flows averaged 5400 cfs, which is slightly less than the optimal sampling flow, which has been determined from past sampling to be 8000 cfs. The results of low velocity habitat sampling (seines) are not included in this report except for *Gila* captures; 4 samples were preserved and all have been processed. A total of 14 YOY *Gila* were collected. Two were preserved, the others identified in the field. Only three were measured, at 19, 19, and 20 mm.

A total of 40 adult and juvenile *Gila* spp. were collected (including 6 recaptures): 11 humpback, 6 roundtail and 23 chubs not identified to species (either juveniles or adults of indeterminate morphology) (Table 6). All chubs were photographed and subjected to a series of morphometric measurements. Humpback and general *Gila* spp. trammel net catch rates are reported in Table 7. A summary of long term catch rates at the four trend sites in Deso/Gray indicates densities of native chubs tended to be lower than those seen in 1997 and 1998, but were comparable to earlier catch rates. Catch rates in 1997 were the highest we have seen since we started sampling in Deso/Gray in 1989.

A total of 47 late juvenile and adult Colorado pikeminnow were collected in 1999 with the majority of those collected at the Joe Hutch site (RM 160). Ten of these fish were recaptures (to be analyzed at a later date). For the third consecutive year our sampling has been coincident with a concentration of spawning pikeminnow at the Joe Hutch site. Last year (1998) the catch rate at Joe Hutch was the highest in UDWR records (Table 8). This year's catch rate was lower than the previous two years, but still higher than other sites. Of the 35 pikeminnow collected at Joe Hutch; 25 were ripe males, 7 were suspected males - not ripe, one was immature, and two large fish ( 758, 712 mm) were suspected to be female. A more complete analysis of this data set will be included in the later reports. One adult Razorback sucker was also collected by electrofishing. This fish was a recapture.

Table 6. Summary of fishes collected in Deso/Gray Canyon, Green River; July 21-25, 1999. Table does not include incidental collection of green sunfish. Results of seine hauls are not included and therefore the absence of non-native cyprinids.

Site / RM	Gear Type	HB	RT	CH	CS	FM	BH	CP	CC	RZ
Cedar Ridge / 184.6	Trammel	2	-	3	5	8	6	1	16	-
	Electrofishing	0	-	2	2	39	12	10	52	1
Rock Ck / 174.0	Trammel	4	-	2	3	9	8	7	27	-
	Electrofishing	-	3	1	-	-	2	5	10	-
Joe Hutch / 160.0	Trammel	2	-	5	30	5	1	-	38	-
	Electrofishing	-	-	4	5	9	16	6	51	-
Coal Ck / 145.5	Trammel	3	1	1	1	5	7	1	17	-
	Electrofishing	-	-	-	1	-	6	1	14	-
<b>Totals</b>	<b>Trammel</b>	<b>11</b>	<b>1</b>	<b>11</b>	<b>39</b>	<b>28</b>	<b>22</b>	<b>9</b>	<b>98</b>	<b>-</b>
	<b>Electrofishing</b>	<b>-</b>	<b>3</b>	<b>7</b>	<b>8</b>	<b>48</b>	<b>36</b>	<b>22</b>	<b>127</b>	<b>1</b>
	<b>Hoop nets</b>	<b>-</b>	<b>2</b>	<b>5</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>-</b>	<b>64</b>	<b>-</b>
<i>Grand Totals</i>		<i>11</i>	<i>6</i>	<i>23</i>	<i>46</i>	<i>82</i>	<i>58</i>	<i>31</i>	<i>289</i>	<i>1</i>

Table 7. Summary of long term trammel net catch rates (fish / net hour) for humpback chub / and Gila spp. combined at four trend sampling sites in Deso/Gray Canyon, Green River; 1993-1999.

Site	1993	1994	1995	1996	1997	1998	1999
RM 184.8	.03 / .03	.04 / .08	.09 / .09	.02 / .02	.06 / .31	.14 / .24	.03 / .07
RM 174.0	- / .07	- / .02	- / .02	- / -	.04 / .12	.09 / .16	.07 / .10
RM 160.0	- / .05	- / .07	.03 / .14	.04 / .04	.09 / .32	.17 / .17	.03 / .11
RM 145.5	- / .09	- / .12	.03 / .09	.02 / .02	.05 / .15	- / .06	.05 / .10

Table 8. Summary of long term trammel net catch rates (fish / net hour) for Colorado pikeminnow at four trend sampling sites in Deso/Gray Canyon, Green River; 1993-1999.

Site	1993	1994	1995	1996	1997	1998	1999
RM 184.8	.02	-	.01	.02	.12	.08	.11
RM 174.0	-	.07	.08	-	.2	.31	.07
RM 160.0	.02	.02	-	.02	.73	1.35	.48
RM 145.5	-	.02	.02	-	.02	.06	.04

*Westwater Canyon*

Monitoring in Westwater Canyon occurred from October 3-8, 1999. The Colorado River flows rose from 6800 cfs to 8000 cfs and dropped back down to 6800 cfs. The monitoring data was lifted out of a larger data set compiled while trying to determine humpback and roundtail chub population size in the canyon. A summary of chubs recaptured during the monitoring effort is presented under the heading - Task 4.

A total of 289 *Gila* spp. were collected with trammel nets and electrofishing while conducting this year's monitoring effort (Table 9). Of that total 53 were identified as humpback, 114 as roundtail and 122 were not identified to species (the majority of these were juveniles - age 1 averaging 110 mm). No Colorado pikeminnow were collected in the main channel and shoreline sampling in 1999. The results of low velocity habitat sampling included only 1 YOY chub, at 40 mm. All samples have been processed. Long term trammel net catch rates of humpback and roundtail chub at each of the three trend sites is presented in Table 10. Native catostomids and non-native carp and channel catfish were relatively scarce as well. A more complete analysis of species relative abundance and population structure will follow in later reports.

Table 9. Summary of fishes collected in Westwater Canyon, Colorado River; October 3-8, 1999. Table does not include incidental collections of centrarchids and other nonnatives. Results of seine hauls are not included and therefore the absence of non-native cyprinids.

Site / RM	Gear Type	HB	RT	CH	CS	FM	BH	CP	CC	WS
Miner's / 124.1	Trammel	8	49	-	-	4	3	-	9	1
	Electrofishing	1	19	16	-	2	5	8	12	-
Cougar bar / 121.5	Trammel	32	12	-	-	-	-	-	1	-
	Electrofishing	3	21	55	-	3	1	4	14	-
Hades / 120.0	Trammel	9	6	-	-	1	11	-	1	1
	Electrofishing	-	7	51	-	4	13	1	3	1
<b>Totals</b>	<b>Trammel</b>	<b>49</b>	<b>67</b>	<b>-</b>	<b>-</b>	<b>5</b>	<b>14</b>	<b>-</b>	<b>11</b>	<b>2</b>
	<b>Electrofishing</b>	<b>4</b>	<b>47</b>	<b>122</b>	<b>-</b>	<b>9</b>	<b>19</b>	<b>13</b>	<b>29</b>	<b>1</b>
<i>Grand Totals</i>		53	114	122	-	14	33	13	40	3

Table 10. Summary of long term trammel net catch rates (fish / net hour) for humpback chub / roundtail chub at three trend sampling sites in Westwater Canyon, Colorado River; 1993-1998.

Site	1993	1994	1995	1996	1997	1998	1999
Rm 124.1	.53 / .61	.35 / .31	.42 / .46	.51 / .59	.25 / .92	.53 / .72	.16 / .98
Rm 121.5	.40 / .44	.27 / .26	.64 / .44	.39 / .16	.31 / .25	.63 / .25	.58 / .22
Rm 120.0	.45 / .92	.10 / .22	.30 / .30	.21 / .40	.25 / .16	.12 / .26	.14 / .09

### *Cataract Canyon*

Sampling in Cataract Canyon has been conducted on a very infrequent basis by the UDWR from 1990-1997. Annual monitoring the fish community in Cataract Canyon was included in the ISMP beginning in 1998. Colorado River flows fluctuated between 10,000 and 10,500 cfs during the trip; September 26 - October 1, 1999. The density of chubs in Cataract Canyon is very low; less than we see in Deso/Gray and far less than that seen in Westwater Canyon. A total of 6 Gila spp. were collected, only four were PIT tagged. One escaped before it could be measured, and one was not large enough to PIT tag (Table 11). None of the chubs were recaptures. Three Colorado pikeminnow were collected, all below the last rapid, in the Lake Powell inflow area. Nonnative channel catfish and carp dominated the main channel collections. The lowest site, at RM 200.9, is located below the major rapids in Cataract Canyon. The fish community there was influenced by Lake Powell fish community. Five walleye were collected at this site. No habitats suitable for low velocity habitat sampling were encountered.

Table 11. Summary of fishes collected in Cataract Canyon, Colorado River; September 26 - October 1, 1999. Table does not include incidental collections of non-native cyprinids. Electrofishing was conducted only at the first two sites.

Site / RM	Gear Type	HB	RT	CH	CS	FM	BH	CP	CC	NP	WE
Brn Betty / 211.8	Trammel	-	-	1	-	1	2	10	33	-	-
	Electrofishing	-	-	-	-	-	-	-	-	-	-
Below #10 / 207.5	Trammel	1	-	1	-	-	-	-	21	-	-
	Electrofishing	-	-	1	-	-	2	5	8	2	-
Below #12 / 206.8	Trammel	1	-	1	-	-	-	3	25	-	-
Ten Cent / 200.9	Trammel	-	-	-	3	1	-	4	10	-	5
<b>Totals</b>	<b>Trammel</b>	<b>2</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>17</b>	<b>89</b>	<b>-</b>	<b>5</b>
	<b>Electrofishing</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>5</b>	<b>8</b>	<b>2</b>	<b>-</b>
<i>Grand Totals</i>		2	-	4	3	2	4	22	207	2	5

Task 4 Complete 3 sampling trips in the fall in Westwater Canyon for a humpback chub population estimate.

There was a significant departure from the study design outlined in the FY98 Scope of Work (and unfortunately perpetuated in the 1999 SOW). We decided to mimic the approach taken by Osmundson and Burnham (1996) in estimating Colorado pikeminnow population size on the Colorado river. Therefore three sampling passes were conducted in a fairly narrow time frame during Fall, 1998 and again in Fall, 1999 to estimate the size of the humpback and roundtail chub population in Westwater Canyon. A similar approach was taken by FWS personnel working in Black Rocks. We PIT tagged all *Gila* spp. larger than 150 mm.

We focused on the same three areas that serve as the monitoring sites in Westwater Canyon. We sampled exclusively with trammel nets. We wanted to focus on the adult component of the Westwater chub population. From past research we know that trammel nets provide us with the greatest numbers of adult sized chubs, while electrofishing is a better technique to collect juveniles. Electrofishing was employed on the second pass (trip), which served as our annual ISMP monitoring trip (see table 11 in Task 3). However, to remain consistent between pop estimate sampling passes, the electrofishing captures were not included in this analysis. Either nine or ten trammel nets were fished at each site beginning in the late afternoon, through the first few hours of darkness, and again during the pre-dawn and early morning hours. Each net was checked at 2-hour intervals and all chubs removed to a holding pen. During each trip we sampled for two days at the Miner's Cabin site (RM 124.3 - 123.7), for two days at the Cougar Bar site (RM 121.5 - 121.0) and one day at the Hades Bar site (shortest stretch; RM 120.0 - 119.8). This represents a significant increase in effort than was expended during the Aspinall study to monitor this component of the fish community.

Table 12 and 13 summarize the catch and recapture of humpback and roundtail chubs collected at each of these sites on each of these three trips. Same trip recaptures were not considered. Recaptures are presented as long term (fish tagged during the Aspinall project, i.e. prior to 1998), fish tagged during the first pass, and fish tagged during the second pass. These results are a summary of the raw data and preliminary at this time. Following further verification of this data set we will pursue generating a population estimate. Further analyses of growth and movement will be discussed in future reports. This three year population estimate began in 1998 and will end in 2000. A draft report will be available March 31, 2000.

Table 12. Summary of humpback chub captures and recaptures during three sampling passes in Westwater Canyon, Colorado River; Fall, 1999. All fish were collected with trammel nets. Long term recaptures refer to fish originally tagged between 1992 and 1998.

<i>Trip #</i>	<i>Sampling dates</i>	<i>Location</i>	<i>HBC caught</i>	<i>Long term recaptures</i>	<i>Recap from 1<sup>st</sup> pass</i>	<i>Racaps from 2<sup>nd</sup> pass</i>
1	980907 - 08	RM 124.3 - 123.8	21	4	NA	NA
	980909 - 10	RM 121.5 - 121.0	81	17	NA	NA
	980911	RM 120.0 - 119.8	11	0	NA	NA
2	980929 - 30	RM 124.3 - 123.8	27	4	0	NA
	981001 - 02	RM 121.5 - 121.0	58	14	2	NA
	981003	RM 120.0 - 119.8	9	2	1	NA
3	981020 - 21	RM 124.3 - 123.8	15	4	0	0
	981022 - 23	RM 121.5 - 121.0	48	9	3	1
	981024	RM 120.0 - 119.8	4	0	0	0

Table 13. Summary of roundtail chub captures and recaptures during three sampling passes in Westwater Canyon, Colorado River; Fall, 1999. All fish were collected with trammel nets. Long term recaptures refer to fish originally tagged between 1992 and 1997.

<i>Trip #</i>	<i>Sampling dates</i>	<i>Location</i>	<i>RTC caught</i>	<i>Long term recaptures</i>	<i>Recap from 1<sup>st</sup> pass</i>	<i>Racaps from 2<sup>nd</sup> pass</i>
1	980907 - 08	RM 124.3 - 123.8	48	6	NA	NA
	980909 - 10	RM 121.5 - 121.0	25	4	NA	NA
	980911	RM 120.0 - 119.8	13	1	NA	NA
2	980929 - 30	RM 124.3 - 123.8	91	21	7	NA
	981001 - 02	RM 121.5 - 121.0	43	7	1	NA
	981003	RM 120.0 - 119.8	6	0	0	NA
3	981020 - 21	RM 124.3 - 123.8	143	9	1	1
	981022 - 23	RM 121.5 - 121.0	63	7	1	1
	981024	RM 120.0 - 119.8	19	0	0	0

There were few short term recaptures recorded this year. This follows the trend established in recent years. We continue to recapture fish from previous year's efforts. Likewise, in our attempts to estimate chub population size during the Aspinall study, we repeatedly saw better recapture rates for fish tagged the previous year(s) as opposed to the previous trip. It is our hope in the future that if the same year recapture probabilities are not sufficient to generate relatively accurate population estimates, perhaps sequential year probabilities will.

Throughout this study, we documented several (17) occurrences of PIT tag loss with a visible PIT tag scar, or recent insertion point. We will make an effort in the future to summarize this information and determine to what extent this phenomenon may be affecting our efforts. Unfortunately, these fish can not be referred to as recaptures without knowing when and where they were tagged. We must reiterate that the data presented above is provisional at this point.

#### VII. Recommendations:

- 1) Return to sampling Cataract canyon for humpback chub every three years instead of every year. The low catch rate does not make this effort cost-effective.
- 2) PIT tags for roundtail chub population estimate should be fully funded because the two populations coexist so closely. The total carrying capacity of the Canyon for chubs (if it should ever be determined) will have to account for all *Gila* spp. inhabiting the canyons.

#### VIII. Project Status: On track and ongoing.

IX. FY 99 Budget:

- A. Funds budgeted: \$ 161,000<sup>1</sup>
- B. Funds expended/obligated: \$ 161,000
- C. Difference: \$ -0-
- D. Percent FY 99 work completed: 100%
- E. Recovery Program funds spent for publication charges: \$0.00

<sup>1</sup> General Funds and Section 6 Funds.

X. Status of data submission: Data entry is in progress with expected completion date of 20 December 1999.

XI. Signed: Matthew Andersen, December 7, 1999

Matthew Andersen