

**EFFECTS OF INTERIM FLOWS FROM GLEN CANYON DAM ON
THE AQUATIC RESOURCES OF THE LOWER COLORADO
RIVER FROM NATIONAL CANYON TO LAKE MEAD**

**Quarterly Report No. 10
Trip No. 10: September 15 - October 7, 1994**

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INTRODUCTION

This report presents preliminary results from Trip 10, 1994 of the Hualapai Aquatic Resources Study. Included in the report are a summary of trip logistics, personnel, data collected, observations, and recommendations. Most information is presented in tables to provide a synopsis of trip details. These data are hand tabulated and should be considered preliminary. Data will subsequently be computerized and checked for accuracy. The purpose of these trip reports is to provide information from BIO/WEST trips as quickly as possible to aid other researchers.

LOGISTICS, RESEARCH SCHEDULE AND PERSONNEL

Trip 10 was conducted September 18 - October 7, 1994 from National Canyon (RM 166.4) to Pearce Ferry (RM 280). This is the first trip of this project that extends the study reach from National Canyon to Diamond Creek. Table 1 presents a summary of logistics and research schedule for Trip 10, 1994. Table 2 is a list of personnel who were present or participated in research activities for Trip 10, 1994.

DATA COLLECTED

Table 3 is a summary of gear types used, sampling effort and fish captured by river reach for Trip 10, 1994. Reach 3 of the study area is from National Canyon (RM 166.4) to Diamond Creek (RM 225.7). Reach 4 is from Diamond Creek to Pearce Ferry (RM 280.0).

Native Fish Captured

A total of 129 flannelmouth suckers were captured during Trip 10, 1994 including 11 larval, 13 young-of-year (YOY), 58 juveniles and 47 adults. Forty adult flannelmouth suckers were PIT-tagged (Table 4). In Reach 3, a total of 102 flannelmouth were captured, including 10 YOY, 54 juveniles and 38 adults. Twenty-seven flannelmouth suckers were captured in Reach 4. Eleven were larval, 3 YOY, 4 juveniles and 9 adults.

A total of 49 bluehead suckers were captured during Trip 10, including 3 YOY, 33 juveniles and 13 adults. Twelve adult bluehead suckers were PIT-tagged (Table 5). Forty-seven bluehead were captured in Reach 3, including 3 YOY, 33 juveniles and 11 adults. Two adult bluehead suckers were captured in Reach 4.

A total of 932 speckled dace were captured during Trip 10. Two hundred and forty-two dace were captured in Reach 3. In Reach 4, a total of 690 dace were sampled, including 597 captured in Spencer Creek.

Water Quality

Water temperatures in the mainstem Colorado River during Trip 10, 1994 ranged from 13.1 to 16.0°C. Water temperatures in Spencer Creek ranged from 20.4 to 24.2°C.

Water turbidity in the mainstem Colorado River was high until October 1, 1994. Secchi depths ranged from 0.1 to 0.45 m before October 1, and from 0.6 to 1.0 m after.

Primary/Secondary Productivity

A total of 27 drift samples (three sets of three samples on rising, falling and steady hydrographs), were collected from the Colorado River during Trip 10. Drift sets were collected at Hells Hollow (RM 182.4), Granite Park (RM 208.9), and upstream of Spencer Creek (RM 246.0).

Hess samples were collected at the mouth of Spencer Creek and in the mainchannel just above Spencer. Surber samples were collected from the upper two multiple pass sites in Spencer Creek. Three surber samples were also collected from Diamond Creek near its confluence with the Colorado River.

River Stage Monitoring

Changes in river stage were recorded at 8 locations during Trip 10 (Table 6). Maximum stage change recorded during the trip (59 cm) occurred at Spencer Canyon on September 29 - October 1, 1994.

Mapping

Mapping of sampling locations on mylar overlays was performed for GIS sites #10 through #13. These data will be included in the long-term monitoring program at GCES.

OBSERVATIONS

1. Total catch rates of flannelmouth and bluehead suckers during this trip were greater than previous efforts for Reach 3 (BIO/WEST Grand Canyon Study).
2. One flannelmouth sucker captured in Reach 3 was a recapture. This fish was recaptured at RM 214.0 on September 24, 1994, only a short distance from its original capture location of RM 213.8 in May 1992.
3. Tagging of channel catfish and striped bass was initiated this trip. Fifty-one channel catfish were tagged with yellow floy tags during Trip 10. No striped bass were tagged.
4. Seining of nearshore habitats collected both YOY and juvenile flannelmouth and bluehead suckers. Speckled dace were also common until below Bridge Canyon Rapid, where red shiners dominated the catch.
5. External parasites (Lernea and leeches) were observed on many channel catfish during this trip. No parasites were observed on any native fish.
6. Several larval suckers were observed in the mainchannel at RM 246.0, approximately 100 m upstream of the mouth of Spencer Creek. Ten fish were sampled with an aquarium dip-net and preserved in formalin for positive identification. These fish were classified as late mesolarvae flannelmouth suckers (Catostomus latipinnis) and ranged in length from 11.0 to 13.8 mm TL. Age of these fish was estimated at three weeks. Another larval flannelmouth sucker (16 mm TL) was captured 17 miles upstream, in a backwater at RM 229.4.
7. Separation Canyon and Spencer Creek flashed prior to sampling on September 28, 1994. Flooding in both areas was likely caused by heavy rains on September 25, 1994. Much of the sand at Separation Canyon was gone, replaced by a cobble bar extending into the river. The stream at Spencer Canyon was altered in several places since Trip 9, 1994 requiring the relocation of multiple pass sites #1 and #2.
8. Several Gambusia were caught seining near the warm springs on river right between RM 268.8 - RM 296.3. Spring temperatures averaged 26°C.

RECOMMENDATIONS

1. Continue floy tagging channel catfish and striped bass for movement information.
2. Mapping of sampling locations on aerial photos should continue to aid data entry in the GIS.
3. Cobble bars at Separation Canyon (RM 239.5), below Separation (left side, RM 241.9), and Spencer Canyon (RM 246.0) should be investigated as possible spawning sites for flannelmouth suckers.
4. The intensive seining effort initiated on this trip should be continued to further document the distribution and abundance of YOY and juvenile suckers, speckled dace and non-native species (principally red shiners and fathead minnows).
5. The multiple pass, population estimate sites in Spencer Creek should be evaluated each trip and moved when necessary to reflect the frequent stream changes.

Table 1. Logistics and Research Schedule Trip 10, 1994.

Date	RM	Location	Research Activities		
			T&R ¹	FS	HQ
9/15	31.5	South Canyon	X		
9/16	68.5	Tanner Canyon	X		
9/17	120.0	Blacktail Canyon	X		
9/18	166.0	Above National Canyon	X		
9/19	174.3	Cove Canyon	X	X	
9/20	182.4	Hells Hollow	X	X	
9/21	182.4	Hells Hollow		X	
9/22	208.9	Granite Park	X	X	
9/23	208.9	Granite Park		X	
9/24	214.0	214 Mile Creek	X	X	
9/25	230.4	Travertine Falls	X	X	
9/26	230.4	Travertine Falls		X	
9/27	235.0	Bridge Canyon	X	X	
9/28	242.5	Below Separation Canyon	X	X	
9/29	246.0	Spencer Canyon	X	X	X
9/30	246.0	Spencer Canyon		X	X
10/01	246.0	Spencer Canyon		X	X
10/02	248.0	Above Surprise Canyon	X	X	
10/03	250.6	Above Maxson Canyon	X	X	
10/04	270.0	Below Bat Cave	X	X	
10/05	273.5	Emery Falls	X	X	
10/06	273.5	Emery Falls		X	
10/07	280.0	Pearce Ferry (Take Out)	X		

¹ T&R = Travel and Reconnaissance

FS = Fish Sampling

HQ = Habitat Quantification

Table 2. Personnel Participating in Trip 10, 1994.

Personnel	Affiliation	Dates	Comments
B. Cowdell	BIO/WEST	9/25 - 10/7	Project Leader
W. Leibfried	BIO/WEST & HNRD	9/18 - 9/25	Project Leader
E. Prats	BIO/WEST	9/25 - 10/7	Senior Biologist
T. Yates	BIO/WEST	9/15 - 10/7	
G. Hardwick	BIO/WEST	9/18 - 9/25	
B. Zimmerman	Hualapai NRD	9/18 - 9/25	
M. Samson	Hualapai NRD	9/25 - 9/28	
D. Lee, Jr.	Hualapai NRD	9/25 - 10/6	
M. Vaughn	Hualapai NRD	9/25 - 10/6	
C. Graham	Hualapai NRD	9/18 - 9/25	
S. Bledsoe	OARS	9/15 - 10/7	Trip Leader
L. Neimi	OARS	9/15 - 10/7	
M. Richmond	OARS	9/15 - 10/7	
K. Abbott	OARS Volunteer	9/15 - 9/25	

Table 3. Summary of Fish Collected and Effort by Gear Type, Trip 10, 1994 (Table does not include 10 larval flannelmouth suckers captured near Spencer Creek and 1 FM larvae captured near Travertine Canyon. THESE DATA ARE PRELIMINARY

Gear Type	Age	FM	BH	SD	CP	SB	CC	RB	RS	FH	PK	GA	GS
Electrofishing Reach 3 N=18	A	3		3	9	1				3			
	J	3	1										
	Y												
Electrofishing Reach 4 N=57	A	5			183	1			209				
	J												
	Y												
Backpack Electrofishing Reach 3 N=5	A									1			
	J												
	Y												
Backpack Electrofishing Reach 4 N=5	A		1	566					118	8	2		
	J												
	Y	1											
Nets Reach 3 N=98	A	35	11		25	16	2						
	J												
	Y												
Nets Reach 4 N=180	A	4	1		18	1	36						
	J												
	Y												

Table 3. Continued.

Gear Type	Age	FM	BH	SD	CP	SB	CC	RB	RS	FH	PK	GA	GS
Seines Reach 3	A			236	1					10			
	J	51	32		1								
	Y	10	3										
Seines Reach 4 N=116	A			81				2038	408	1	46		
	J	4			3			53	3		6		
	Y	2		13									3
Traps Reach 3 N=85	A			3						1			
	J												
	Y												
Traps Reach 4 N=130	A			30				103	11	49			
	J				2								
	Y												2
Angling Reach 3 N=4	A												16
	J												
	Y												
Totals	A	47	13	919	236	2	69	2	2468	442	52	46	
	Y	58	33		6				53	3		6	
	J	13	3	13									5

A = Adult
 J = Juvenile
 Y = Young-of-year
 FM = flannemouth sucker
 BH = bluehead sucker
 SD = speckled dace
 CP = carp
 SB = striped bass
 CC = channel catfish
 RB = rainbow trout
 RS = redshiner
 FH = fathead minnow
 PK = plains killifish
 GA = mosquito fish
 GS = green sunfish

Table 4. Summary of flannelmouth suckers PIT-tagged during Trip 10, 1994.

#	DATE	GEAR ^p TYPE	PIT TAG	RECAP	OLD TAG	TL (mm)	WT (g)	RM (capture)	RM (release)
1	940923	EL	1F234A0173	N	-	354	432	205.8	205.8
2	940923	EL	1F10660467	N	-	245	236	205.8	205.8
3	940925	EL	1F204F747E	N	-	259	145	214.3	214.3
4	940926	EL	1F20476515	N	-	246	127	227.1	227.1
5	940926	EL	1F1F6C3224	N	-	285	211	227.1	227.1
6	940926	EL	1F1F624E12	N	-	321	294	228.5	228.5
7	940926	EL	1F200D062E	N	-	312	257	230.5	230.5
8	940928	EL	1F1F71361B	N	-	410	565	238.6	238.6
9	940920	TK	1F204D363E	N	-	334	309	171.8	171.8
10	940919	TK	1F211D693A	N	-	408	660	172.0	172.0
11	940920	TK	1F20410000	N	-	408	672	172.0	172.0
12	940920	TK	1F200D0F25	N	-	282	199	173.4	173.4
13	940921	TK	1F200E7F34	N	-	406	628	181.5	181.5
14	940921	TK	1F1F604022	N	-	264	178	181.5	181.5
15	940921	TK	1F20530B63	N	-	330	308	181.5	181.6
16	940922	TK	1F2051135D	N	-	459	856	181.5	181.5
17	940921	TK	1F20262378	N	-	297	244	180.9	180.8
18	940921	TK	1F1F6E5C78	N	-	376	512	180.9	180.8

Table 4. Summary of flannelmouth suckers PIT-tagged during Trip 10, 1994.

#	DATE	GEAR TYPE	PIT TAG	RECAP	OLD TAG	TL (mm)	WT (g)	RM (capture)	RM (release)
19	940921	TK	1F20454933	N	-	401	627	180.9	180.8
20	940921	TK	1F14325843	N	-	266	190	180.8	180.8
21	940921	TN	1F1F63203F	N	-	358	454	180.8	180.8
22	940921	TN	1F2022021D	N	-	340	416	180.8	180.8
23	940922	TN	1F20257428	N	-	402	601	208.0	208.0
24	940922	TN	1F1E40146F	N	-	430	710	208.0	208.0
25	940922	TN	1F1E2B5444	N	-	358	461	208.0	208.0
26	940924	TN	1F1F5F5112	N	-	464	965	208.0	208.0
27	940923	TK	1F1F73321D	N	-	335	357	208.9	208.9
28	940922	TK	1F1F665309	N	-	315	263	208.4	208.4
29	940923	TK	1F1F62055B	N	-	325	271	208.4	208.4
30	940922	TK	1F1F683624 ^A	N	-	395	493	208.0	208.0
31	940923	TK	1F201C287D	N	-	387	616	208.0	208.0
32	940923	TK	1F20257428 ^B	Y	PIT-TAG	396	585	208.0	208.0
33	940923	TK	1F1F780F3B	N	-	394	574	208.0	208.0
34	940923	TK	1F1F571853	N	-	339	342	207.9	207.9
35	940924	TK	7F7D085C5E ^C	Y	PIT-TAG	403	643	214.0	214.0
36	940925	TK	7F7B016604	N	-	375	459	214.0	214.0

Table 4. Summary of flannelmouth suckers PIT-tagged during Trip 10, 1994.

#	DATE	GEAR ^a TYPE	PIT TAG	RECAP	OLD TAG	TL (mm)	WT (g)	RM (capture)	RM (release)
37	940926	TK	1F1F7D281D	N	-	240	125	229.9	229.9
38	941001	TK	1F2047007A	N	-	230	108	246.5	246.5
39	941003	TK	1F1E43136D	N	-	326	258	248.0	248.0
40	941002	TL	1F20093008	N	-	368	391	248.4	248.4

A. Flannelmouth variant (Flannelmouth X Bluehead)

B. Fish PIT-tagged previous day at same location

C. See Observations section for initial tag location

D. Gear Types

EL = Electrofishing

TL = 75'x6'x1½"x12" trammel net

TK = 75'x5'x1"x12" trammel net

TN = 50'x6'x1½"x12" trammel net

Table 5. Summary of bluehead suckers PIT-tagged during Trip 10, 1994.

#	DATE	GEAR TYPE	PIT TAG	RECAP	OLD TAG	TL (mm)	WT (g)	RM (capture)	RM (release)
1	940919	GP	1F200A7443	N	-	355	503	172.8	172.8
2	940921	TK	1F1F64617D	N	-	289	235	181.5	181.5
3	940921	TK	1F20467506	N	-	250	148	181.5	181.5
4	940922	TK	1F20415030	N	-	294	258	181.5	181.5
5	940921	TN	1F2014634A	N	-	305	323	180.8	180.8
6	940921	TK	1F20431668	N	-	321	327	183.0	183.0
7	940923	TK	1F1E422A57	N	-	270	179	208.9	209.9
8	940923	TK	1F1E430E72	N	-	239	120	208.4	208.4
9	940923	TK	1F20185C4D	N	-	307	315	207.9	207.9
10	940923	TK	1F1F5C6C7A	N	-	270	211	207.9	207.9
11	940924	TK	1F1F792029	N	-	259	167	214.0	214.0
12	940928	TK	1F2044017C	N	-	273	198	234.2	234.2

^ Gear Types

GP = 100'x6'x1½" gill net

TK = 75'x5'x1"x12" trammel net

TN = 50'x6'x1½"x12" trammel net

Table 6. Fluctuations in river stage measured in Lower Grand Canyon and Lake Mead Inflow.

SAMPLE SITE (River Mile)	OBSERVATION PERIOD DATE (time)	MAX. STAGE CHANGE (cm)
Cove Canyon (RM 174.3)	940919 (2000) - 940920 (1330)	30
Hells Hollow (RM 182.4)	940920 (1600) - 940922 (1008)	45
Granite Park (RM 208.9)	940922 (1830) - 940924 (0900)	27
214 Mile Camp (RM 214.0)	940924 (1315) - 940925 (0745)	28
Travert. Falls (RM 230.4)	940926 (0600) - 940927 (1110)	32
Bridge Canyon (RM 235.0)	940927 (1615) - 940928 (1012)	48
Spencer Canyon (RM 246.0)	940929 (1315) - 941002 (1030)	59
Emery Falls (RM 273.5)	941005 (1803) - 941006 (1202)	14